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COAL AGE

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With Which is Consolidated The Colliery Engineer

DEVOTED TO THE OPERATING, TECHNICAL
AND BUSINESS PROBLEMS OF THE
COAL-MINING INDUSTRY

ISSUED WEEKLY

VOLUME XXV

January 1 to June 30, 1924

McGRAW-HILL COMPANY, INC.
10th AVE. AT 36th ST.
NEW YORK

COAL AGE

With Which is Consolidated
The Colliery Engineer

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January 1 to June 30, 1924

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COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER, *Editor*

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Number 1

Sane Thinking on Transportation

CONSIDER for a moment the significance of the fact that the railroads have many friends. But a few years ago the most maligned industry, today befriended by all save La Follette and his radical following. What has brought about the change and why do we find the United States Chamber of Commerce coming to the rescue of the railroads at this critical juncture? Because the business men of this country have finally learned that it is fatal to make an important industry the plaything of politics. There was a time when the public was exploited by railroad financiers. That day is past and the carriers are paying for their past follies with surrender of their freedom to regulation.

But even regulated, they have rights and the shippers of the country have rights, of which there should be no surrender to politics. Hence the National Chamber is making the people think of transportation sanely. It has had a careful study made of the whole subject and will have a huge conference on transportation in Washington next week—not to solve the questions but to make people see the problems in other than the refulgent light of Congress' halls..

Why Not Telephone?

PERHAPS there is a reason why we do not have active "Coal Exchanges" in this country, such as are described by Paul Wooton in his article elsewhere in this issue. There are coal exchanges in a number of our cities, as Cincinnati, but they are not active buying and selling organizations, but rather more often social. The nearest approach to a coal exchange as found in England is that conducted under the amiable direction of Herman M. Griggs at Cleveland—the Lake Erie Ore & Coal Exchange, where during the season of navigation coal, ore and ship chartering are freely traded at the noon hour in the halls, offices and dining room. Buyers and sellers get together and all that is lacking to make the picture a duplicate of the daily gathering Mr. Wooton describes at Newcastle-on-Tyne is a statistical record of the business done or a blackboard on which to post sales.

Now, coal is bought and sold in this country in greater volume than in Great Britain. At Chicago, Cincinnati, Pittsburgh and perhaps other centers doubtless more tonnage of coal is traded in than on the largest British exchange, but here without the open marketplace. How is it done and why has the exchange never come into vogue? Certainly not because of legal inhibitions, for we have exchanges in other basic commodities, as sugar, cotton and wheat. Some reason doubtless exists in the natural disinclination of the coal trade to do anything different or new. But the main reasons for sticking to the present system of trading in coal are the efficiency of our telephone and the large bulk of contract business done.

The modern private telephone exchange is for a coal

company as the coal exchange is to the Englishman whose telephones are nowhere nearly as quick as ours. The best equipped companies have young men for the leg work of calling on the trade, but the office telephone is the mainstay of business.

It might be added that the only buyers that might be expected to attend a trading exchange in this country would be other coal traders; consumers are so accustomed to being besieged by salesmen in person, over the phone and by mail that they would have slight interest in the initiation of such a market place.

It is obvious that the coal trade would be much better off were it to have some reliable, up-to-the-minute record of sales and prices other than that afforded by gossip. The problem of the business papers reporting the market would be simplified thereby, it is true, but that can hardly be advanced as an argument for a revolution in the free and easy business practice of our coal traders.

"The First Robin" Is The Same Robin

WITH such a caption the Central Pennsylvania Coal Producers Association in a recent bulletin discusses the outlook as respects labor and wages. The statement which is carried in full elsewhere in this issue, notes that whereas in former times, discussion of wage agreements began with joint conferences of miners and operators, now it starts by conferences at the White House, where John Lewis and Secretary of Labor Davis call on the President, and by "dire predictions of strikes" emanating from the non-union operators. It is further noted that the union coal operators have not been consulted as to their necessities.

Then follows the advice to the United Mine Workers that they should understand that unless they help to establish conditions in the union fields permitting their employers to meet the competition of non-union operation, they will suffer lack of work even as the mines in which they work will suffer lack of market. It is prophesied that the union fields will become the "uneconomical" units of the soft-coal industry, doomed to go. The present competition from non-union areas adjacent to Central Pennsylvania is stressed and reductions in wage below the present 25 to 35 per cent cuts are prophesied as soon as the "union coal operators have been safely signed, sealed and delivered by another agreement." Criticism of this opinion is invited.

Now there is no gainsaying the fact that if and when the union fields renew their present scale, then will it be in order for the non-union fields to put general wage cuts into effect. So far they have held their ranks remarkably well, but the leaders of the South are finding it increasingly difficult to maintain that position. The protestations of union operators that they have concrete evidence of extensive competition from non-union coal at lowered cost indicates that the good resolutions of non-union operators are already dissolving.

The basic plea made by Central Pennsylvania oper-

ators is that their union miners give heed to the economics of the situation, face the fact of non-union wage reductions in effect and in prospect, and consent to meet those cuts by a reduction in labor costs of producing coal in that field. This has been put forward in the face of resolutions from the union locals demanding the 30-hour week and a 20-per cent increase in wages.

The statement of the case, therefore as far as Central Pennsylvania is concerned, is not new; it is 1922 over again. It will be remembered that John Lewis then answered that he did not propose to enter a competition with the non-union fields in wage cutting, that in such a contest the union areas would always be a lap behind and hopelessly outclassed. He therefore in 1922 elected to stand pat and the record of his success is clear. There is nothing to indicate that he has changed his policy or that he would be less successful in 1924.

The loudest talking is being done by those operators who, even though they may not want to have a strike, require that there be one, realizing that it will save them financially and by those in the United Mine Workers who are opposed to the Lewis *régime*. Central Pennsylvania is sore pressed, will be even more heavily pressed with a continuation of present conditions and knows not where to turn for relief, save to appeal to the men to be reasonable, face the facts and consent to join with the operators, their partners in business in meeting the situation.

It is then not difficult to agree with the general tenor of Central Pennsylvania's statement of the case, but it must be asked in return, what it proposes to do in the event that the union will not amicably consent to wages being so reduced as to meet non-union competition. Lewis is strong enough, it is believed, to get from his union a renewal of present wage scales but who has any idea that, no matter how he personally feels, he is, or will be, able to get the union to agree to a reduction? Hence how can there be thought of reduction without thought of a trial of strength?

We have no criticism of Central Pennsylvania's statement of opinion, but we do ponder what the answer may be.

Protecting the Buyer

ALBERTA has put into effect a real coal act. Even before Pinchot began dabbling in coal regulation the Legislature of Alberta passed (April 21, 1923) a Coal Sales Act that in September was made effective in all its provisions. Among other things ordered in this law are the branding of all coal by registered name, the requirement that operators and dealers display the name of the coal, its origin by mine, the district, size, grade and quality, when shipped and destination. Inspection is authorized at any time or place by properly designated officials.

From this it may be gathered that the purpose of the act is not to regulate prices, direct distribution, punish profiteers, prohibit resales, require publication of cost, prices, wages, profits and what not—in other words not a so-called fact finding measure. Rather the purpose is to protect the buyer by making it possible for him to know whence came his coal. That seems to be something heretofore overlooked by the legislation drafters in this country, and we commend it to their attention. A few more provisions to the proposals already formed may not break the camel's back.

There is another provision in the Alberta act that is sensible—that it is effective only until May 1, 1924. The lawmakers may have conceded that they were experimenting and agreed to make the sentence short for the coal man.

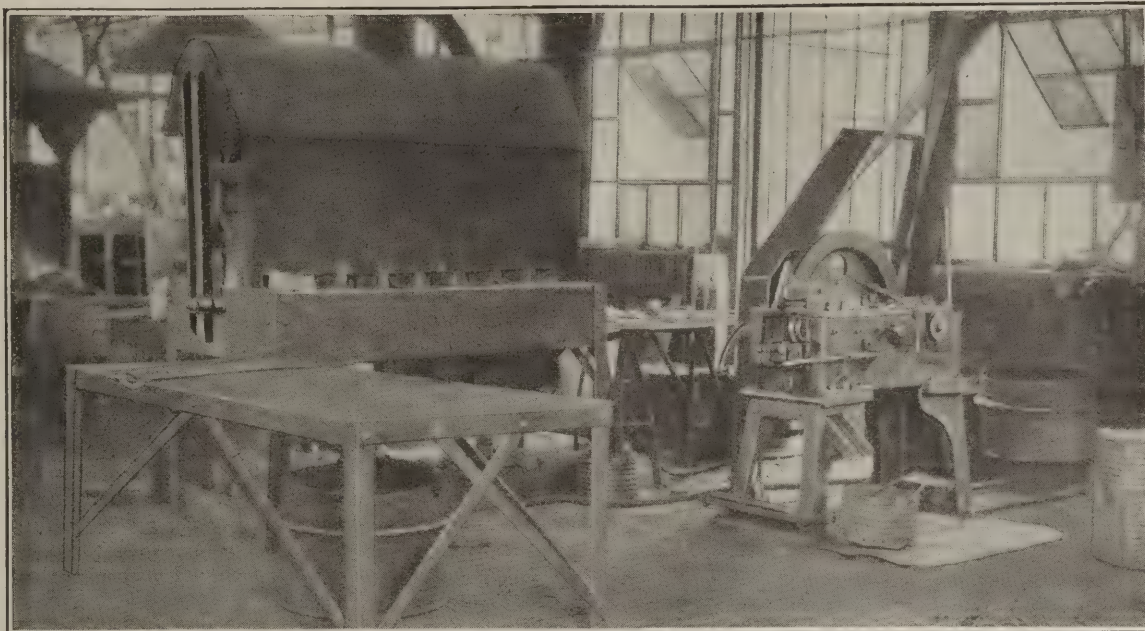
Are You Watching for Crop Fires?

AT ALL times the mines are subject to the menace of coal crop fires. In the summer forest and clearing fires are apt to ignite the coal through crop holes, the embers from the fire often falling through crevices and large openings in the roof and coming in contact with the coal. In other cases fires in slate piles and coal storages are likely to be communicated to an underlying or neighboring seam. Even the most harmless of slate piles are in the bituminous regions likely to burn, for all the slates in the coal measures are, in a degree, oil shales. That they are free of actual coal is no assurance that they will not ignite and burn into what is now known as "red dog." Ashes from boiler houses and from blacksmith shops also are a possible menace. The fact that they are not located near the particular seam being worked affords no security if they are near another seam, for a fire well started is not necessarily confinable to a single bed and a fire in a lower seam may make mining in an upper one impossible.

Managers of mining properties will do well to keep a watch on adjacent lands because fires started on these properties may extend to their own and the parties owning these lands may be little concerned as to the possible firing of the coal and in most cases may be too poor to make an adequate attempt to extinguish a fire when once started. Fires have been initiated, as Henry Phythyon has shown, by the burning of garbage. Possibly the persons starting them had an expectation that exposed coal either in the solid or thrown out of the hole would aid in sustaining the heat of material naturally disinclined to burn. They little thought that the small fire they started might devastate many acres.

The Bitner fire, that of the Youghiogeny & Ohio Coal Co. with that in the residential portions of Pittsburgh may serve to remind the public of the difficulty experienced in extinguishing such fires. Many shallow fires, especially in the anthracite regions, have cost millions of dollars. It is only necessary to refer to that on Summit Hill and to one which before it is extinguished may be equally costly—the Red Ash fire near Wilkes-Barre. One is likely to look upon shallow mine fires with less interest than those in the heart of a mine but they are apt to be far more expensive before they are quenched, if such extinguishment is ever ultimately achieved, as is to be greatly doubted.

The report of James Archibald, mining engineer and agent of the Girard Estate, mentions three fires in mine breaches caused by the ignition of rubbish, two at Kehley's Run Colliery and one at Packer No. 4 Colliery. Fortunately they were extinguished promptly. An ash-bank fire also occurred in the same year, 1922, at the William Penn mine. Discovered in August of that year it is said to be under control. The mention of these fires in the annual report of the Girard Estate is evidence of the importance that this estate lays on this possible form of destruction. Extinguishment of all crop fires is an essential part of any company's conservation program and one not to be dismissed with indifference, even if outside its immediate holdings.



*Equipment for Forging and Tempering Cutter Bits**

Correct Forging and Tempering Methods Double The Life of Undercutting-Machine Bits

Each Crew Carries Its Own Bits, Receiving and Delivering Them Through a Checking Station—How Cost Records Are Kept—Three Men in Turn Forge, Grind and Temper Each Bit

BY ALPHONSE F. BROSKY
Assistant Editor, *Coal Age*, Pittsburgh, Pa.

DISSATISFACTION caused by soft and brittle cutting-machine bits disgusts machine men and prevents them from cutting the scheduled yardage, thus upsetting the loading and haulage schedules of the mine. At the Lynch operation of the United States Coal & Coke Co. 1,800 cutter bits are given a correct shape, a sharp point and a correct temper every working day and only three men are employed in this service. Since the tempering has been made painstakingly and systematically the work done by each bit has been doubled. But before coming to that let me explain how the crews get their bits promptly and in accord with their needs, for at many mines that we know bits often go astray or arrive in inadequate numbers, and in consequence places are not cut. When men cut at night a little uncertainty or discouragement sends them home early to their beds.

Adjoining the tool room at the entrance to the machine shop at the Lynch mines is a station in which a record is kept of the cutter bits to be sharpened and issued each day. This system has been introduced for the purpose of preventing the machine runners from disturbing the bit sharpeners. After cutting their places the machine crews bring out their dull bits in regulation army canvas knapsacks and on their way to the bathhouse stop at the bit station to check them

in. The attendant, who also has duties in the tool room, places a check on the bag and gives a corresponding one to the miner.

This system has several advantages over the customary manner of handling bits. Foremost among these is the assurance given to each crew that it will have sharp bits, as one member of each crew carries to his cutting machine a sufficient number of bits to last one shift. Furthermore, bits are thus handled by but one man from the check room to the mine face, and he is the man most interested in their safe arrival. Moreover, with this arrangement the services of a bit boy are not needed. In some mines locomotive crews and mule drivers have to pass the bits from hand to hand. In the Lynch mines they are relieved of that responsibility, and hence are not delayed in the performance of their regular duties. Haulage is too vital a responsibility to be held up by giving motormen and drivers the duty of delivering bits to working places.

The man who sharpens the bits notes the check number on each knapsack and counts the number of bits it contains, entering the figures in a book provided for that purpose. He also records later the number of sharp bits placed in each bag. The form sheet used for this purpose is illustrated in Fig. 1. Sharpened bits are returned to the bit station ready for distribution and in each bag are placed sharp bits equivalent to the number of dull bits it contained when the crew to which it belongs brought it to the bit station. Where

*A forging machine, a good furnace, two steel tables, two sand boxes, two oil baths, three men and a well scheduled process provide each day for the machine crews 1,800 cutter bits that are really sharp and honestly tempered.

DATE _____					DATE _____				
CHECK NUMBER	NUMBER DULL BITS TURNED IN	NUMBER SHARP BITS ISSUED	MINE AND SECTION	NAME	DATE	NUMBER OF BITS	NUMBER OF SETS	PLACES CUT	TOTAL LABOR COST

FIG. 1

DATE	NUMBER OF BITS	NUMBER OF SETS	PLACES CUT	TOTAL LABOR COST	AVERAGE COST PER BIT

FIG. 2

DAILY RECORD OF DISTRIBUTION AND MONTHLY RECORD OF COST OF REPOINTING CUTTER BITS

Each day machine crews are provided with one sharp cutter bit for every dull one they turn in. Tally is kept of the transaction in the form shown in Fig. 1. Daily cost of sharpening cutter bits for each mine is kept form depicted in Fig. 2.

no records are kept the crews on cutting machines frequently are discontented, for at times they do not receive the number of bits they need for their work. If a crew turns in sixty dull bits it expects that number to be returned. When a machine runner or his helper calls in the evening for his bits the attendant in the station fills in the two right-hand columns of the record form—the name of the machine man and the section of the mine in which he works.

Cost figures on the sharpening of bits are kept by the man in charge of the bit station. By a knowledge of the time spent by the men engaged in sharpening he is enabled to ascertain a labor charge for each bit and to allocate the total cost of labor to each mine. This account he keeps in a record book in the form shown in Fig. 2. From each crew he gets information as to the number of places cut during each shift. It is a simple matter to figure the cost and to determine the average number of places cut for each set of bits.

The labor cost of sharpening is kept separate from that of making new bits. These latter are formed from bars of special tool steel, cut to length in a shearing

machine. The labor cost of making new bits is charged to supplies, and the account is handed to the supply clerk. As the machine runners must get new bits from the supply room, an accurate record of the cost of new bits (material plus labor) may be kept. A supply of 400 to 500 new bits is held for current replacements.

Three men are employed in the processes of shaping old and new bits. One man heats and forges them in a bit-sharpening machine, another grinds the upper surface of each and a third does the tempering. By dividing labor in this manner, better results are obtained, each man becoming more skilled in his work than he would be were he to perform all three processes. In either case the number of bits that must be sharpened each day at the Lynch mines requires the services of three men.

Heat for forging and tempering is derived from a single coal furnace, detailed in Fig. 3, and shown also in the headpiece of this article. Air draft can be furnished to the furnace either by an individual blower or else by a feed line from a central blower which supplies air to the blacksmith forges. The individual unit is preferable, of course. In the front of the furnace are eight ovens each of which is big enough to accommodate eight bits.

Four holes are used for heating the bits that have to be forged and the remaining four holes are utilized for tempering purposes. Wide-mouthed prongs serve to handle a set of eight bits at one time. In the process of forging, the bits are withdrawn from the fire one at a time and in regular rotation. The air blast is regulated to maintain in the furnace a temperature high enough to give the correct heat to each bit in the time required to complete the forging of 32 bits (eight bits in each of four ovens). This constitutes a cycle. A uniform temperature in the furnace imparts the same

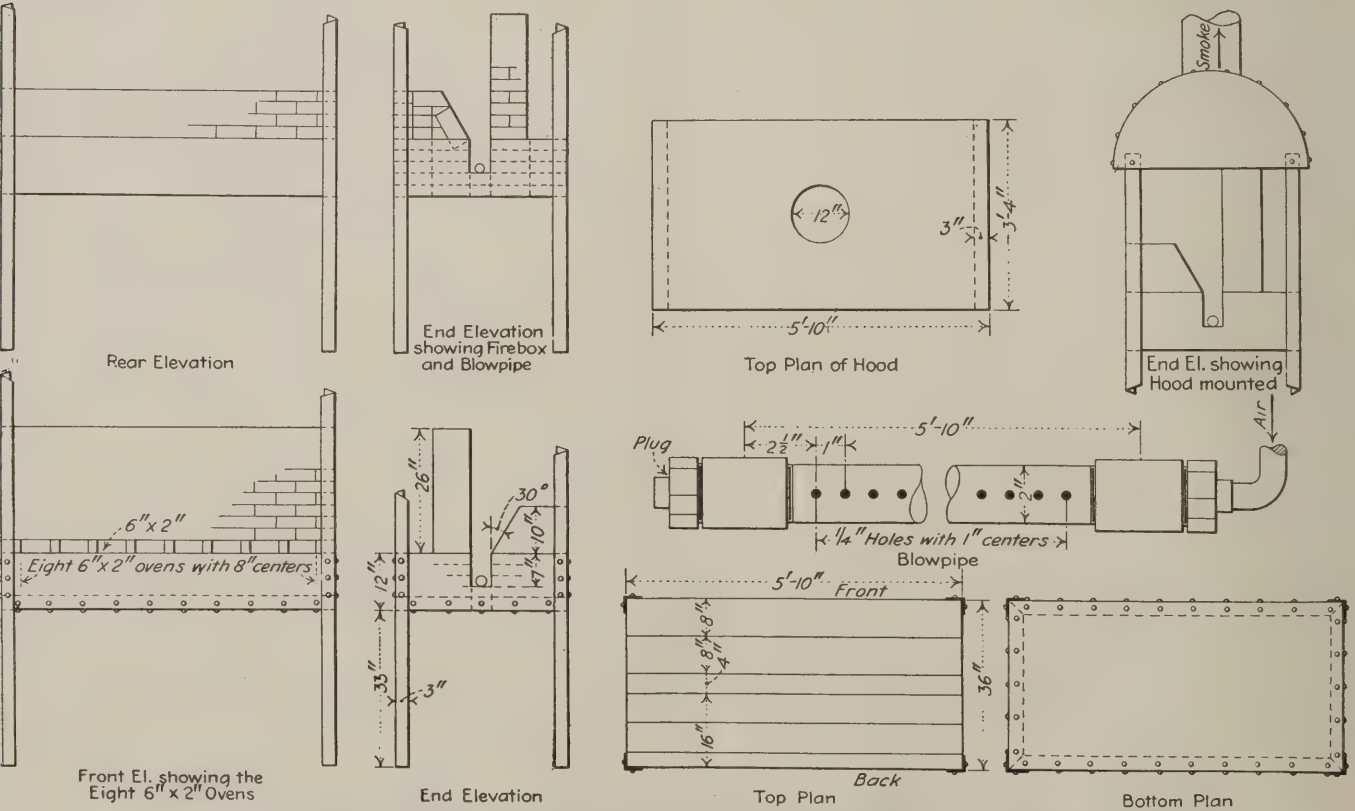


FIG. 3—HEATING FURNACE FOR FORGING AND TEMPERING CUTTER BITS

This coal furnace closely resembles a gas furnace in that its design is such as to cause the flames to shoot out of the fire openings where the cutter bits lie. The latter do not come in contact with the coal.

heat to bits that are tempered as is given to those which are forged. Satisfactory results are obtained by this arrangement.

Where the degree of hardness required for the cutting of a certain coal is such as can be obtained only by heating the steel to a temperature higher or lower than that required for forging, I would suggest that a firewall be built to divide the furnace into two compartments. Then each compartment can be fired separately, and the draft in each regulated by an individual valve in each of the arms of a Y-connection from the main line.

After the bits are forged, they are cooled, and then ground on their upper surfaces so as to remove the scale of oxide which forms on the steel in the forging operation, thus providing a fresh metallic surface on which the man who does the tempering can better observe the manifestations of color when the heat is being drawn out of the steel. The following is a description of the heat-treating process:

Eight bits are stacked side by side to form a set, and staggered so that the tips of four of them alternately project about $\frac{1}{4}$ in. in advance of the four remaining bits. Four sets are placed in the four ovens provided for the purpose. One set of eight bits is removed from the fire upon being heated to the correct temperature. The eight bits as a unit are quenched in an oil bath for a sufficient length of time to reduce the heat to the desired temperature.

GETTING THE CORRECT TEMPERING HEAT

This time is gaged by observing the color of the oxide forming on the bit. The set of bits, grasped in a pair of prongs, rests on a metal-covered table during the observation period. The correct degree of tempering is indicated by the appearance of a filament of blue oxide which forms progressively toward the tip of the bit in the zone of tempering. The staggering of each set makes it easy to remove one or more bits without disturbing the others if it is manifest that they have not received proper treatment.

Uniformity of hardness in the zone of tempering is obtained by burying the tips of the treated bits in sand. An equalization of temperature is obtained in this manner without annealing them to a point where they are soft. Too great a degree of hardness, caused by too rapid cooling, is manifested by the appearance of a straw-colored oxide in the tempering zone.

Bits rejected because they have been overtempered are allowed to cool and later treated again. Those that are undertempered are further treated in the oil bath before they are buried in sand. An average of about one bit for every set treated is rejected for further treatment. After being cooled, all are removed from the sand box and inspected. Any that appear to have been overtempered or undertempered are grasped individually in a pair of blacksmith tongs having a small mouth, and the tips are struck against steel. When undertempered the tip will show its degree of malleability by bending over; when overtempered the tip of the bit will show that it is too hard by breaking off.

Three men will repoint about 1,800 dull bits in one shift at an average cost of 1c. per bit. The cost of pointing a piece of bar steel to form a new bit is $1\frac{1}{2}$ c. Since the institution of the tempering process at the Lynch mines a set of cutter bits on a shortwall cutting machine will cut, for each sharpening, twice as many places as before.

How to Minimize Breakdowns Of Electrical Machinery

Importance of Cleanliness and Regular Lubrication—
Bearings Should Be Kept Cool and Renewed
Promptly—Replace Fuses Carefully

By C. H. S. TUPHOLME

London, England

THOUGH breakdown of electrical machinery often can be traced to some cause quite outside the operator's or engineer's control, there are many instances where a little more care or a little more skill on the part of an attendant would have averted a breakdown. It is therefore necessary that every engineer in charge of electrical equipment see that the men under his supervision are thoroughly well trained in how to handle and care for the equipment.

In the first place, cleanliness is most important. All electrical machines and apparatus should be kept scrupulously clean, dry, and free from oil or dust, particularly copper and carbon dust, which are the most frequent causes of breakdowns of electrical plant. Oil rapidly destroys many of the materials commonly used for insulating purposes, while films of copper or carbon dust form conductive surfaces capable of short-circuiting the parts between or upon which they lie.

The parts of generators and motors requiring most attention are the insulating washers and bushings of the brush rigging, the inside surfaces of hollow commutators, the spaces between the end connectors of armatures and between the commutators and the armature cores inside the end connectors, and the insulating rings at the bearing end of the commutators.

PROTECT INSULATION FROM DETERIORATION

A fairly stiff brush and a pair of bellows, or better still, a blast of compressed air, will be found useful for removing dry dust and dirt. If oil is mixed with the dirt, a little gasoline may be used, and the parts thus cleaned should afterward receive a coat or two of good insulating varnish. Generators and motors should be dismantled at least once a year and thoroughly overhauled and cleaned; the windings should be revarnished.

When filling the oil wells in the bearings, great care should be taken to prevent any overflow. Every oil well should have an overflow pipe and drain tap, and every enclosed machine should have a drain pipe at the lowest point of the casing. A good quality light engine oil should be used, and it should be renewed or filtered from time to time. When renewing the oil, clean out the bearings and oil wells before putting in fresh oil. Always see that the oiling rings revolve freely after the machine has been started.

CARE OF BALL AND ROLLER BEARINGS

If the machine is fitted with ball bearings a good quality neutral grease is the best lubricant. Under ordinary conditions, with the ball races filled with a suitable grease, the bearings will run for several months without further attention, unless they are exposed to excessive dirt or dust. Do not put too much oil into the oil wells nor force too much grease through the ball races. Oil or grease will get onto the insulated parts of the machines, and deterioration and damage eventually will result. The proper amount of oil or grease put on a bearing will last a considerable time, and it is

unnecessary to be continually adding fresh lubricant when ring oilers or ball bearings are used.

Bearings should be renewed as soon as they show appreciable wear. This is especially necessary in the case of alternating-current motors, where the clearance between the stationary and revolving parts is very small. Comparatively little wear of the bearings will cause these parts to come into contact and cause serious damage. In the case of a hot bearing, fill up the oil well. If possible, keep the machine running slowly until the bearing has cooled. The heating may be due to lack of oil, a tight belt, dirt in the oil, or a bent shaft. All contacts and screw connections on machines, backs and fronts of switchboards, switches, fuse blocks, and other electrical equipment should be periodically tightened and kept perfectly clean, as heating at loose or dirty contacts is a frequent cause of fire and variations in motor speed and supply voltage. This, however, should be done only when the power is cut off.

When the intersegment micas are undercut the grooves thus formed should be kept free of dirt and dust. Carborundum cloth or sand paper may be used for smoothing the surfaces of commutators and slip rings if these should become roughened by sparking. If the commutators or slip rings are out of true, or if bad flats have formed, they must be turned true.

The following are the principal causes of sparking:

Direct-Current Machines

- (a) Overloading.
- (b) The brushes may not be set at the best position for sparkless commutation. In the case of machines having interpoles, a very small difference of position may cause considerable sparking, and in addition has a marked effect on the voltage regulation of a generator and the speed of a motor.
- (c) The various sets of brushes may not be equidistant from one another.
- (d) The brushes may not be of the right quality.
- (e) The brushes may not be free in the holders.
- (f) The brushes may require fitting to the commutator.
- (g) The brushes may not have sufficient pressure on the commutator.
- (h) The commutator may be rough, dirty, oily or out of true.
- (i) Vibration of machine, owing to faulty foundations or drive.
- (j) There may be a break or open circuit on one of the armature coils. This causes bad sparking and the burning away of the mica insulation between those commutator bars to which the faulty coil is connected.
- (k) One or more of the armature coils may be short-circuited. This causes overheating and burning of the insulating material of that particular coil.
- (l) The intersegment micas may be too hard, and therefore projecting beyond the surface of the copper.

Alternating-Current Machines

- (a) The brushes may not be of the right quality.
- (b) The brushes may not be free in the holders.
- (c) The brushes may require fitting to the slip rings.
- (d) The brushes may not have sufficient pressure on the slip rings.
- (e) The slip rings may be rough, dirty, oily or out of true.
- (f) There may be excessive vibration.

The fuse is the safety valve of an electric circuit. If a fuse blows after having been properly adjusted, the supply should be shut off, the contact surfaces and binding screws or the fuse blocks should be cleaned, and a new fuse, of the same size as the old, put in. Should this blow there probably is a ground or short-circuit

on the system. On no account should a fuse that is too large to give proper protection be substituted.

In replacing a fuse care is necessary to neither stretch nor otherwise injure the wire when attaching it to the terminals, and also to see that good and clean contact is made between the wire and the terminals. If this is not done local heating will take place, in which case the fuse will melt at a lower temperature than it would otherwise.

Copper strips or wires make very reliable fuses, but for very small currents—say below 14 amp.—tin composition wires are more suitable owing to their being more convenient to handle. For large currents—say over 100 amp.—it probably is better to use some form of mechanical-overload circuit breaker.

As a general rule every circuit should be protected by a fuse or other circuit breaker, which will open the circuit with a current not exceeding double the normal full load. In many cases it is not advisable to allow so great a departure from normal working conditions, while in exceptional cases a greater margin may be permitted.

In the case of alternating-current motors of the squirrel-cage type, which may take from three to six times the full load current at starting, the connections should provide for the normal fuse being temporarily shunted or out of circuit during the period of starting. The type and form of the fuse holder has considerable influence on the efficiency and reliability of the fuse as a circuit breaker.

KEPT TOOLS AWAY FROM DYNAMOS

As many breakdowns have been caused by foreign bodies falling or being drawn against revolving armatures by the magnetism of the field, or otherwise, attendants should be cautioned not to use the tops of machines as tables, nor to have steel or iron tools, or oil cans near electrical machines. Copper oil cans are preferable to those of iron or tinplate. The tops of switches, starters, controllers, and resistance frames or boxes also should be kept clean and not be used for placing loose articles.

In starting direct-current motors care should be taken to move the switch arm slowly across the contacts of the starting resistance, in order to prevent the armature receiving an excessive current while getting up its speed. The contact studs of the starting switch should be kept clean and smooth. Deterioration, from corrosion, of the resistance coils in connection with a starting switch when mounted in a damp location may be prevented by the application of one or two coats of a good moisture-resisting enamel. Immediately after starting up a generator or motor the attendant should see that all bearings are being properly lubricated and that the oiling rings are revolving properly.

Before switching current onto any motor, care should be taken to see that the handle of the starter is in the "off" position. In the case of a direct-current motor, if a shunt regulator is used all resistance should be cut off at starting, while in the case of a direct-current generator with a shunt regulator connected, all the resistance should be in circuit at starting.

After a generator or motor has been installed and connected up, a diagram, plainly showing the actual connections, should be made and hung up near the machine. Such a diagram will often save much time in the event of any trouble with the machine or starting equipment.

John C. McNeil Describes

More Short-Line Ways of Handling Coal Sales

Accounting Is Not Writing a History of Past Transactions
So Much as Recording the Immediate Status of Accounts
In Order to Afford a Basis for Decisions as to Credits

ALTHOUGH modern methods of mining have superseded the old way of the pick miner, and the "hay-burner" has given way to the electric mule in haulage, archaic methods still seem to prevail in the office.

The principal object of any accounting system is to serve the management as a guide by which to direct future operations, and if the system is a history, rather than an up-to-date statement of facts, it is useless for any such purpose. Pen-kept records cannot be kept up to date like machine methods, and the time required at the end of the month to prepare the statements for customers, make up the payrolls, pay off the bills and render the necessary statements to the management and the owners is so long that before the statements are out, another month is upon the office force.

The underlying principles of machine accounting are the same as those in other methods, with the addition of controls and proofs not obtainable under the old pen methods of accounting. Ledgers are kept in balance and up to date, so that it is possible to take off a trial balance of the accounts or to render a statement which is in exact balance with the ledgers at any time.

EVERY RE-ENTRY AN OPPORTUNITY FOR MISTAKE

Take, for example, the pen system of handling accounts receivable. After a car of coal is loaded at the mines a bill of lading must be made, and after the coal has been weighed the shipment must be entered in the shipping record. An invoice is then made up, either from the bill of lading or from the shipping record. If the invoice is made from the bill of lading it is used as the posting medium for the shipping book or if the invoice is made after the shipping book is written up, this book becomes the posting medium. After the invoice is mailed, entries are made in the accounts receivable ledger, using either the invoice or the shipping book as the posting medium.

At the end of the day, or period of operations, sometime at the end of the month, the shipping book has to be totaled and balanced, the accounts-receivable ledger accounts totaled and balanced, statements taken therefrom covering each account, added and balanced with the ledger. In order to keep the end-of-the-month peak load down to the limits of human endurance, the usual custom around coal-mine offices is for the bookkeeper or his assistant to keep posting statements from time to time during the month so as to have them ready at the end of the month for mailing to customers.

As it is of the utmost importance to get statements of accounts receivable out on time it is almost the invariable custom to mail these statements before the general ledgers are balanced. Should the accounts-receivable ledger be out of balance with its control at the end of the month nothing can be done other than

to adjust the control to agree with the statements mailed to customers.

By the short-line methods hereinafter described, the work of the coal-mine accounting office is shortened, the invoice being made, the ledger being posted, the customer's statement being prepared and the sales or shipping record being made at a single operation. At the same time by using machine accounting the balance due from each customer is calculated down to date, showing these balances on his ledger account and statement as well. So at the end of the month, there is nothing to do but mail the statement to the customer. This can be done just as soon as the invoices for the last day of the month are made out.

EVERY MONTH BEGINS WITH OVERTIME SHIFTS

Accounts payable at coal mines are either handled through the voucher system, or through the use of an accounts-payable ledger, and sometimes through a combination of the two. Under the former system accounts-payable invoices are accumulated at the end of the month, vouchers drawn for them and then entry is made in the voucher register distributing accounts.

Under the latter, invoices are entered in invoice registers and postings made to the accounts-payable ledgers. Statements are then taken off for remittance advices, entries made in the cash book of checks drawn and then the cash entries are posted to the accounts-payable ledger. Under either plan of operation the end of the month brings long working hours to the office force, working under strain, and the accounts-payable liability is not known until all of these entries have been made. In the short-line method described herein these accounts are posted, voucher or remittance advice made and distribution is made at the same time, with an additional knowledge at the end of each day of the exact amount of liability.

The archaic method is a costly one and aside from the delays and peak loads, expense is an item to be considered.

As previously explained, the chief advantage of machine accounting is having the ledgers always in balance and the general ledger entries up to date. The advantages of machine accounting are based upon the same principles that have enabled undercutting machines and haulage motors to effect savings in time and labor. This system was designed with the idea of saving time and labor as well as having accurate accounts, legibly written and the maximum of work done at one operation.

Accounts Receivable—The system of dealing with accounts receivable has already been described in detail in my article entitled "Machine Bookkeeping Speeds Accounts at the Mine," which appeared in *Coal Age*, Aug. 30, pp. 319-322. Reference therefore is made to that article. The forms given on page 321 as of the General Coal Co. do not cover errors arising from charging the wrong party, over- or under-charging, allowances for defective preparation, prepayments of

This article by John C. McNeil precedes one on handling of expense accounts, payrolls and the general ledger. It should be read; in connection with the article in *Coal Age* of Aug. 30, 1923, pp. 319-322.

FORM A-9											
CENTRAL COAL COMPANY											
DAILY JOURNAL OF CREDITS TO ACCOUNTS RECEIVABLE											
FOR											
OLD BALANCE	DATE	NO	DESCRIPTION	CR ACCOUNTS RECEIVABLE	BALANCE	ACCOUNT CREDITED	REPEAT OLD BALANCE	DEBIT BANK	DR SALES ALLOWANCE	SUNDY DEBITS NAME	DR NOTES RECEIVABLE
883 50	6/5/23		CHECK NO 87450 OF JUNE 5TH 1923	177 50	846 00	R C TRAY COAL COMPANY	883 50	177 50			
846 00	6/5/23	85	ALLOWANCE ON LAM 7525 50 TONS AT 100	50 00	596 00	R C TRAY COAL COMPANY	846 00		50 00		
596 00	6/5/23	86	PREPAYMENT ALLOWANCE ON THREE CARS	80 00	516 00	SOUTHERN COAL COMPANY	596 00				
516 00	6/5/23		TRUCK ACCEPTANCE NO 052 NO 7822	846 55	0 00	HARVEY JELLYCOO COAL CO	516 00				
0 00				1121 15	1584 25	TOTALS PROOF	2795 40	177 50	50 00	30 00	846 55
<i>Old Balance less Credits agrees with new Balance</i>						<i>Distribution agrees with Credit to Accounts Receivable</i>					
OLD BALANCE	DATE	NO	DETAILS	DR ACCTS REC	BALANCE	ACCOUNT CHARGED	REPEAT OLD BALANCE	PREPAID FREIGHT	MISC CREDITS	CREDIT ACCT	
883 50	6/5/23	110	PREPAY ON L & R 86230 40 TONS AT 1 50	50 00	923 50	R C TRAY COAL CO	883 50	80 00			
923 50	6/5/23	113	PREPAY ON SMO 23407 40 TONS AT 1 00	40 00	1083 50	DILLIE DEMOND COAL CO	923 50	40 00			
1083 50	6/5/23	118	PREPAYMENT IN RATE OF LAM 7525 50 TONS AT 25	7 50	1076 00	CHESTER COAL CO	1083 50		7 50	MISC EARNINGS	
0 00				107 50	4189 47	TOTALS PROOF	4081 97	100 00	7 50		
<i>Old Balance plus Debits Equal new Balance</i>						<i>Distribution agrees with Total Debits</i>					

FORM B-2											
CENTRAL COAL COMPANY											
CENTRAL CITY, KY.											
THE CENTRAL NATIONAL BANK OF LOUISVILLE, KY.											
WILL PAY TO THE ORDER OF:											
CHECK NUMBER	108545	BELKNAP ROW & MFG COMPANY	DISCOUNT 10 66	NET AMOUNT 522 34	DATE OF CHECK JUNE 15th 1923						
AUDITED:			CENTRAL COAL COMPANY			DOLLARS					
BY			CENTRAL COAL COMPANY			CENTRAL CITY, KY.					
DETACH THIS STATEMENT AND RETAIN FOR YOUR RECORDS											
OLD BALANCE	DATE OF INVOICE	MEMO	CREDITS	DEBITS	BALANCE	NAME OF VENDOR					
0 00	6/10/23	INV NO 6450	55 25								
	6/10/23	INV NO 6452	125 50								
	6/10/23	INV NO 6455	225 41								
508 25	6/11/23	INV NO 6457	185 90	55 25	508 25	BELKNAP ROW & MFG CO					
		CR MEMO 2241				BELKNAP ROW & MFG CO					

FORM B-4											
CENTRAL COAL COMPANY											
REGISTER OF CHECKS ISSUED ON ACCOUNTS PAYABLE FOR 192...											
DEBIT ACCTS PAYABLE	CHECK NO.	PAYEE & ADDRESS	CREDIT DISCOUNTS	CREDIT BANK	DATE OF CHECK	PROOF OF POSTING	REMARKS				
538 00	125545	BELKNAP ROW & MFG COMPANY	10 66	527 34	JUNE 15th 1923	538 00					
1028 40	125546	LOUISVILLE GROCERY COMPANY	10 28	1018 12	JUNE 15th 1923	1028 40					
1516 76	125547	DAYLESS BROTHERS & COMPANY	30 36	1486 40	JUNE 15th 1923	1516 76					
125 50	125548	E D MORTON & COMPANY		125 50	JUNE 15th 1923	125 50					
5207 66			51 28	5156 38		5207 66	TOTALS PROOF				

FORM A-6											
CENTRAL COAL COMPANY											
CENTRAL CITY, KY. 192...											
R C TRAY COAL COMPANY											
LOUISVILLE KY											
WE CREDIT YOU AS FOLLOWS:											
MAKE NECESSARY CONTRA ENTRY											
OLD BALANCE	DATE	NO	DETAIL OF ACCOUNT	AMOUNT							
923 50	6/5/23		LAM 7525 SHOULD BE CHARGED TO DILLIE FUEL CO	100 00							
823 50	6/5/23		LAM 7525 CHARGED TO R. C. TRAY & CO IN ERROR	100 00							
1447 10				1447 10							

FORM B-1															
CENTRAL COAL COMPANY															
JOURNAL OF ACCOUNTS PAYABLE CREDITS															
DATE															
OLD BALANCE	DATE OF INVOICE	MEMORANDUM	CR TO ACCOUNTS	BALANCE	NAME OF VENDOR	REPEAT OLD BALANCE	ADMINISTRATIVE AND GENERAL EXP	COAL MINING DEBITS	MERCHANTILE DEBITS	GENERAL LEDGER DEBITS					
								MINE NO 1	MINE NO 2	MINE NO 3	MINE NO 4	STORE A	STORE B	ACCOUNT NAME	AMOUNT
0 00	6/10/23	INV NO 6450	55 25												
	6/10/23	INV NO 6452	125 50												
	6/10/23	INV NO 6455	225 41												
646 40	6/10/23	INV NO 6457	185 90	508 25	BELKNAP ROW & MFG COMPANY	0 00	55 25	185 90	225 41	125 50		46 46	46 97	BOARDING HOUSE	128 51
768 32	6/10/23	INV NO 6459	95 48	741 92	LOUISVILLE GROCERY COMPANY	646 40									
1453 01	6/10/23	INV NO 6460	128 51	870 43	CANTER DIRT GOODS COMPANY	768 32									
			812 19	2745 29	TOTALS PROOF	1453 01		185 90	225 41	125 50		46 46	46 97		128 51

FORM B-3															
CENTRAL COAL COMPANY															
JOURNAL OF ACCOUNTS PAYABLE DEBITS															
DATE															
OLD BALANCE	DATE OF INVOICE	MEMORANDUM	DR TO ACCTS PAYABLE	BALANCE	NAME OF ACCOUNT CHARGED	REPEAT OLD BALANCE	CR ADMIN & GENERAL EXP	COAL MINING CREDITS	MERCHANTILE CREDITS	GENERAL LEDGER CR					
								MINE NO 1	MINE NO 2	MINE NO 3	MINE NO 4	STORE A	STORE B	NAME OF ACCOUNT	AMOUNT
508 25	6/11/23	CR MEMO 2241	55 25	563 50	BELKNAP ROW & MFG COMPANY	508 25	55 25								
1281 82	6/11/23	CR MEMO 1980	86 31	1368 81	AMERICAN SUPPLY COMPANY	1281 82									
1826 32	6/11/23	CR MEMO 1115	84 53	1453 34	DAYLESS BROS & COMPANY	1826 32		96 31				42 50	42 05		
3647 25	6/11/23	CR MEMO 2385	268 52	1724 82	E D MORTON & COMPANY	3647 25			151 76	151 76	1287 50				
6452 80	6/11/23	CR MEMO 1258	1257 50	5167 32	JEFFERSON MFG COMPANY	6452 80									
14450 15			1787 11	12860 04	TOTALS PROOF	14450 15		96 31	151 76	151 76	1287 50	42 50	42 05		

freight and so forth. For these reasons have been added Forms Nos. A-7, A-8 and A-9. For the forms Nos. A-1 to A-6 see the article in question.

Often coal is shipped to prepay stations, necessitating the prepayment of freight charges, which of course, are chargeable to the customer. A debit memorandum is made against the customer on Form A-5 with the proper explanation. This is at the same time posted on Forms A-2 and A-3, "Accounts Receivable Ledger," and the "Customer's Statement," and in addition is entered on the "Sundry Accounts Receivable Debit Sheet," Form A-8 as a proof of accuracy and for General Ledger charges. These debit memoranda should be entered at one run, as illustrated on the few postings shown on Form A-8. Credit distributions are entered on these sheets and after postings have been completed the items will balance as shown on the form illustrated.

CREDITS TO ACCOUNTS RECEIVABLE SHEET

Credits to Accounts Receivable are through cash payments made on accounts by customers, Notes or Trade Acceptances given and Credit Memoranda. For this reason one Credit Sheet, Form A-9, "Credits to Accounts Receivable," is used and on this sheet is posted the appropriate data, using as before, at the same time Forms A-2 and A-3, Accounts Receivable Ledger and the Customer's Statement. Allowances to customers should be made through the medium of Credit Memoranda, Form A-6, which should be used in connection with the account forms described, viz.: A-2, A-3 and A-9.

The cashier should prepare, for the operator, cash posting slips for all cash postings, note slips for notes and trades acceptances and other authorities should prepare the data for the allowances. Predetermined totals should be taken of these items, so as to prove the accuracy of the work after postings are made. Postings to the General Ledger from these sheets are made in the same manner as from the Sales Sheet.

Under this system it is next to impossible to post an entry to the wrong account. If an invoice is made against the Brown Coal Co. the operator must also have the Brown Coal Co.'s statement and Ledger Sheet. However, should such an event occur, we have provided for that by the use of Form A-7, "Journal of Accounts Receivable Inter-Account Transfers." The Customer's Statement and Accounts Receivable Ledger should be posted in connection with this form and the total debits will equal the total credits on this form, which after completion should be posted into the General Ledger.

It will be seen from this description that it is not possible to make an entry in what is usually known as the books of original entry without also entering the amount in the ledger and on the customer's statement at the same time. In other words, the ledger and statement become as much the book of original entry as the journal.

Balances of each ledger account are taken after the completion of each entry and by the keeping of a control account in the subsidiary ledger to which totals are posted after the completion of each Journal or Proof Sheet, the operator can ascertain at once the total balance due on each account and as well on all accounts. In addition to this, an adding machine run of these accounts will prove with the total balance as shown by the subsidiary control sheet. This subsidiary control sheet will likewise be in accord with the control account kept in the General Ledger.

A complete account with different kinds of entries is shown, both as to statement and ledger account—see Forms A-2 and A-3, as an illustration of how they are worked. Under this short line system, the customer's statement is ready for the mail at any time. At the end of the month, when statements are ready to be mailed out, new statement sheets are headed and the last balances shown are entered as an item brought forward to the new statement. A proof sheet is kept in the machine which will be used as a trial balance or statement of balances due by customers. The total of this statement will agree, of course, with the balances shown in the "dummy" and general ledger controls.

Accounts Payable.—The usual method of handling accounts payable is either through a voucher system, making the vouchers direct from the invoices at the end of the month, or through an accounts payable ledger, posting credits and charging checks or other items. Either system requires a vast volume of work and incurs the ill will of the office force through the peak load at the end of the month.

ACCOUNTS PAYABLE VOUCHER SYSTEM

It being customary with coal companies of any standing to settle their accounts monthly on a cash basis, taking whatever discounts are necessary, they are not interested in an accounts payable ledger, showing debits and credits to creditors, together with the attendant labor of debiting these accounts with cash payments, discounts, etc. The principal object to be attained under this method is to see that all payable invoices are accounted for, that the creditor receives credit for his invoices and that a remittance slip is given showing the invoices paid. Other than that an account is not necessary, nor is it wanted. We have provided, therefore, under our short-line method for an Accounts Payable Voucher system instead of a ledger.

Invoices when received from creditors should be entered in a memorandum book of some nature by the accounting department, showing the date, name of creditor, amount and to whom referred. It might be well to number these entries beginning at the first of each month or at the first of each year, as desired by the accounting official. After the invoices are approved by the department receiving the goods, they are sent back to the accounting department, checked off this list and arranged in alphabetical order. A predetermined total is taken of these invoices, as was described for the accounts receivable entries. After this total is taken and entered in the chief accounting officer's memorandum book, they are handed to the operator for posting.

Form B-1, Journal of Accounts Payable Credits, is placed in the machine and Form B-2, Accounts Payable Voucher (in duplicate) is used. On the voucher is entered the invoice number (ours), date, amount of credit and new balance. This is automatically entered on Form B-1 at one operation and the distribution to the various accounts effected at the same time. It will be observed from the sample form herewith that the total charges to the distribution accounts will equal the total credit to accounts payable.

The total of the old balance column, plus the new credits, will equal the balances shown in the new balance column. After the invoices are entered on this sheet they should be cancelled as entered or credited to accounts payable, together with the date, and the journal page number and then filed away alphabetically. The voucher and its duplicate should be kept in the current

file for audit purposes. Credit memoranda issued by creditors should be posted on Form B-3, Journal of Debits to Accounts Payable and the proofs of posting on this are the same as on B-1.

When the accounts are due for payment, the voucher should be taken out and the invoices lifted from the alphabetical suspense file for audit purposes. The audit can be made by checking each of the items shown on the remittance advice. Form B-4 should now be used, filling in the check. The amount of the last balance shown in the balance portion of the remittance advice should be repeated on the check portion on the line "Amount of last new balance," the number of the check written in, the name of payee, the amount of discount to be taken on the total remittance and the machine will automatically calculate the balance, which is the net amount of the check.

The date of issue should next be written in. This will automatically make the check register, showing the total debits to Accounts Payable, total credits to discounts on purchases and total credit to the bank. After this is done the voucher and duplicate should be separated and the invoices covered by the voucher should be firmly stapled to the duplicate voucher and filed in the paid file alphabetically. This file will then give the invoices covered by any particular payment to a creditor, the date and number of check issued thereon, the amount of discount taken and the net balance due. The payee will of course, keep the remittance slip for his files and after the checks are returned by the bank and reconciled, they should be filed in numerical order.

Subsidiary and General Ledger controls should be kept on these accounts and the total of the vouchers remaining in the open file will agree at all times with the control figures.

Pressing Water Out of Peat

WATER is not readily pressed out of peat, for it is not in that substance as "water" but as gel, just like the water in a jelly. Recently J. W. Hinchley, professor of chemical engineering at the Imperial College of Science and Technology, London, England, has discovered that extreme cold and heat destroy the colloidal matter which holds the water in the peat, so that the moisture can be reduced to 40 per cent or even to 30 per cent by the application of pressure. Unfortunately, extremes of heat and cold are said to destroy the binding qualities of dried peat blocks to such a degree that they fall apart.

A REPORT on the Twentymile Park district of the Yampa coal field of Colorado, just published by the U. S. Geological Survey, which was prepared by Marius R. Campbell, shows the outcrops of all of the more valuable coal beds or groups of beds and the location of mines and prospects, by which the outcrops are generally marked. Particular attention was given to coal beds of the middle and lower groups, for these are the only ones that are now being mined on a commercial scale. The object of the work was first to determine the number, thickness, continuity, and geographical distribution of the beds and the quality of the coal in each bed. When this was done it was fairly easy to correlate beds in distant parts of the district, to predict where workable coal would be found in each bed, and to make an estimate of the available tonnage of coal in each section of land in the district.

The Miner's Torch

Our Mining Villages

PROBABLY the most misunderstood institution in connection with the coal-mining industry, so far as the general public is concerned, is the company-owned town. In all of my experience I have never run across an outsider who could visualize, even by the wildest stretch of the imagination, a company-owned town as a necessity. Even the social workers from the cities who journey out to the mining camps, prompted by the best of motives, have a hard time "being shown" as it were, when the subject comes up for discussion.

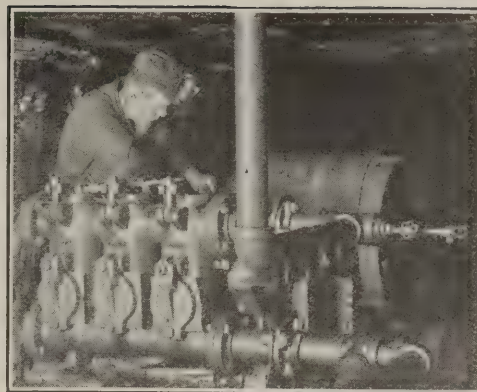
Once during a strike when a company that I was with was getting a lot of cruel publicity from the daily papers because of tenant evictions, I got a reporter to come out to my office so that I could give him the story of our camp, which started with a virgin tract miles from the nearest railroad and with not a home of any kind within a day's journey. One of the company's biggest problems was to get money enough to build the town that was required and to stock the commissary with goods for which payment could not be collected until the newcomers had a chance to make a start.

The reporter had never thought of the matter in quite that light, but it made little impression on him and he could not sense an interesting story in anything that I told him, so my trouble was all for nothing. Before he got out of our camp he saw some families moving out, and the story that he wrote next day showed that he had taken in every detail of that event.

I was not with him when he saw the departing families, so I was not allowed to explain to him that unless we could get possession of our houses we could not begin mining again, and that if all the idle mines should remain idle there would be a shortage of coal, and of necessity much suffering would follow. But some of my fellow superintendents did make such explanations to newspaper men, and they might as well have saved their words, judging by results accomplished. The reasonable rent that the miners had been charged was a thing of the past; the coal famine that might come was a thing of the future; but today families were being forced from their homes with no place to go and that in spite of the promises and efforts of the union—there was *the* story.

The above relates to incidents that happened years ago, and I have long since become hardened to the taunts of foes and friends outside of the mining industry, but it has lately occurred to me that it might have been better for the industry today had I and all the other superintendents of a decade ago remained sensitive to outside criticism, even to the point of going around with chips on our shoulders. One need only follow the reports from Washington to realize that the law makers and the general public are gunning for the coal man—the misunderstood coal man, without a friend at court—and he is likely to be hit at any time and in almost any spot. Unfortunately, all of this feeling against the industry is coming to a head at a time when it is threatened with overproduction and vanishing profits. We may even have to witness the abandonment of many company-owned towns.

Features That Should Be Embodied in the Design of Plunger and Centrifugal Pumps



Pumps, Crescent Coal Co., Beaver, Ky.

Mining Congress Committee Suggests Standards Which Should Govern Construction of Pumps in Coal Mines, Not for Gathering Water but for Its Delivery to the Surface

WHEREVER possible, all permanent pumping stations should be so constructed and the pumps so placed in them as to allow at least 3 ft. of space all around each pump, thus providing that ample room shall be available to get at all parts of the mechanism when it is necessary to make repairs. The height of the station should be such as to permit of the use of the chain blocks whenever heavy parts have to be removed. Space also should be provided adjacent to the pumproom for the making of ordinary repairs. In the larger pumping stations a hand traveling crane should be installed, and one end of the pump station should be extended about 15 ft. beyond the floor space needed for the reception of the pump or pumps.

This additional length should be served by the same traveling crane, and where ordinary repairs can be made, extra parts should be conveniently stored. In the larger pumping stations a work bench with vise should be supplied, also cupboards or lockers furnished with substantial locks and keys where all wrenches, small supplies, etc., can be kept safely for the exclusive use of the regular pump attendants.

UNDER 200 GALLONS PER MINUTE USE PLUNGER PUMP

No hard and fast rule can be made specifying when plunger and when centrifugal pumps should be used. In general, however, it can be stated that when the capacity is less than 200 gallons per minute, a plunger pump should be used and when the capacity is 2,000 gal. per minute or over, preference should be given to centrifugal pumps. Between these two limits the deciding factors are the heads against which the pump must operate and the cost of power required to operate the pump. In Table I a tentative suggestion is given as to the type of pump to be installed where the power charge is 2c. per kilowatt hour.

Specifications for Plunger Pumps.—Pump purchasers should give the following information to prospective pump builders: The number of pumping units required, the capacity of each pumping unit in U. S. gallons per minute, the total head against which the pump is to operate (this total head to include suction lift and pipe friction), the suction lift from the floor of the pumproom to the level of the water in the sump, the

length and size of both the suction and discharge pipe; also the speed at which the pump should be run. This should not exceed 65 r.p.m.

The purchaser also should inform the pump builders of the name of the firm that will furnish the motor for driving the pump, as well as the current characteristics; namely, whether direct current or alternating current can be furnished and at what voltage, also the phase and cycle if alternating current is to be used. If the purchaser furnishes the motor it should be one running at the speed recommended by the pump builder, and he should deliver the motor, freight prepaid, to the pump builder for mounting on the base casting.

SECTIONALIZE WATER END FOR LOW REPAIR COST

Plunger pumps should be of vertical, triplex, single-acting, outside-packed plunger pattern. As far as possible the water end should be of sectionalized design, so as to minimize the cost of repairs, and it is recommended that the pump should be of the pot-chamber pattern, should consist of three interchangeable water cylinders, three discharge and three suction pot chambers, all three water cylinders to be interchangeable as well as all pot chambers. The water cylinder should be of cast iron and the stuffing-box throats lined with bronze bushings.

The water valves should be of rubber, resting on bronze seats, and, as before stated, each valve should be set in its individual cast-iron chamber and be provided with covers for ready access to the valves. The valve seats preferably should be of the flange type, bolted between the bottom of the pot chambers and their connecting branches. Where the water is acidulous it is recommended that the water cylinder, pot chambers and connecting pipe be all wood-lined. All water cylinders and air vents should be tapped and furnished with drain valves.

Plungers should be of cast iron, accurately polished. For acid mine water, however, they should be of hard bronze or preferably of porcelain. The plunger glands should be constructed of cast iron, and each be provided with four gland bolts.

The crankshaft and connecting rods should be of cast or forged steel and the crank and crosshead pins should be fitted with adjustable brass boxes. Crossheads should be provided with adjustable babbitt-lined shoes.

Single-reduction gearing should be used between the

TABLE I—PUMP EQUIPMENT FAVORED FOR VARIOUS HEADS

Capacity Gal. per Min.	100-Ft.	200-Ft.	Total Head			
			300-Ft.	400-Ft.	500-Ft.	600-Ft.
200	P or 1C	P or 2C	P	P	P	P
300	P or 1C	P or 2C	P or 2C	P	P	P
400	1C	P or 2C	P or 2C	P or 3C	P	P
500	1C	2C	P or 2C	P or 3C	P	P
600	1C	2C	2C	3C	P or 4C	P or 5C
800	1C	2C	2C	3C	4C	5C
1,000	1C	2C	2C	3C	4C	5C
1,200	1C	2C	2C	3C	4C	5C
1,500	1C	2C	2C	3C	4C	5C
2,000	1C	2C	2C	3C	4C	5C

Note—"P" signifies plunger pump; "1C," single-stage, double-suction volute centrifugal pumps; "2C," two-stage centrifugal pumps, or preferably two-single-stage volute centrifugal pumps in series; "3C," "4C," and "5C," three, four and five-stage centrifugal pumps, respectively.

motor and the crankshaft or pump. The pinion should be of forged, and the wheel of cast steel. All gearing should be furnished by the pump builder, who also should bore and keyseat the pinion to suit the motor shaft. All gearing should be protected by a sheet-iron guard so constructed as to be readily removed. The frame should consist of three vertical standards so arranged as to form outboard bearings for both pinion and crank shafts.

In pumps of larger size it is recommended that the gear pinion be mounted on an independent shaft supported by two ring-oiled babbitt-lined bearings attached to the two outer frames or standards, the motor being coupled to this jack shaft by a flexible coupling of the pin-and-buffer type. This flexible coupling should be furnished by the pump builder. He also should furnish a suitable cast-iron base plate for supporting the motor frames and pumps. The upper part of the standards or frame should form the main journal boxes which should be babbitt-lined and provided with all the adjustments necessary to afford a correct alignment in all three bearings in case any one bearing should be subject to excessive wear.

The pump builder should furnish a flanged iron water-relief valve set for a pressure exceeding that of the discharge by 50 lb. This valve should be bolted to the discharge pipe. Other equipment which he should provide are a 6 $\frac{3}{4}$ -in. dial vacuum and a 6 $\frac{3}{4}$ -in. dial pressure gage, grease cups for main journals, crank and crosshead pins, a revolution counter and a complete set of standard and special wrenches.

All castings should be clean and free from sand, dirt or blowholes. All parts proving defective in design, workmanship or material within a period of one year after the pump is received, should be replaced by the builder free of charge. All parts of the machine should be subject to the inspection and approval of purchaser's engineers, to whom full facilities should be given to test the pump at the factory under actual working conditions before the shipment is made.

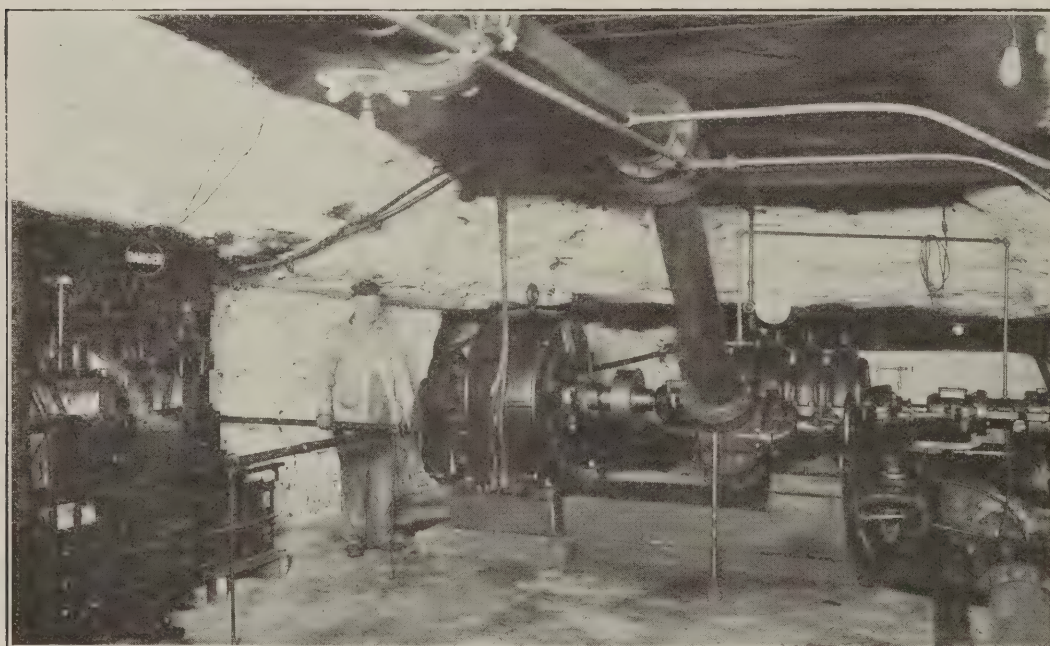
Pump builders with their proposal should furnish purchasers with the net weight of pump complete but without motor and should submit with their proposal blueprint giving sufficient data to form an intelligent conception of the pump. The pump builder also should state the time required to furnish pump after the receipt of full information regarding motor and any other manufacturing details.

Specifications for Centrifugal Pumps.—The purchaser should give the pump builder the same information as has been advocated already in the specification of plunger pumps. The pump should be of the horizontal type with horizontal split casing, suction and discharge connections being on the bottom half of the casing and so designed that by removing the upper half of the pump casing the whole interior of the pump will be revealed and can be examined readily. The pump should be so designed that if for any cause its rotation is reversed in direction, the machine will not be damaged.

The pump builder should furnish a heavy cast-iron baseplate for supporting the pump and motor and should accurately align both and place dowel pins in the pump base so that it cannot get out of alignment.

When pumping fresh water the casing should be of cast iron; when handling gritty water it preferably should be of special hard iron; when raising acidulous mine water the casing should be of acid-resisting bronze. As it is readily understood that the pump builders cannot know the conditions under which each installation must operate as thoroughly as the purchaser himself, it is recommended that the purchaser specify the material from which he desires the casing to be constructed.

In order to minimize repairs, the casing should be fitted with renewable sealing rings, the same material

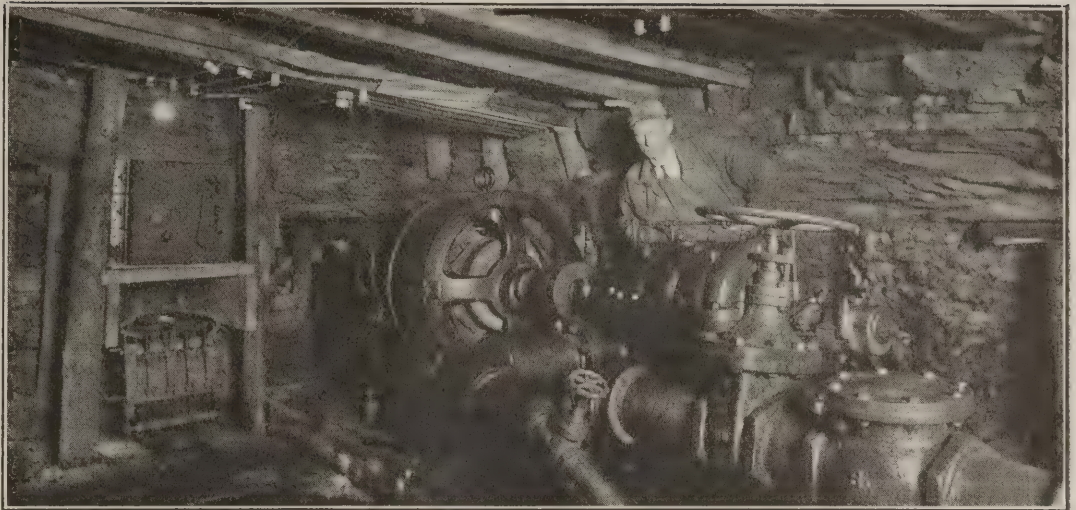


Three-Stage Pump

Workings at Orchard Slope, No. 1 Shaft. The subcommittee on permanent pumps advises that three-stage centrifugal pumps be used for 400-ft lifts when capacities of 600 to 2,000 gallons per minute are required and either a plunger pump or a three stage centrifugal pump for raising 400 to 500 gallons per minute. Some engineers prefer to use single-stage pumps connected in series so that the various units can be disconnected or connected to others and the pumps adapted to the various lifts with which they may have to contend when moved from place to place.

Four-Stage Centrifugal

At the mine workings of the Consolidated Coal Co., Saginaw, Mich. Large capacity, minimum horizontal and vertical space occupied and low cost are among the good qualities of the centrifugal pump, especially when installed to take care of the overloads due to sudden floods.



being used as in the casing. These should fit around all revolving parts, suitable provision being made to prevent the rings from turning. For this purpose the use of small screws or dowel pins should not be permitted. All high spots of the casing should be tapped and furnished with suitable cocks for air vents; also cocks should be furnished to drain the entire casing.

The impellers should be of the enclosed type, made of bronze and fitted with renewable bronze rings secured by a shrinkage fit onto the impellers, no small pins or dowels being permitted.

Stuffing boxes should be deep enough to take not less than four rings of packing after allowing the glands to project $\frac{1}{2}$ in. into the stuffing box. They should be provided with renewable bronze neck rings or bushings. Each stuffing box should be fitted with a "Lantern" gland, furnished with suitable bronze cocks, pipe and fittings for an outside water seal. Glands should be of bronze, made in halves and fit snugly in stuffing boxes, but be bored out $\frac{1}{8}$ in. larger than their shaft to prevent them from riding on it or rubbing it.

The pump shaft should be of open-hearth steel, of liberal proportions and protected at those parts which come in contact with the water by cast-bronze bushings made to project through the stuffing boxes and forming collars to keep the impeller in place laterally, the whole so arranged that in case of wear they may be readily renewed without destroying the main shaft. Provision should be made to prevent leakage along the axis of the pump shaft. This can be done by inserting fiber gaskets between all bushings and hubs of the impeller. The impeller should be secured direct to the steel shaft by a bronze key. The shaft with its impeller, rings and coupling should be perfectly balanced before being placed in the pump.

The pump builder should furnish all couplings, which should be of cast iron and as light as possible consistent with ample strength. They should be of the flexible pin-and-buffer or other approved type. The motor coupling should be bored and keyseated and should be fitted to the motor shaft by the pump builder.

All couplings should be guaranteed to run cool 24 hours under full load without water cooling. All bearings should be lined with the best grade of babbitt or with some other approved anti-friction metal; be split and accurately fitted to cast-iron boxes with bolted caps, the whole so arranged that bearings can be removed,

rebabbitted or renewed without disturbing the shaft or other parts of the pump. Each bearing box should form a liberal oil well and be provided with gage glasses that will show that oil is present when the base is full of oil. It also should be fitted with plugs for draining the oil. Suitable washers or collars should be fitted on the end of the shaft to prevent water or dust working into the bearings.

Except where the pump handles very gritty water or the water is extremely acidulous, it is recommended that all multi-gage pumps be of the hydraulic balance type or of the back-to-back construction. However, in some designs of pumps it is necessary to furnish a thrust bearing that will take care of the end thrust when the machine is being started as well as any unbalanced thrust which may occur in operation. If furnished, the thrust bearing should be of liberal proportions with all suitable adjustments and so arranged as to allow of removal or repairs without disturbing or destroying the main pump shaft. The thrust bearing should be enclosed, self-oiling and capable of running cool under a full-load run of 24 hours' duration, and, if desired, this bearing can be water-cooled.

SAFETY GUARD SHOULD BE PROVIDED

To protect the motor from injury due to pump leakage caused by the blowing out of a gasket or other packing, also to prevent the operative from being caught in the revolving coupling, a suitable sheet-iron guard should be furnished by the pump builder. The guard should consist of a vertical shield, of a thickness not less than No. 16 gage; should be the full width of the motor base and have a semicircular top and be placed around the pump shaft between the inner bearing box on the pump and the hub of the pump coupling, with a circular hood built on the back of the shield which will entirely encase the couplings; the whole being split vertically with halves bolted together and rigidly connected to the baseplate, but so arranged that it readily can be removed.

The inside of the casings and the impeller should be painted with two coats of Highland non-corrosive paint or of some other approved acid-resisting coating.

Each pump should be furnished with a water-pressure gage having a $6\frac{1}{2}$ -in. dial and with a vacuum gage of the same dimension. This should be mounted on a suitable board for fastening to the pumproom wall. Piping to connect the gages with the pump should be

furnished by purchaser. The pump builder should furnish all necessary fittings, air vents, drain pipes, circulating pipes for thrust bearings and all standard and special wrenches; in short, provide everything necessary for the satisfactory operation of the pump from its suction inlet to its discharge outlet.

All castings should be free from sand, dirt or blow-holes, and be smooth on the inside as well as the outside. All parts proving defective in design, material or workmanship within a period of one year after the pump is placed in actual operation should be replaced by the builder free of charge. All parts of the machine should be subject to the inspection and approval of the purchaser's engineers, to whom full facilities should be given to test the machine at the factory, as nearly as possible under working conditions, before shipment is made.

Bidders should furnish the price of pump complete, as specified without motor, the time required to furnish pump after receipt of full information regarding the motor, complete specifications with blueprint showing sufficient details to form an intelligent conception of

the machine offered, the efficiency of the pump when running under working conditions, the net weight of the pump complete with baseplate but without motor. If the manufacturer wishes to quote on a pump other than as specified, he should quote a price with full detailed information of its advantages over the pump specified.

In Table II the sizes of several important parts of centrifugal pumps having capacities from 500 to 8,000 gallons per minute are recommended.

TABLE II—RECOMMENDED DIMENSIONS FOR CENTRIFUGAL PUMPS OF VARIOUS CAPACITIES
(All dimensions are in inches)

	Capacity in Gallons per Minute						
	500 to 800	800 to 1,200	1,200 to 2,000	2,000 to 3,200	3,200 to 4,500	4,500 to 6,500	6,500 to 8,000
Size of pump.....	5	6	8	10	12	14	16
Diameter of discharge opening.....	5	6	8	10	12	14	16
Diameter of suction opening.....	6	8	10	12	14	16	18
Thickness in casing { Single-stage pumps	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$
{ Multi-stage pumps	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$
Thickness of metal in impeller walls and vanes....	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$
Width of impeller rings.....	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$
Thickness of impeller rings.....	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$

American Steam Shovel Nears North Pole

WITHOUT doubt the record for farthest north for American steam shovels is held by the one operating on the Spitzbergen Islands, off the coast of Norway. These islands lie north of the Arctic Circle between 76 and 81 deg. north. The coal mine farthest north is 79 deg. north latitude. Some of the coal deposits lie about 650 ft. above sea level, but at King's Bay the deposits are little above sea level. The coal is transported to the shore by ropeways. Here the coal is handled by means of a 36-in. gage railway which transports it to storage piles or to the loading pier. This railroad can boast that it is the northernmost in the world.

Fortunately for the coal operators the climate on the islands is comparatively dry, and hence the coal does not freeze hard. The coal is frozen in the ground and never thaws out. The difficulties are therefore in mining and not in handling after the coal is mined. Considering how far north it is, the thermometer does not show any great extremes, the mercury seldom registering below 15 deg. below zero. The harbors are cleared of ice about the middle of June and remain free of ice till the middle of September, when cold weather sets in.

The working days are long enough in the summer to suit the most exacting. The sun does not go below the horizon on Spitzbergen from April 20 to Aug. 24, and it does not come above the horizon from Oct. 26 to Feb. 16. However, the long night is not so dark as

might be expected, for the aurora borealis, which illuminates the landscape, is, of course, visible for the whole of the twenty-four hours when the sun is not above the horizon.

During the winter months the only means that the islanders have of communicating with the outside world is by the wireless that the Norwegian government has installed.

The largest operating coal company is the Store Norske Spitzbergen Kul Co. It has produced on an average of 60,000 tons annually. When the shipping season opens, the number of miners usually is doubled. As far as possible the coal from the mine is sent direct to the ships.

Production by the "Iron Man"

Tables have been prepared from which it is ascertained that in the mines of Great Britain in 1922 there were 5,434 coal-cutters in use. The number driven by electricity was 2,395, compressed air being the driving power for 3,039 of the machines. Although compressed-air coal-cutters are in the majority, their average production is much below that of which the machine driven by electricity is capable. The machine-mined coal last year amounted to 38,124,122 tons, which represents 15.2 per cent of the total produced, the average tonnage per machine working out to 7,015 tons. At the beginning of the present century only about 3 per cent of the coal was got by the "Iron Man." Even today the machine does not operate so extensively in South Wales.



Steam Shovel Near North Pole

Though the temperature is always low, and night and day are long seasons rather than mere diurnal divisions of time, the shovel handles stored coal without difficulty, for the frost is in the coal and does not bind the lumps or slack together.

British Coal Exchanges A Popular Form Of Co-operative Effort

Eliminate Senseless Competition and Clamor for Regulatory Legislation—Newcastle Exports Noted in 1325—Coal Age Correspondent Urges Organization at Norfolk on Old World Pattern

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

GREAT BRITAIN has escaped any wave of popular clamor for anti-trust laws and legislation calculated to prevent "restraint of trade." As a consequence, that country enjoys numerous advantages flowing from united action. The wastes incident to senseless competition in bituminous coal are eliminated and the vitality of the industry is not drained in the same way as is the case in this country.

Despite the absence of statutes comparable to our Sherman and Clayton acts, no condition has arisen to cause even a suggestion that the industry be subjected to regulation of the public-utility type. It is true that there has come from labor the entirely unrelated demand for nationalization, but the severe defeat of that proposal has so impressed the labor party that it probably will be disinclined to risk its hard-fought gains on an issue regarded as unsound by a clear majority of the people of the kingdom. It may be said, however, that the issue is by no means dead.

COAL EXCHANGES AN OLD CUSTOM

A popular form of co-operative effort in the United Kingdom is the coal exchange. Even our Federal Trade Commission, with its electrically propelled, radio-directed and thoroughly modernized muckrake, could find no fault with this institution. There can be no restraint of trade at gatherings of buyers and sellers.

Exchanges are maintained at the principal coal centers. Most of them have been systematically conducted for generations, although, in fact, they date back centuries. The exchange simply is the outgrowth of curbstone gatherings. In Newcastle-on-Tyne in the old days, those having coal to sell, those desiring to purchase it, and those possessing the means with which to transport it met on the sidewalk outside the Guildhall. On the days when the weather was inclement the coal men would withdraw into the lobby of the building. The natural outgrowth of the proceeding was the establishment of an organized exchange.

The floor of the exchange is like that in most of our commodity exchanges but without any pit or platform features. Due to the frequent use which must be made of statistical records and other books of reference, a portion of the exchange floor at Newcastle is given up to the library. Telegraph and telephone facilities are maintained on the floor so that members need not leave the spot of actual trading in making use of those necessary adjuncts of the business. The manager of the exchange has an office on the second floor.

The Newcastle exchange is described as "the pivot upon which turns the whole of the coal and the shipping business of the ports on the Northeast coast." While the exchange is primarily devoted to coal, traders in other commodities are eligible for membership. As a result, a vast contract business is conducted there in coal, chemicals and non-ferrous metals.

The present exchange is in the old Guildhall. The building itself was erected before the discovery of America. There have been proposals to house the exchange more pretentiously but sentiment always has been strongly in favor of continuing to trade on the same spot where so much of the coal business of the Northumberland and Durham fields has been conducted for centuries. King Edward III in 1350 granted Newcastle a charter to work coal, but there are many earlier references to Newcastle as a source of coal. The shipment of coal from Newcastle to London was prohibited by a royal decree in 1306, when the King decided the best way to accomplish smoke abatement was to prohibit the use of coal. An old record shows that exports of Newcastle coal were being made to France in 1325.

The exchange is organized as a limited company, the common form of commercial organization. Principal authority for the conduct of the exchange is vested in a floor committee of five members, but, recognizing that the mainspring of the organization is the manager, a high-grade man is employed in that capacity. There are some 1,500 members. A requirement for membership is the purchase of a certain minimum amount of the company's stock.

BRITISH COAL SALESMAN AVOIDS TELEPHONE

At Cardiff the exchange occupies a large central court in a building in which most of the coal interests maintain their offices. It is under the immediate direction of a board of control and is conducted in much the same manner as the exchange at Newcastle. The popular hours are between eleven and one o'clock. During those hours the floor of the exchange is crowded. Few transactions in coal take place anywhere else. For a purchaser of coal to call at the office of the seller or even to inquire by telephone as to prices would be regarded as poor business. On the floor of the exchange buyers engage in what appears to be casual conversation with first one seller and then another. The buyer feels that he is in a more advantageous position to get the lowest price than would be the case were he to call at the office of a seller, thereby revealing the fact that he is anxious to buy.

While the larger operators usually are represented on the floor by a member of their staff, it is apparent that the contacts and the sociability of the daily gathering at the exchange is attractive to everyone, large and small, in the coal business. In addition to being a great stabilizing factor, important benefits flow from these personal contacts between all interests in the district. The problems of the industry are discussed and wider points of view obtained because of these intimate personal contacts. The ingrowing tendencies which come from being isolated day after day at one's own desk are overcome. Incidentally much clerical work is avoided. Most of the business, particularly at

Cardiff, is conducted on verbal understandings. Quite frequently large transactions are consummated without any exchange of written communications.

After seeing these exchanges in actual operation I am convinced that there should be a new effort to establish them in our coal centers. If such an institution were set up at Norfolk—probably the best place to try it out—full advantage should be taken of British experience. Coal men familiar with the territory tributary to Norfolk have expressed the opinion to me since my return that the management of such an exchange probably would have to be vested in a person well acquainted with the local situation.

While it probably would be impracticable to vest the management in an outsider, I do believe that arrangements should be made to bring someone from Newcastle

or Cardiff who is thoroughly familiar with the workings of the exchanges there. He could be engaged as an assistant manager. I have in mind the representative in Cardiff of a large coal interest, whose employers doubtless would be willing to give him a six-month's leave of absence for such duty, since it would familiarize him with American methods and contribute greatly to his value to the concern. He doubtless could be induced to accept, at a relatively low salary, the assistant managership of such an exchange. This would bring to the proposed institution all the facts which have contributed to the success of exchanges in Great Britain, and probably would contribute in no small way to the establishment of a permanent institution in this country which has promise of being particularly helpful to our coal trade.

Dangers Accompany Starting of Electric Mine Fans

Induction Motors Reasonably Safe—Ventilation of Fan or Fan Room with Non-Explosive Atmosphere Recommended Rather Than Permissible Fan Motor

PRESENTED with a question from Denver, Colo., on the dangers of an electrically driven exhaust fan at a mine giving off methane, members of the Coal Mining Institute of America at its meeting of Dec. 20 in Pittsburgh, Pa., proceeded to discuss quite generally the whole question of the dangers of mine fans, exhaust and blower, after standing or when running slowly or normally. Graham Bright, of Howard N. Eavenson and Associates, said sparking was not to be expected where induction motors, particularly of the squirrel-cage type, were used to drive the fan. It was difficult to conceive how motors of that kind could go so far wrong as to spark and ignite gas. Danger certainly existed where direct-current motors were used, because of the sparks on the collector rings.

BIG MOTORS CANNOT WELL BE MADE FLAME-PROOF

True, these could be enclosed, and satisfactory results be obtained with motors up to 20 hp., but he felt it would be difficult to provide in this manner for the safety of motors of 100-hp. capacity or over. Small motors might be so constructed that their use would be permissible in places where gas was occasionally present, but the manufacturers had found that the demand for permissible motors is not brisk, at least not at present. The controller, he added, could be put in an explosion-proof box and so prevented from communicating flame to the outside air.

Asked about the effect of power factor, he said that low power factor in the system would have no adverse effect. Low power factor in the motor itself might cause excessive current with consequent sparking in the controller. However, the controller might be inclosed in a box with a ventilating current feeding the box from some point so distant from the mine that the presence of methane at that point would be unlikely.

W. L. Affelder said that with an exhaust fan of the Sirocco or Capell type the gas could not enter the motor room, because the tendency of the fan was to remove the air from the motor room and the discharge was through a chimney. He later declared that with a disk fan this danger was, of course, to be feared.

J. W. Paul put an entirely different light on the subject by saying that the fan chamber and motor room might be full of gas prior to the starting of the fan and in consequence an explosion might occur even with a blowing fan. He suggested that the electrical parts be put in a casing whether explosion proof or not was immaterial. The casing might be connected with a compressed-air line. Then before starting the fan the air in the casing could be freed of its methanized air by the introduction of a blast of air from the compressor. Unfortunately, some compressed air, owing to the evaporation of lubricating oil, is not wholly free from explosive and combustible qualities.

Mr. Affelder said that when the fan was belt-driven the belt drew air into the motor room from the fan room and so created a risk. Joseph Williams, state mine inspector, of Altoona, Pa., said he preferred a steam-driven fan. With a steam turbine much uncertainty was removed.

Joseph J. Walsh, Secretary of Mines, State of Pennsylvania, said that in the anthracite regions there had been only eight stoppages of steam-driven fans in twenty years and that in a single year there had been an equal number of stoppages of electrically driven fans. Mr. King suggested that the steam-driven fans might not stop but might slow up to such a degree as to make dangerous conditions. Mr. Walsh declared that he had never heard of this happening. Someone said that steam-driven equipment sometimes began to run slow as a result of steam of low pressure being supplied to the prime mover. In that case the power was not thrown off the fan as in the case of the electrically driven equipment, which automatically slows down when the voltage is too low.

He recalled a case where a carpenter who entered the fan house at a gaseous mine in Colorado, after the fan had been stopped 30 minutes, fired the gas in that place with his open light. In the State of Indiana the gas in the fan house during the stoppage of a fan became so abundantly present that it formed a cap on the light of a safety lamp. There was always a danger that the gas would be ignited by the static electricity of the belt if the fan were belt driven.

L. C. Ilsley said that the U. S. Bureau of Mines had at no time recommended permissible motors for use on the surface. A separate motor compartment was preferable to the use of a permissible motor. M. D. Cooper said that before restarting the fan after a shutdown the motor room should be examined with a safety lamp as carefully as a working face.

News Of the Industry

Illinois Must Have Lower Wages or Lose Markets, Honnold Brochure Says

Expert Study Shows Non-Union Fields Have Cut Heavily Into State's Natural Trade — Operators Must Regain Control of Their Mines and Reduce Screenings

Illinois operators are staring at something this week. It is a picture of ruin, or something approaching it. The picture is conjured up in their minds upon reading a powerful document now in circulation from the office of Dr. F. C. Honnold, manager of the Honnold Coal Bureau, Chicago, in which a strong case is set up to prove that the state is fast losing its markets to non-union competing fields and that two things are necessary: (1) That miners' wages in Illinois be reduced, and (2) that a new agreement be made with the United Mine Workers by which control of Illinois coal mines will be regained by the operators from the union.

Graphic charts in Dr. Honnold's pamphlets to operators, miners and others interested in the coal industry of Illinois show that even though the production of Illinois has increased from 6,000,000 tons in 1880 to 60,000,000 tons in 1922, the increase in such competing states as West Virginia and Kentucky has been in far greater proportion, indicating that the non-union regions have been acquiring markets Illinois previously claimed as its own. The relative growth since 1880 of competing states is shown to be as follows: Illinois, 850 per cent; Indiana, 950 per cent; Kentucky 4,150 per cent; and West Virginia, 4,300 per cent. The working conditions of Indiana, bad as they are in comparison with those of non-union states, are shown to be markedly more favorable to the marketing of that state's coal than is true of Illinois.

The loss of Illinois markets during the past seven months is illustrated strikingly in a series of charts showing working time by states and time losses for all causes in Illinois and the five principal competing fields: Western Pennsylvania rail and river mines, northern and central Ohio mines, West Virginia Panhandle district, West Virginia Pocahontas field, and the Harlan County field of eastern Kentucky. In these seven months the "no market" losses were approximately these: Western Pennsylvania, 4 per cent; Ohio, 5 per cent; Panhandle, 7 per cent; Pocahontas, 2 per cent; eastern Kentucky, 4 per cent; Illinois, 45 per cent.

Attention also is directed to the in-

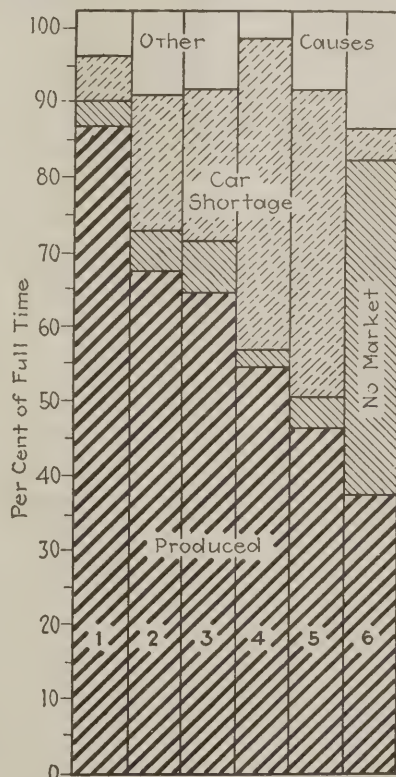
crease in the proportion of screenings produced in Illinois. This increase has been from 19.6 to 48 per cent between 1900, three years after the basis of paying miners changed from lump to mine-run, and 1923. Doctor Honnold estimates that this increase has caused a loss of between \$10,000,000 and \$12,000,000 a year to Illinois operators.

This is pointed out as "a condition wholly without justification but impossible of correction unless and until co-operation of the workmen is obtained. This co-operation is necessary both from the individual workman and from the union organization of the United

Mine Workers. It is a result of carelessness and indifference instead of the application of skill and interested co-operation" in spite of that clause of the agreement written in 1897 and continued to this day in which the union guarantees "heartly support and co-operation in disciplining any miner who, from ignorance or carelessness, or other cause, fails to properly mine, shoot and load his coal."

The screenings produced in Illinois through 2-in. round perforations (comparable to the 1½-in. openings in the bar screens used at the time the shift from lump to mine-run basis was made in 1897) have not "since April 1 of this year returned beyond 60 per cent of production cost." The average loss in only twenty Illinois mines has been 76.9c. per ton, or a total of over \$2,000,000. The average loss for 43 months from April 1, 1919, to Oct. 30, 1923, at the same twenty mines was 50c. per ton.

Such statistics as these, backed up by certain statements which Dr. Honnold makes in the pamphlets, are waking many Illinois operators to a clear realization of a situation which they have only dimly realized before. Most of them have had fragmentary knowledge of what confronted them as men in the business of producing coal, but this has served to crystallize their knowledge.



TIME WORKED AND LOST BY FIELDS

Diagram showing per cent of full time worked and time lost by causes, averaged for the seven months, April to October, 1923. The fields shown, one for each vertical column, are: (1) Western Pennsylvania rail and river mines; (2) Northern and central Ohio mines; (3) West Virginia—Panhandle district; (4) West Virginia—Pocahontas district; (5) Eastern Kentucky—Harlan County field; (6) Illinois.

Transportation Parley Called for Jan. 9

A national conference on transportation, to be held in Washington, Jan. 9, 10 and 11, has been called by Julius H. Barnes, president of the Chamber of Commerce of the United States. Two hundred leaders of recognized standing in commercial, educational, financial and industrial fields have been invited to take part in its deliberations and in the discussion of problems involved in the development of an adequate national transportation system. It is expected that every state will be represented at the conference.

"The expanding transportation needs of America can be easily visualized," said Mr. Barnes, "and must be resolved so that national wealth and individual production may be marketed into consumption. All production, agricultural and industrial, is dependent on adequate and ready distribution."

Coal-Mine Accidents Took
167 Lives in November

Fatal accidents at coal mines throughout the United States during November numbered 167 as compared with 153 in the previous month and 370 in November last year, according to a report by the U. S. Bureau of Mines. The fatality rate for the month was 3.29 per million tons, based on 50,783,000 tons of coal produced, as compared with 2.64 in the preceding month and 6.88 in November a year ago.

The year 1923 to the end of November shows a total of 2,254 coal-mine fatalities and an output of 593,000,000 tons of coal, the fatal-accident rate being 3.80 per million tons. The corresponding period in 1922 showed 1,813 men killed, 410,000,000 tons of coal produced, and a fatality rate of 4.42. Although in 1922 the five-months' strike reduced the number of men working in the mines, and thus also reduced the number of men killed, the cost of coal during the past eleven months of 1923, ton for ton, in number of lives lost, has been 14 per cent lower than in 1922.

The reduced fatality rates for 1923 are evident in all of the principal classes of mine accidents. For example, falls of roof and coal, which usually account for nearly half of all fatalities at coal mines, showed a decline in the death rate from 2.01 per million tons in 1922 to 1.78 per million tons in 1923; haulage accidents, normally comprising about 18 per cent of all deaths at coal mines, showed a de-

cline in the rate from 0.73 to 0.64; the rate for gas and dust explosions fell from 0.75 to 0.61 in spite of three bad explosions during the past eleven months. The fatality rate for all classes of accidents to men working underground was 3.49 per million tons in 1923 and 4.03 in 1922.

Reorganization of Federal
Departments Deferred

The proposal that the administration show its faith in the reorganization of the federal departments which it is advocating, by carrying into effect a part of the program by executive order, has met with delay. It is understood that administration leaders feel that the plan should be discussed with the joint congressional committee before any such action is taken. It has been impossible to obtain a meeting of the committee for that purpose. It is known that friction exists between members of the committee and their chairman. Whether or not this friction is such as to prevent an ultimate meeting of the committee has not been determined as yet. At any rate, it is believed that no transfer of bureaus will be made by executive order until further efforts have been made to discuss the matter with the congressional committee on reorganization.

Proposals to create a Department of Mines have failed to enlist the support of President Coolidge, according to a report from the White House. The President, it is said, does not look with



Dr. R. R. Sayers
Chief Surgeon, U. S. Bureau of Mines

favor upon the addition of another department to the government, but does feel that the present Bureau of Mines could be effectively strengthened and enlarged.

Incidentally the President took occasion to set at rest a persistent rumor that the Bureau of Mines was to be transferred by executive order from the Interior Department to the Commerce Department. The President, it was stated officially, has no thought of issuing such an executive order.

Coal-Mine Fatalities During November, 1923, by Causes and States

(Compiled by Bureau of Mines and Published by Coal Age)

State	Underground											Shaft				Surface						Total by States					
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosion and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1923	1922
Alabama.....	3		1	3									7													7	95
Alaska.....																										0	0
Arkansas.....																										0	0
Colorado.....	2	1											4													4	12
Illinois.....	3				2								7	1												8	10
Indiana.....	4		1	1	1								8													8	10
Iowa.....													1													2	3
Kansas.....	2			1		1							4						1							4	2
Kentucky.....	5		1										6													7	4
Maryland.....																										0	1
Michigan.....																										0	1
Missouri.....	1												1													1	0
Montana.....																										0	1
New Mexico.....	1												1													1	10
North Dakota.....																								1	1	1	0
Ohio.....	8		1										10													11	15
Oklahoma.....																										0	2
Pennsylvania (bituminous).....	15		4										19						1					1	2	21	117
South Dakota.....																										0	0
Tennessee.....	1		2										3													3	4
Texas.....																										0	1
Utah.....		1	2										3													4	2
Virginia.....	1	1				1							2													3	2
Washington.....																										0	4
West Virginia.....	10	3	7	27		2		1	1				51						1		1			1	3	54	31
Wyoming.....	1	1	1										3													3	5
Total (bituminous).....	57	7	20	32	3	5	1	2	1				131	1		2		3	2		2		1	3	8	142	332
Pennsylvania (anthracite).....	12	1	3	3									3	22					1		2			3	3	25	38
Total, November, 1923.....	69	8	23	35	3	5	1	2	1				153	1		2		3	3		4		1	3	11	167	
Total, November, 1922.....	102	9	33	88	91	17	1	3	2				351	2		4		6	2		3			6	13		370

"Let Well Enough Alone" Probable Policy of Union and Operator Leaders

Disaster Seen in Wage-Negotiation Course Favored by Radicals of Either Side—Usual Period of Uncertainty Likely to Precede Agreement—Legislative Bugaboo May Figure

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Leaders of the United Mine Workers and among the coal operators alike are thought to be convinced that of all times next spring would be the worst possible time to have a bituminous-coal strike. There is every reason why, for their own welfare, these interests should let well enough alone and continue operation on the same basis during the next coal year as during this coal year. Nevertheless there are operators who are willing to go to the mat with the union in an effort to reduce wages. There is even a larger element in the United Mine Workers who would be willing to insist upon a six-hour day, a five-day week and a 20-per cent increase in wages.

To the operators who have a grasp of the general situation it must be entirely apparent that there is not a ghost of a chance to reduce the wage scale next April. To the equally intelligent leaders of the United Mine Workers it must be obvious that the application of the thirty-hour week and an increase in wage would simply lay their organization open to more disastrous non-union inroads than already have taken place. The union has lost its hold completely in the New River field. Its influence is all but gone in Kanawha. Throughout the whole northern half of West Virginia its strength is only one-half of that a year ago. For the union to insist upon extreme demands would be to invite ruin.

These facts are so well understood among the operators and among the mine workers who will participate in the wage conference that the logical thing for them to do would seem to be to agree promptly to extend the present agreement for another year. It is widely believed that this will be done eventually. It is doubtful if any such direct and businesslike result will be attained. A show of great determination to reduce wages must be made to appease the minority of operators who want to attempt the impossible. A sop must be thrown to the radical element in the ranks of the mine workers, so there will be a great display of demands known to be unobtainable. As a result, the usual three-months' period of uncertainty and dissension—in some ways nearly as bad as a strike—probably will precede this new agreement.

There is another reason for believing that neither side is going to precipitate a strike this year; Congress is in session. It is going to take all of the legislative influence of the operators and all of that of the union to prevent legislation, which neither wants, at

this session. Let there be a strike and the demand for this legislation will be such as to insure its prompt enactment.

There is one great temptation dangling before John L. Lewis. He knows that the federal government has formed a habit of interfering promptly when a strike is actually called. In such a situation he is at a great advantage. His capabilities are suited particularly to the masterful handling of such a pass. This was demonstrated anew during the recent anthracite strike, when labor entered the wage-scale conference with no hope of doing more than maintaining the *statu quo*.

If a strike is avoided, the chances seem to favor the passing of the session without coal legislation. The administration has shown no disposition to urge even the legislation recommended by the Coal Commission. Secretary Hoover is outspoken in his belief that the main remedy needed by the coal industry lies outside the legislative field. The operators oppose it. Labor opposes it. On the eve of a presidential campaign, Congress is more disposed to discuss such major issues as railroads, taxation, soldier bonus and immigration. These subjects have vote-getting potentialities far in excess of any coal legislation at a time when bituminous coal is not yielding pre-war prices and much of it is being marketed at an actual loss.

Big Snowbirding Deal Is Made in Illinois

For the first time, a large volume of Franklin County (Illinois) coal has fallen into the hands of an agency which will sell it direct to consumers by mail and otherwise. A contract is now in process of completion under which Simon Levy, a man who has grown in the coal business of the middle West until he now operates several direct-by-mail and direct-to-consumer companies, headed by the Boylston Coal Co. of Chicago, will receive the entire output of the two Franklin County mines of the Southern Gem Coal Corp. of Chicago. To gain control of this coal, Mr. Levy's interests have underwritten a Peabody Houghteling bond issue on the two properties—an obligation which has been embarrassing the Southern Gem corporation.

The details of the new contract between the Southern Gem and Mr. Levy remained to be cleared up at the end of last week. In one quarter it was expected that the contract would cover the output of the mines for five years. Mr.

Down Near Herrin

They've had a pleasant year in "bloody Williamson" County, Illinois, wherein lies Herrin, the town famous for the mine massacre of 1922. The coroner's annual report for 1923 shows sixteen murders, twenty deaths in mine accidents, ten suicides, eight deaths from undetermined causes and two from alcoholic poisoning. Just before Christmas a "dry" squad raided a list of drinking places, engaging in a gun battle in which a liquor defender was one of the principal defendants in the Herrin trial a year ago. Altogether an enjoyable time was had by all present.

Levy wanted ten. A certain running time and a certain price per ton were to be guaranteed the operators, but these were not announced. Mr. Levy said that his own selling organization would handle the domestic sizes, and that an arrangement would be made with the operators' selling department to market the steam sizes. It is probable the output of the two mines will total 1,500,000 tons a year.

This arrangement is expected to cause various changes of personnel in the Southern Gem Coal Corporation, but none of the other mining properties of the company is involved.

Must Commerce Department Abandon Statistics?

In view of the decree issued in connection with the cement manufacturers' case, the Department of Commerce has referred to the Department of Justice the question as to the propriety of collecting statistics such as are gathered by that department. While the decree in the tile manufacturers' case indicated that returns to a government agency are allowable, it is apparent that the effect of the department's figures is the same in many particulars as those handled by trade associations. The Department of Justice is understood to hold the position that it is contrary to the law for a trade association to submit figures to trade publications. In fact it is turning its attention at this time to associations which distribute their figures only in that manner.

Jan. 1 Coal Stock Report

A report to cover all coal stocks, as of Jan. 1, is to be issued by the U. S. Geological Survey. The Department of Commerce is co-operating in the gathering and compilation of the material, which will require all of the month of January. A report will be made available as soon after Feb. 1 as possible.

"The First Robin" Seen as Forerunner Of Forthcoming Soft-Coal Wage Parley

The following is reprinted from a recent bulletin of the Central Pennsylvania Coal Producers' Association:

"The prospect of coal legislation at the present session of Congress and the situation in the bituminous mines where part time operation is now the rule were discussed with President Coolidge today by John L. Lewis, president; Philip Murray, vice-president; Ellis Searles, editor of the *Journal*, of the United Mine Workers of America, and by Secretary of Labor Davis,' states this morning's paper.

"The article says that the gentlemen representing labor declined to say what was discussed with the President and they had merely called to 'pay their respects.' The report says, however, 'the President's message to Congress concerning legislation and the matter of negotiations this winter between the bituminous operators and miners for renewal of the wage contract in the coal mines, which expires April 1 next,' were the topics talked about in this conference, with particular attention paid to that part of the President's message favoring the immediate establishment of a commission by the President, 'empowered to deal with whatever emergency situation might arise, to aid conciliation and voluntary arbitration, to adjust any existing or threatened controversy between employer and employee, when collective bargaining fails, and by controlling distribution to prevent profiteering.'

"Previous to this time the discussion of wage agreements in the union fields began with the joint conference of miners and operators representing the union districts.

"Discussions now begin by dire predictions of strike in the union fields, emanating usually from non-union operators in other states. One could not suspect in such cases that 'the wish might be the father to the thought.' This unselfish devotion of non-union coal operators to the country's good during strikes in the union fields is most inspiring. That such condition enhances the value of their coal greatly, and therefore their profits, of course has nothing to do with their concern about the possibilities of a strike in the union districts.

"As 'the first robin is a sign of spring,' so we must take these signs as forerunners of an interest in our forthcoming negotiations, stronger than mere curiosity.

"Irregular operation of mines arises from a great many conditions, all of which have been discussed at great length by coal operators and coal miners, as well as experts and near-experts of every variety during the past five years. The one great cause of irregular operation in the union fields is the ability of the non-union fields to produce coal at a lower cost than the

union mines. Their business is more profitable and moreover is always profitable, made so at the expense of the wage schedules. This fact has tended to increase the development of the non-union fields more rapidly than the country required. It will continue to cause overdevelopment in the non-union fields so long as the union is able to maintain a wage schedule so much higher than the non-union wage schedules as to insure non-union mines a profit.

"So far as we know, the union coal operators have not been consulted as to their necessities following the termination of the present wage agreement April 1 next. Neither do we think it important that they be consulted.

"It is important, however, that the United Mine Workers of America should understand that unless they are able to establish conditions in the union fields of this country where the coal operators and the coal miners in such fields can compete for the business of the country upon a fair basis with the coal operators and coal miners of the non-union fields, any continuation of the present basis means ruin to many union coal operators and continued idleness to thousands of union coal miners during the coming year.

"If the policy of the government as indicated by various statements and decisions and reports of different governmental bodies is to eliminate the uneconomic coal mines of America by establishing car rules, etc., so as to accentuate the natural law of competition, the union may as well understand that the present policy of wage-scale making and enforcement means that all of the union mines in the fields where keen competition now obtains as against non-union mines may be listed as uneconomic. Operating conditions in the union fields are just as good, just as efficient, the quality of their coal is just as high (and, if we believe the Union, labor more skilled) as compared with the non-union fields. As between mines where natural conditions are equal, union mines will be wiped out as a result of unfair competition and not the mines that are naturally uneconomic. The union miners must come to understand this: if they are going to have work and their union is going to continue to be a strong force in their lives, they must bear their share of the burden of contest during the struggle 'for the survival of the fittest.'

"Non-union operators competitive with and contiguous to central Pennsylvania have already cut wages 25 to 35 per cent. The reduction, as made, affects a large volume of tonnage, probably five to six million tons per annum. More reductions, in our opinion, will follow in the non-union fields, the day when union coal operators have been safely signed, sealed and delivered by another agreement."



Harrison D. Mason

Recently re-elected secretary-treasurer Coal Mining Institute of America.

Taylor Coal Co. Takes Over Bickett Mines

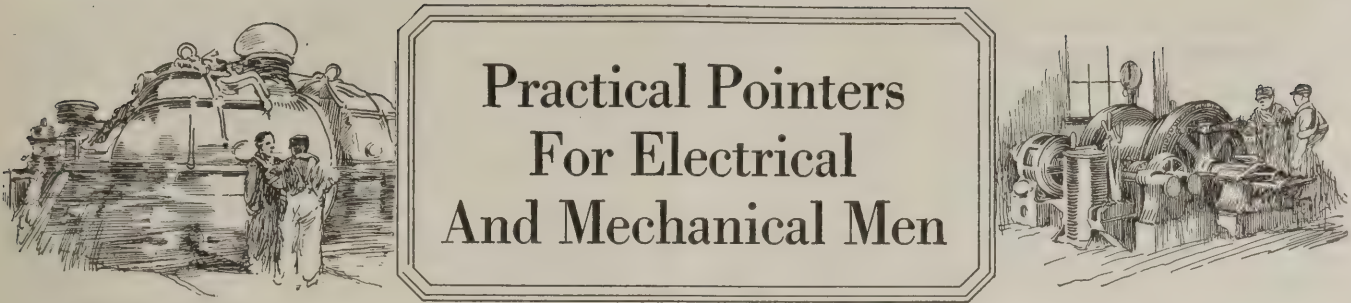
The Taylor Coal Co., of Chicago, has acquired the Bickett Coal & Coke Co., effective Jan. 1. By the merger the Taylor company takes over the properties of the Franklin Coal & Coke Co., at Royalton, Ill., and the Chicago & Sandoval Coal Co., at Centralia, Ill., which will practically double the output of the Taylor company to 15,000 tons per day.

Three mines are involved in the transaction, two at Royalton and one in Christian County. The Royalton mines have a daily capacity of approximately 5,000 tons. Extensive improvements are planned at Royalton, Mr. Keeler, manager of sales of the Taylor company, announced.

C. A. Bickett, former president of the Bickett Coal & Coke Co., will become a director of the Taylor Coal Co., and Ray Jones, sales manager of the Bickett concern, also will join the sales organization.

A Two-Foot Hole

A hole barely 24 in. in diameter was the aperture through which death came to the three men killed in the recent flooding of the Radium mine of the Aluminum Ore Co. of America near St. Louis, Mo. A drill broke through into an old water-filled working whose proximity was unguessed and a sufficient flood of water and gas came through to drown the mine. Two pumps are now throwing 8-in. streams out of that mine and must continue for an estimated sixty days before mining can be resumed. Nearly 200 men are thrown out of work for that length of time. The cost to the company is great. All because of careless mapping—and a 2-ft. hole.



Practical Pointers For Electrical And Mechanical Men

How Underground Substations Should Be Ventilated to Obtain Full Rating

In the modernly equipped non-gaseous mines of the present day, purchased power seems to have proved the most economical and efficient, due to the fact that the required operating voltage may be maintained at the working face of the coal and also the usual power-house expense and troubles eliminated; hence the underground substation is rapidly taking its place in the industry.

Although these substations are originally installed at or near the working face, before long the mine has developed a considerable distance from the point where the substation was located, and as most of these isolated stations are equipped with automatic reclosing circuit breakers for the control of the direct-current side, an operator is not required. Therefore the substations are practically forgotten until development of the mine has advanced to such a point that the voltage drop is again realized, and the substations must be moved nearer the workings. Long before this condition arises it is probable that the paths of ventilation will be changed, the fans moved closer to the workings, etc.; therefore the path for ventilation that was originally provided for the substation will be badly crippled or blocked entirely. As a result the motor-generator set or converter—whichever may be employed for converting the alternating current into direct current—must pay the first penalty, the second being paid by the

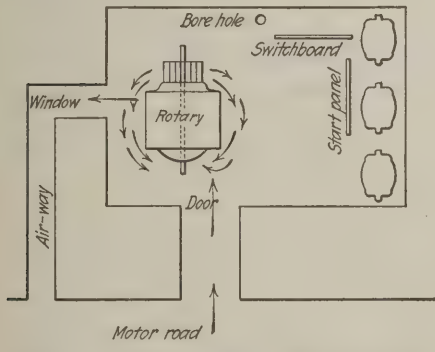


FIG. 1—VENTILATION BEFORE FAN WAS INSTALLED

The same air was continually circulating through the converter and thus causing a gradual increase in temperature until it became a detriment to the insulation, commutator and brushes, also cutting down the capacity and efficiency of the machine.

maintenance man in charge of the equipment, and the third by the operators of the mine.

While nearly all manufacturers of electrical machinery design their apparatus to generate its own ventilation, this provision is far from ample when no supply of fresh air is available; in fact it is of no practical help, as it only circulates the same volume of air through the machine again and again. Therefore a means must be provided to circulate a much greater volume of air.

Referring to a condition that I believe will serve as an average experienced along such lines: The room temperature at 7 a.m. was found to be 60 deg. F., as the machine had been standing idle since 4:30 p.m. of the day before. This machine was a Westinghouse synchronous converter having a capacity of 150 kw., 275 d.c. volts and an allowable temperature rise of 55 deg. C., and an additional 5 deg. rise, at the commutator and rings, as well as an allowance for 100 per cent momentary overloads without damage or excessive temperature rise, but at no time did the machine accommodate a peak load of more than 51 per cent while the temperature conditions were under test.

At 7:15 a.m. the converter was started and thrown on the line, and the results of tests taken throughout the day are as follows:

Time	Room Temp.	Field Surface Temp.
9:15 A.M.	74 deg. F.	81.3 deg. F.
10:15 A.M.	82 deg. F.	89 deg. F.
12:15 P.M.	96.5 deg. F.	116 deg. F.
3:15 P.M.	109 deg. F.	163 deg. F.
4:20 P.M.	110.5 deg. F.	176 deg. F.

Thus the armature and field insulations were being rapidly destroyed, commutator burned, brushes damaged and the general efficiency of the machine greatly lowered.

By experiment it was learned that the air in this station must be replaced one and one-half times each and every minute to relieve this condition in a satisfactory manner. The dimensions of the room were 11 ft. x 17 ft. x 10 ft. 6 in.; hence, approximately 1,963.5 cu.ft. of air was contained in the room, which would require a fan capable of removing $1,963.5 \times 1.5 = 2,945$ cu.ft. of air per minute. The nearest to the requirements just determined was a Venturi exhaust fan, listed by the Westinghouse Electric & Manufacturing Co., of East Pittsburgh, Pa. The capacity of the fan

selected was 3,250 cu.ft. per minute, this being nearest to the requirements.

The fan just mentioned is direct connected to a direct-current motor of the series-wound type with a speed of 900 r.p.m. having a full load current of 0.11 amp. at 275 d.c. volts. This fan was connected through suitable fuses to the direct-current terminals of the converter; therefore it does not remain idle during the moments that the d.c. circuit breaker may be open, nor is it subjected to the full-line voltage while starting, as the fan attains its maximum speed as the voltage of the converter builds up to its maximum, considering that most all small converter units are started from the alternating-current side of the machine.

The maximum temperatures after the fan was placed in operation are as follows: At 4:20 p.m., room temperature, 64 deg. F.; fields, 98 deg. F.

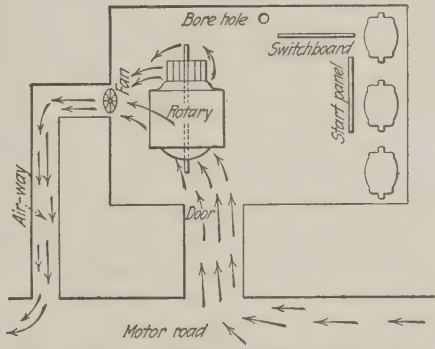


FIG. 2—PROPERLY VENTILATED SUB-STATION AND CONVERTER

After the fan was installed the air in the substation was changed every minute and a half. The circulation of air through the converter allowed the machine to be operated to its full capacity without any damage or danger of overheating.

Prior to the time this fan was put in service, the average life of a grade No. 619 National Carbon Co. brush for the d.c. side of the converter was 46 days, but since the fan was put in service the same grade of brush shows only 9/32 in. of wear after seven and one half months of service.

From this data it may readily be proved that in only a short period of time the brush savings alone will pay the cost of the ventilating fan plus the labor required to install it.

The accompanying illustrations show the natural ventilation before the fan was installed and the air currents after the fan was installed.

ROYCE L. GRIMES,
Electrical and Chemical Engineer.
Piney Fork, Ohio.

Combustion Control and Best Boiler Practice

Will you please give me solutions to the following questions:

(1) In a certain plant coal having a heat value of 14,000 B.t.u. per lb. is used. If the flue-gas temperature was 450 deg. above the air in boiler room, and 25 lb. of air was supplied per pound of coal, what percentage is lost in stack gases? The specific heat of chimney gases is 0.24.

(2) What gas in large proportions in chimney gases indicates insufficient air being supplied to the fuel?

(3) What gas in the chimney indicates that too much air is being supplied to the fuel? What proportion of this gas is good practice?

(4) What instrument is commonly used to test flue gases?

(5) How is the condition of the boiler indicated by a change in temperature of the chimney gases, and why?

Chicago.

C. E. PETERSON.

(1) The precise answer depends upon the analysis of the coal, for if 25 lb. of air per pound of coal is supplied, the weight of flue gases per pound of coal will be this amount of air plus the carbon or other elements which are added to it. If the coal were 100 per cent carbon, the amount of flue gas per pound of coal would be 26 pounds and the heat lost under the conditions named would be 20 per cent. This condition, of course, never exists in actual practice, as there always is a certain percentage of ash and hydrogen. The latter element burns to water and is not shown in the analysis of flue gas for which the samples are collected over water.

(2) CO, when present in any amount always indicates insufficient air. High percentages of CO₂ also are likely to be accompanied by a certain percentage of CO.

(3) Oxygen, of course, indicates air which has not been used in combustion. It is always necessary to supply air in excess of that theoretically required. In present-day practice 6 to 8 per cent. of oxygen, depending upon whether the boilers are hand or stoker fired, would indicate good practice.

(4) The instrument commonly used is what is known as the Orsat machine. This apparatus consists of a burette graduated up 100 c.c. and surrounded by a water jacket. This burette is connected to a manifold, which in turn is connected to three or four pipettes containing various reagents for the absorption of different elements in the gas. These pipettes are in turn connected to rubber bags which permit the gas permanently in the rear half of the pipette to pass out of the pipette to permit the introduction of the gas to be analyzed into the front bulb of the pipette. Each one of these pipettes is provided with a stop cock to shut it off from the manifold. The burette also is provided with an opening to which is connected a three-way cock,

one opening in this cock connecting to the tube through which samples are drawn and the other for discharging analyzed samples to the atmosphere. At the bottom of the burette is placed a connection for a rubber tube to the end of which is connected an open bottle.

The method of using an Orsat is to fill the burette with water, open the three-way cock to the sampling tube and draw a sample of gas into the burette by permitting the water therein to flow into the bottle connected to the bottom of the burette. Exactly 100 c.c. is drawn off after two or three samples have been drawn and rejected so as to be sure to get the proper sample from the boiler. The sample is then passed into the first pipette, which contains a solution of caustic potash for the absorption of carbon dioxide, by raising the water bottle, which causes the water to flow into the burette and displace the gas sample. After being permitted to remain in the pipette a sufficient length of time, the gas is returned to the burette by lowering the water bottle, and the amount of gas remaining is determined. The difference between this amount and the original 100 c.c. represents the carbon dioxide absorbed in the first pipette.

The second pipette contains an alkaline solution of pyrogallol for the absorption of oxygen and the remaining pipette or pipettes contain an acid solution of cuprous chloride for absorbing the carbon monoxide. The process of absorbing and measuring the oxygen and the carbon monoxide is the same as that described for absorbing and measuring the carbon dioxide. After the three reactions have been performed, there will be considerable volume remaining, which is nitrogen.

(5) Increasing temperatures of the chimney gases indicate that the boilers are dirty, either internally or externally. Scale or soot existing on boiler tubes decreases the flow of heat through the boiler tubes and therefore makes the boiler less efficient and the temperature of the chimney gases high.

Information on Heating of Electrical Conductors

Answering the recent inquiry on heating of conductors in your paper, we feel we cannot do better than give you below the report of our research engineer on the subject of heating of conductors in conduits:

"We have no data here giving methods for computing the proper current-carrying capacity of single conductor cables for 3-phase a.c. when in iron or steel conduit. The problem is not possible of purely mathematical solution. The chief difficulty is the calculation of the induced current in the conduit due to the current in the copper conductor.

"The information desired can be obtained only by a long experimental investigation. About the only thing one can do is to calculate the current along the lines suggested and then use

a factor which will give a fair degree of agreement with actual practice. This factor will be less than one, and is obtained by dividing what is considered the proper current by the computed current.

"With reference to the specific problem cited, if the 1/0 A.W.G. conductor was alone in the conduit, it might just meet the limit in temperature. Also, this will be influenced by how close the other conductors will be."

THE OKONITE CO.

Installing Cables in Shaft

With the more general use of alternating current for power transmission in the mines and the use of voltages greater than 440, much more consideration must be given to the shaft cable.

These cables should rarely be installed in the main hoisting shaft because of the difficulty of installation, maintenance and likelihood of accident. Whenever possible, the cable should preferably be placed in a separate borehole. A serious objection to the cable being placed in the shaft is the liability to damage from being cut by pieces of coal or damage caused by accidents with the hoisting cage in the shaft.

When cables are installed in a shaft, joints are among the most important items to be given attention. A good joint should be mechanically strong and water-tight. Joints should never be made directly in the shaft unless absolutely necessary, because of the danger in working upon them and the greater liability to breakdown.

A better arrangement is to have the cable continuous from the top of the shaft to the bottom or ordered in sections of such length that the joints may be made at the different shaft levels or veins. Whenever the joint must come in the shaft it is advisable that it be made in an inset in the shaft for the purpose; then the workmen will be in a better position to do a good job and still not be in any great danger.

Joints should be made only after the two cable ends have been securely anchored, the anchorage being designed in accordance with the type of joint. If the joint is of sufficient strength to take the weight of the cable the anchorages may be removed when the joint is completed, but usually some form of support must be maintained for the cable.

One lb. carbon oxidized with perfect efficiency equals:

11,325,000	ft.-lb.
14,600	heat units.
1.11	lb. anthracite coal oxidized.
2.5	lb. dry wood oxidized.
22	cu.ft. illuminating gas.
4.275	kw.-hr.
5.733	hp.-hr.
15.05	lb. of water evaporated from and at 212 deg. F.



Problems In Underground Management



Dynamite Unquestionably Exerts Its Force Equally in All Directions

Tests Show Guncotton Exploded Makes Holes of Same Size Whether
Placed Below or Above Plates of Steel—With Lead
Blocks Pressures Proved to Be Equal

By J. E. CRAWSHAW

Explosives Engineer, U. S. Bureau of Mines, Pittsburgh, Pa.

"Dynamite acts down and black blasting powder acts up," is a statement frequently heard around the mines and from men whose practical observations may seem to warrant their making the statement. Nevertheless those who have studied and tested explosives are convinced that it is an erroneous opinion, arising from a failure to consider all contributing factors.

Tests showing that the force is equal in all directions are simple and easily made, and many explosives investigators have performed them. Before presenting these tests it might be well to consider one or two cases of the use of such explosives which often lead the unwary falsely to conclude that dynamite does not exert an equal disruptive force in every direction:

TWO MISLEADING INDICATIONS

(1) The use of dynamite in the form of an "adobe" or "mud-capped" shot where a mass of explosive detonated on a rock shatters it into many pieces, the broken rock which before the explosion was below the dynamite being the only visible result of the explosive force released. In discussing this action no consideration usually is given by mining men to the force expended on the surrounding air.

(2) The action of dynamite in "brushing" the roof of a coal bed, the explosion throwing out shattered pieces of rock, leaving a crater in the immediate vicinity of the charge. An explosion of black blasting powder will, on the other hand, break the rock upward and outward from the charge, bringing down a large mass of the rock. The difference in the result is not due to the fact that the one shoots up and the other shoots down but that the gases from the one are more rapidly developed than those from the other and so have time to penetrate the cracks and fissures before the rock has given way along the lines of least resistance.

Dr. Charles E. Munroe conducted a test in which he placed disks of guncotton against plates of iron and steel. The holes made by the explosion of the guncotton were of the same size regardless of whether the disk of guncotton was placed above or below the metal plate. This is convincing proof that high explosives exert their power equally in all directions.

At a later date Dr. Walter O. Snelling extended the method of Dr. Munroe; but instead of measuring the forces by the size of the holes in iron plates, he

used the compression produced in small lead blocks. In each trial the explosive and lead block were held rigidly in position. In the first two tests with each kind of explosive the charge was placed above the lead block, while in the other two tests the charge was placed below the lead block, so that the downward and upward pressures were measured, respectively. A measurement of the four blocks used showed equal compression in each instance.

In the practical use of explosives, however, this force which is applied equally in all directions acts against unequal resistances and the effect obtained in any one direction can be equal only to the resultant of the resistances which act in the opposite direction. As soon as the confined gas is released, the force no longer acts. It is evident therefore that when the explosive is not exposed on all sides to an equal resistance the results of blasting may be such as to cause a ready misinterpretation of the real action of the explosive.

Apportioning Working Places To Miners by Lot

By ALFRED JONES
Wheeling, W. Va.

Places in the coal mines are often of extremely unequal desirability and that fact permits, and in truth invites, the rankest kind of favoritism on the part of the foreman who distributes them. Even where the foreman means to treat all fairly he is faced by the fact that he has no clear basis on which to decide who is entitled to the better places and so frequently he yields to the loudest clamor, to some personal preference in regard to the claimant or perhaps to the solicitation of someone related to him or a near neighbor.

In the Durham mines of the north of England the working places are distributed by lot. The system is known as cavilling. That this plan is popular is evidenced by its long continuance. Every man feels he has an equal chance and almost all of them accept their lot and are satisfied to plod along in the place afforded till the next drawing. Of course, if a man does not like his place he can leave the mine but this he rarely does.

With this arrangement the charge can no longer be made that the mine foreman is paid for the better places. To accuse a boss of taking money for

that purpose generally results in the miner being fired on the spot. Nevertheless men do pay \$50, even \$100, for a good place. Foreigners just arrived, not considering the giving of money for this purpose to be wrong, are quite willing to pay that much cash for an advantage which will enable them in a short time to recoup themselves for the expenditure.

Not only are men sometimes favored who pay the boss money but men are removed for not paying it. To excuse his action a foreman will give some reason having little foundation in fact. He will declare that the place "is going too slow" or that the man "is loading dirty coal" or he may curtail the miner's turn of cars. A favorite scheme, however, is to give the man a partner he doesn't like hoping he will quit rather than work with him.

In the system allowing men to choose their places by lot two men may ask the foreman to permit them to exchange places because, for various reasons, some men like places that others dislike. The change is then beneficial to both. The only disadvantage of the English custom is the loss of time when the men change their working places. However, that rarely exceeds a half a day and no manager will begrudge that time if the men by reason of the arrangement are made content.

Reply to question on this subject delivered at Dec. 19 meeting, Coal Mining Institute of America.

Discussion

Some, at Least, Were Quizzed In Presence of Gas

With indignation I read a letter written by a superintendent in the Dec. 6 issue of *Coal Age*, page 863, in which he criticized the work of the Board of Examiners at the last examination of mine foremen and firebosses and questioned the validity of the certificates issued by them. He no doubt refers to the examinations held this summer at two of our mine schools.

I happen to know much about the routine and character of the work performed at State College this summer, where a class of about fifty men were preparing themselves for certificates, and I must say that, judging from the way these men worked and the completeness of their instruction, I do not see how anyone can question their qualifications and ability to perform the duties of any appointment within the range of their certificates.

The mining law was taught and discussed most thoroughly and frequent oral tests showed that the students had a good conception of what the law means to the mining man. "Superintendent" says that candidates for fireboss certificates were not submitted to an oral examination. Those who believe that are certainly laboring under a false impression. I will admit they were not examined inside a mine, but the law reads that candidates for certificates "shall also have undergone all oral examination in the presence of explosive gas," which examination they did take in a chamber containing gas of that character.

By a regular course of lectures, demonstrations and tests the men were taught the construction, advantages and disadvantages of the principal types of approved flame safety lamps. They also were given demonstrations of the action of these lamps in a gaseous mixture. Let me add that at considerable expense and loss of valuable time these men took advantage of these courses, and they should be given credit for their enterprise.

M. S. L.

Joseph J. Walsh, Secretary of Mines, State of Pennsylvania, in a letter dated Nov. 23 to James T. Beard, says: "The examining boards under the new act, as under the old act, have authority to make rules for the conduct of the examinations. The new act, though it omitted the clause regarding the oral examination in the presence of explosive gas, gives the boards authority to make the examinations as thorough as they desire."

This disposes of the question as to whether examinations omitting the oral examination of the applicant in the presence of explosive gas are valid or

invalid. They are distinctly valid, but the question whether they fill the need is still to be answered. In truth, the examination of firebosses is both a mental and a physical test. The fireboss may be clever, responsible and well instructed enough for the job but if he cannot see a cap on a lamp, cannot distinguish it when caused by small percentages of gas, then he is not a fit man though he had all the knowledge in a mining pocketbook or all the wisdom of the oldest fireboss in the industry or had a medal for long and faithful service. When will it be learned that no college or school can endow a man with powers of color perception or grow an arm on the stump of a one-armed man?—EDITOR.

Will Classroom Examination Fill the Bill?

No one can effectually examine the qualifications of a fireboss anywhere but in a mine, and for this reason I believe that the reader signing himself Superintendent in *Coal Age* of Dec. 6 performed a public service in calling attention to the importance of hewing close to the line laid down in the Bituminous Mining Law of Pennsylvania.

After many conferences and prolonged discussion with mining engineers and mine officials, the mine inspectors of the bituminous region of Pennsylvania, under the leadership of the late James R. Roderick, then chief of the Department of Mines, at Harrisburg, submitted to a committee of the State Legislature a complete and comprehensive draft of what they considered would make a thorough revision of the mining laws then on the statute book.

This entire revision was promptly enacted by the Legislature sitting at that time and approved by the Governor of Pennsylvania, June 9, 1911. The revised law has generally been conceded to be a model and many of its features have been incorporated in the mining laws of several of the states. Notwithstanding, there have since been made a number of revisions of different sections, as suggested by the changing conditions and requirements in the mines.

Until the present year, May 31, 1923, applicants for fireboss certificates were supposed to be given an opportunity to demonstrate their ability to detect a flame cap in a safety lamp exposed to an explosive mixture of gas and air. It may be assumed that some of the examining boards misinterpreted the meaning of the expression "oral examination in the presence of explosive gas."

Though some of the boards took their applicants for fireboss certificates into the mines and subjected them to the

practical test, other boards may have employed means of making this test by exposing a safety lamp to an explosive mixture of gas and air in a chamber or box, on the surface, the apparatus being provided with a window through which the action of the lamp flame could be observed by the candidate. Still other boards may have satisfied themselves of the ability of the candidates to perform the duties of fireboss in gaseous mines without putting them to the practical test.

This difficulty appears to be the only reasonable excuse for the dropping of this clause when Art. 24 was revised in its entirety by the last legislature, and approved by Governor Pinchot, May 31, 1923.

There are many firebosses now employed in making the test for gas in bituminous mines who fail to detect the presence of gas until the mixture has reached 2½ or even 3 per cent. This is largely due to failing eyesight, and in some instances color blindness may be the cause. The danger of this condition is easily recognized when it is remembered that 1 per cent of gas or less is extremely dangerous in the mining of a soft inflammable coal.

How Ohio Lost an Output Of Six Million Tons

Diversion of business by the government and shipment of inferior grades of coal into Ohio from the "crescent" has cost the southern Ohio operators the loss of much of their Ohio business is the conclusion of W. D. McKinney, secretary of the Southern Ohio Coal Exchange.

Mr. McKinney points out that the demoralization of the district is due primarily to the federal government's war orders compelling Ohio producers to ship their entire output to the Northwest. The loss this year is more than 6,000,000 tons in production.

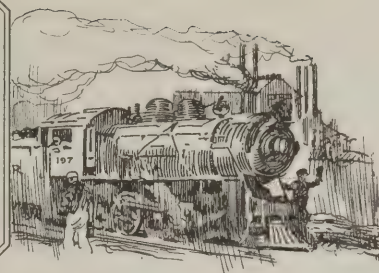
"The severely cold winter of 1917-18 found the country short of fuel, particularly the Northwest, and the U. S. Fuel Administration directed that all the domestic coal of southern Ohio be directed to that section," Mr. McKinney said. "Practically every pound of screened lump produced in this field was taken away from the operator's trade in Ohio, Indiana and Michigan and sent to the lakes, where it was transhipped to the Northwest.

"This opened the Ohio retail field to the Crescent district, south of the Ohio. There are few laws that govern grading of coal in this district, with the result that people of Ohio burned inferior and dirty coal, in the majority of instances, not knowing its source. Consequently coal from the southern Ohio district was given, figuratively speaking, a 'black eye.'"

Mr. McKinney said further that coal from the Hocking, Pomeroy, Crooksville and Jackson districts of southern Ohio is equal for general domestic and steam purposes to coals of the same rank produced in West Virginia.



Production And the Market



Weekly Review

The anticipated slump in the anthracite market arrived on scheduled time. Demand for all sizes fell off and independent coals was quoted last week, in many instances, as low as at any time in 1923. Although there was a heavy cut in production due to the holiday season, there was sufficient coal on hand to meet all needs. Movement of premium coal is more difficult and producers and shippers of independent product are looking for orders. Despite the dullness of the soft coal market there is a distinctly better feeling as the new year opens. Inquiries for both contract and spot coals are more numerous and buyers generally show indications of adding to their present reserves.

Coal Age Index as of Dec. 31 shows an advance of one point to 179 over the previous week. The corresponding average price was \$2.17. Slight increases in Mt. Olive, Standard, eastern and western Kentucky, Clearfield, Cambria-Somerset, Kanawha and Pocahontas districts were partly overcome by decreases in southern Illinois, Springfield and Indiana coals.

Production Takes Upward Turn

Output of soft coal increased to 10,545,000 net tons during the week ended Dec. 22 according to the Geological Survey, an advance of 607,000 tons over the previous week's production. In the corresponding week of 1922 the output was 10,138,000 net tons. Soft coal production for 1923 to Dec. 22 stands at 537,143,000 net tons, which is 117,370,000 tons ahead of the average production for 1919, 1921 and 1922, and 19,251,000 tons behind the average production of 1917, 1918 and 1920, the years of activity.

The holiday season affected the midwest markets last week. There was no action in domestic coals and little demand for steam sizes. While many mines closed down during the week between Christmas and New Year's, production exceeded the demand. The trade at St. Louis is doing little business in the cheaper grades of coal, but there is no demand for anthracite, smokeless coals or coke. Little activity is reported from

Kentucky, Duluth or Milwaukee. Buying is quiet in Ohio and the Pittsburgh district market continues in poor shape. An extremely quiet market is reported from New England, with buying and receipts in light volume.

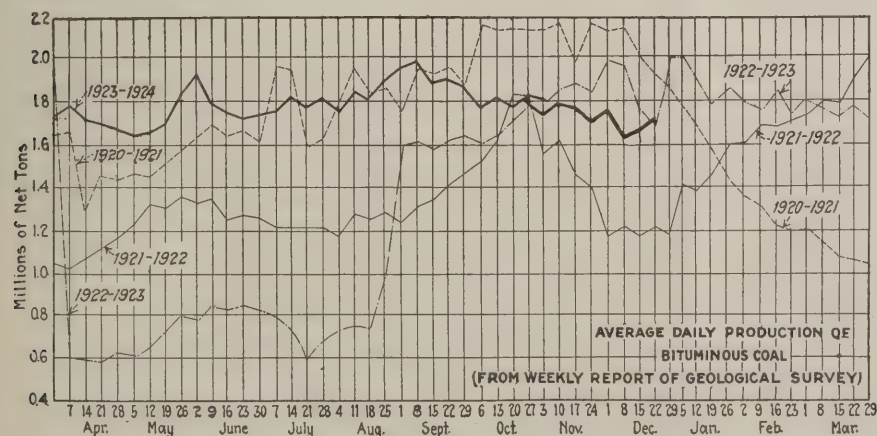
The anthracite market lost much of its snap last week. While there is a good market for stove and chestnut coals the demand for the other sizes, with the possible exception of barley, is not active. Egg coal is in over supply with some shippers. Pea coal is rapidly accumulating and it was said that some of the larger companies were willing to make concessions to keep it moving. Quotations for this coal ranged as low as \$5.50 at Boston while the markets at New York and Philadelphia ranged around \$6. Cancellations of orders for high-priced coals are being received from Long Island and sections of New England. Output of anthracite amounted to 1,990,000 net tons, during the week ended Dec. 22. This was a decrease of approximately 23,000 tons when compared with the previous week.

The export market was quiet. Some inquiries were reported but comparatively little new business was reported as closed. Freight rates remained high. A slight increase in foreign business was reported at Hampton Roads. Dumpings for all accounts at Hampton Roads during the week ended Dec. 27 were 357,110 net tons, an increase of 1,183 tons when compared with the previous week.

Midwest Market Dormant

The week between Christmas and New Year's struck little life into the coal trade of the Midwest region. Domestic sizes of everything were without action and steam sizes were in light demand. Regardless of the fact that dozens of mines in Illinois, Indiana and Kentucky shut down before Christmas and expected to stay down until some day early in 1924, production was too great for the market. Cold weather seems to be a necessity if the trade in this region is to rise from the dumps.

Franklin county lump, rated at \$3.75 since the price drop



Estimates of Production

(Net Tons)

BITUMINOUS

	1922	1923
Dec. 8.....	11,495,000	8,929,000
Dec. 15 (a).....	10,667,000	9,938,000
Dec. 22 (b).....	10,138,000	10,545,000
Daily average.....	1,690,000	1,757,000
Calendar year.....	397,737,000	537,143,000
Daily av. cal. year.....	1,319,000	1,786,000

ANTHRACITE

Dec. 8.....	2,075,000	1,899,000
Dec. 15.....	2,237,000	2,013,000
Dec. 22.....	2,065,000	1,990,000
Calendar year.....	53,095,000	93,961,000

COKE

Dec. 15 (b).....	299,000	241,000
Dec. 22 (a).....	281,000	251,000
Calendar year.....	7,770,000	17,694,000

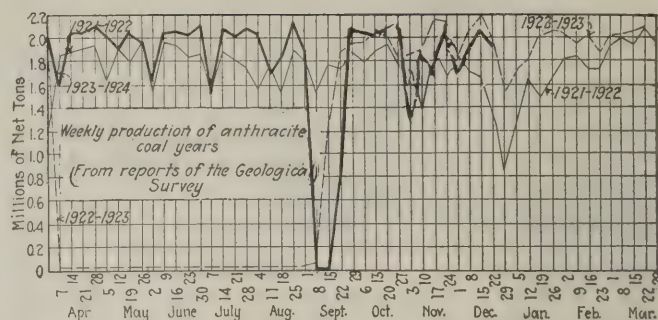
(a) Subject to revision. (b) Revised from last report.

of Dec. 6, has softened until it is hard for association members to sell in the face of independent competition at \$3. Middle sizes have been selling at almost any price and screenings, though not in great volume, have sold in transit as low as \$1.20 though quoted at \$1.90 on the circulars. Central Illinois lump is soft at \$3 and screenings from that region waver from \$1.25 to \$1.50. There is little eastern coal coming into this general territory just now.

The usual holiday depression covers the entire Southern Illinois field and everything is quiet in Williamson and Franklin counties, with a little demand only for screenings and small nut. All mines have a surplus of domestic sizes and cutting the price does not seem to move them any. Railroad tonnage has eased up. Idle mines have strings of empty coal cars on their sidings and the tonnage loaded and billed moves promptly. Somewhat similar conditions prevail in the Jackson and DuQuoin fields.

St. Louis Trade Drags

Business is still dragging in St. Louis with weather above freezing. As a matter of fact, no season up to the present has equaled the end of 1923 for warm temperature. The



trade seem to be doing a little business for cheaper grades in smaller quantities and the finish of the year will be quiet, with practically no coal moving. There is no demand for anthracite, smokeless or coke and the higher grades of midwestern coals.

There is very little activity in the Western Kentucky fields, as most of the mines are reported as down with the idea of staying down until Jan. 2 or Jan. 7. Demand for

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
	Market Quoted	Dec. 26, 1922	Dec. 17, 1923	Dec. 24, 1923	Dec. 31, 1923†		Market Quoted	Dec. 26, 1922	Dec. 17, 1923
Smokeless lump.....	Columbus.....	\$6.30	\$3.35	\$3.35	\$3.25@ \$3.50	Franklin, Ill. lump.....	Chicago.....	\$5.35	\$3.60
Smokeless mine run.....	Columbus.....	6.00	2.10	1.85	1.75@ 2.00	Franklin, Ill. mine run.....	Chicago.....	4.10	2.35
Smokeless screenings.....	Columbus.....	5.50	1.25	1.25	1.20@ 1.35	Franklin, Ill. screenings.....	Chicago.....	3.10	1.80
Smokeless lump.....	Chicago.....	7.75	3.35	3.50	3.25@ 3.75	Central, Ill. lump.....	Chicago.....	4.35	3.00
Smokeless mine run.....	Chicago.....	6.60	1.80	2.10	2.00@ 2.25	Central, Ill. mine run.....	Chicago.....	3.10	2.10
Smokeless lump.....	Cincinnati.....	6.75	3.10	3.10	2.75@ 3.50	Central, Ill. screenings.....	Chicago.....	2.20	1.50
Smokeless mine run.....	Cincinnati.....	6.25	2.00	2.00	2.00@ 2.25	Ind. 4th Vein lump.....	Chicago.....	5.10	3.25
Smokeless screenings.....	Cincinnati.....	6.10	1.50	1.75	1.50@ 2.00	Ind. 4th Vein mine run.....	Chicago.....	3.85	2.60
*Smokeless mine run.....	Boston.....	8.60	4.40	4.45	4.60@ 4.75	Ind. 4th Vein screenings.....	Chicago.....	2.35	1.70
Clearfield mine run.....	Boston.....	4.25	1.90	1.80	1.50@ 2.25	Ind. 5th Vein lump.....	Chicago.....	4.75	2.50
Cambria mine run.....	Boston.....	4.80	2.35	2.35	2.25@ 2.75	Ind. 5th Vein mine run.....	Chicago.....	3.60	2.10
Somerset mine run.....	Boston.....	4.40	2.15	2.10	1.75@ 2.50	Ind. 5th Vein screenings.....	Chicago.....	2.35	1.50
Pool 1 (Navy Standard).....	New York.....	6.25	3.00	3.00	2.75@ 3.25	Mt. Olive lump.....	St. Louis.....	3.10	3.10
Pool 1 (Navy Standard).....	Philadelphia.....	5.50	2.95	2.95	2.75@ 3.25	Mt. Olive mine run.....	St. Louis.....	2.50	2.50
Pool 1 (Navy Standard).....	Baltimore.....	6.00				Mt. Olive screenings.....	St. Louis.....	1.75	1.75
Pool 9 (Super. Low Vol.).....	New York.....	5.35	2.25	2.25	2.00@ 2.25	Standard lump.....	St. Louis.....	4.25	2.85
Pool 9 (Super. Low Vol.).....	Philadelphia.....	5.30	2.35	2.35	2.10@ 2.50	Standard mine run.....	St. Louis.....	2.10	1.95
Pool 9 (Super. Low Vol.).....	Baltimore.....	5.10	2.25	2.00	2.00	Standard screenings.....	St. Louis.....	1.50	1.35
Pool 10 (H.Gr. Low Vol.).....	New York.....	5.10	2.00	1.95	1.75@ 2.00	West Ky. lump.....	Louisville.....	4.35	3.00
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	4.85	1.85	1.85	1.70@ 2.00	West Ky. mine run.....	Louisville.....	3.35	1.75
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	4.60	2.20	1.90	1.90	West Ky. screenings.....	Louisville.....	2.50	1.15
Pool 11 (Low Vol.).....	New York.....	4.15	1.60	1.60	1.40@ 1.80	West Ky. lump.....	Chicago.....	4.25	2.85
Pool 11 (Low Vol.).....	Philadelphia.....	4.45	1.65	1.65	1.55@ 1.75	West Ky. mine run.....	Chicago.....	2.75	1.75
Pool 11 (Low Vol.).....	Baltimore.....	4.10	1.90	1.75	1.75				
High-Volatile, Eastern					South and Southwest				
Pool 54-64 (Gas and St.).....	New York.....	3.55	1.60	1.60	1.50@ 1.75	Big Seam lump.....	Birmingham.....	3.95	3.85
Pool 54-64 (Gas and St.).....	Philadelphia.....		1.65	1.70	1.60@ 1.80	Big Seam mine run.....	Birmingham.....	2.60	1.95
Pool 54-64 (Gas and St.).....	Baltimore.....	3.85	1.85	1.50	1.50	Big Seam (washed).....	Birmingham.....	2.60	2.35
Pittsburgh so'd gas.....	Pittsburgh.....	5.25	2.55	2.40	2.40@ 2.60	S. E. Ky. lump.....	Chicago.....	6.25	3.10
Pittsburgh gas mine run.....	Pittsburgh.....		2.25	2.25	2.20@ 2.30	S. E. Ky. mine run.....	Chicago.....	3.85	1.85
Pittsburgh mine run (St.).....	Pittsburgh.....	3.10	2.05	2.00	1.90@ 2.10	S. E. Ky. mine run.....	Louisville.....	6.75	3.10
Pittsburgh slack (Gas).....	Pittsburgh.....	3.00	1.50	1.65	1.60@ 1.75	S. E. Ky. mine run.....	Louisville.....	3.50	1.75
Kanawha lump.....	Columbus.....	5.25	2.85	2.60	2.50@ 2.75	S. E. Ky. screenings.....	Louisville.....	3.10	1.15
Kanawha mine run.....	Columbus.....	3.10	1.60	1.60	1.50@ 1.75	S. E. Ky. lump.....	Cincinnati.....	6.50	2.85
Kanawha screenings.....	Columbus.....	2.85	0.95	1.05	1.00@ 1.25	S. E. Ky. mine run.....	Cincinnati.....	3.35	1.55
W. Va. lump.....	Cincinnati.....	6.25	2.85	2.55	2.25@ 3.00	S. E. Ky. mine run.....	Cincinnati.....	3.25	1.00
W. Va. Gas mine run.....	Cincinnati.....	3.75	1.60	1.45	1.40@ 1.75	Kansas lump.....	Kansas City.....	5.50	4.75
W. Va. Steam mine run.....	Cincinnati.....	3.35	1.60	1.45	1.40@ 1.75	Kansas mine run.....	Kansas City.....	3.75	3.25
W. Va. screenings.....	Cincinnati.....	3.10	0.80	1.20	1.10@ 1.50	Kansas screenings.....	Kansas City.....	2.50	2.00
Hooking lump.....	Columbus.....	5.25	2.90	2.60	2.50@ 2.75				
Hooking mine run.....	Columbus.....	2.85	1.85	1.75	1.65@ 2.00				
Hooking screenings.....	Columbus.....	2.60	1.15	1.30	1.25@ 1.40				
Pitta. No. 8 lump.....	Cleveland.....	4.75	2.45	2.45	2.00@ 2.90				
Pitta. No. 8 mine run.....	Cleveland.....	3.25	1.95	1.90	1.85@ 1.90				
Pitta. No. 8 screenings.....	Cleveland.....	3.10	1.60	1.50	1.50@ 1.60				

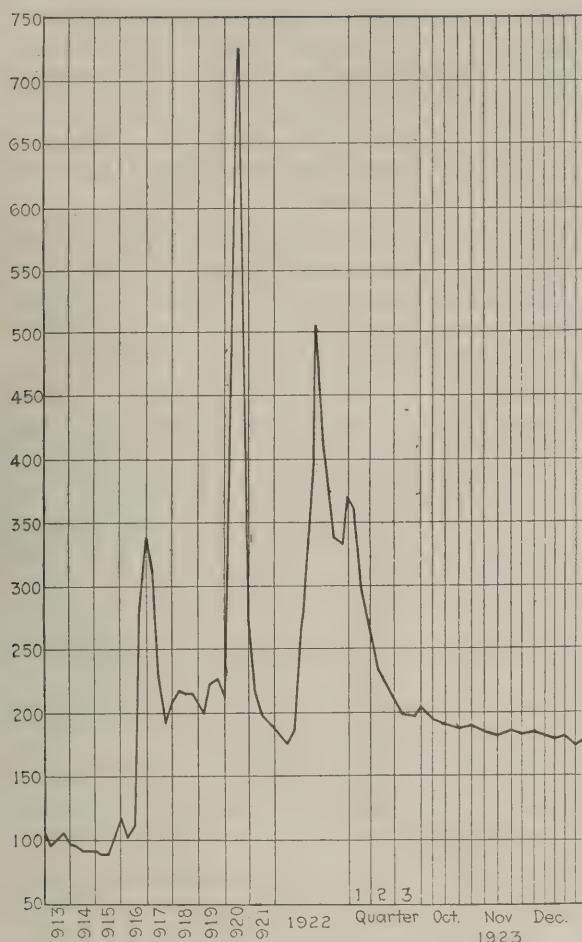
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Dec. 26, 1922		Dec. 24, 1923		Dec. 31, 1923†	
		Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34	\$9.00	\$7.75@ \$8.25	\$8.50@ \$10.00	\$8.00@ \$9.25	\$8.00@ \$9.25
Broken.....	Philadelphia.....	2.39		7.90@ 8.10		9.50@ 10.00	8.75@ 9.25
Egg.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.85@ 10.50	8.75@ 9.25	9.85@ 10.50
Egg.....	Philadelphia.....	2.39	9.25@ 11.00	8.10@ 8.35	9.85@ 12.20	8.75@ 9.25	9.85@ 11.00
Egg.....	Chicago*.....	5.06	12.50@ 13.00	7.20@ 8.25	9.60@ 12.50	8.00@ 8.35	9.60@ 12.50
Stove.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.85@ 11.00	8.75@ 9.25	9.85@ 11.00
Stove.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 12.20	8.90@ 9.25	9.85@ 11.00
Stove.....	Chicago*.....	5.06	12.50@ 13.00	7.35@ 8.25	9.60@ 12.50	8.00@ 8.35	9.60@ 12.50
Chestnut.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.85@ 11.00	8.75@ 9.25	9.85@ 11.00
Chestnut.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 12.20	8.90@ 9.25	9.85@ 11.50
Chestnut.....	Chicago*.....	5.06	12.50@ 13.00	7.35@ 8.35	9.60@ 12.50	8.00@ 8.35	9.60@ 12.50
Range.....	New York.....	2.14	5.00	8.25		9.00	9.00
Pea.....	New York.....	2.22	7.00@ 11.00	6.15@ 6.30	6.00@ 6.50	6.15@ 6.65	6.15@ 6.65
Pea.....	Philadelphia.....	2.14	7.00@ 8.00	6.15@ 6.20	6.35@ 7.50	6.35@ 6.60	6.35@ 6.60
Pea.....	Chicago*.....	4.79	7.00@ 8.00	5.49@ 6.03	6.00@ 6.75	5.40@ 6.05	6.00@ 6.75
Buckwheat No. 1.....	New York.....	2.22	4.00@ 5.00	4.00@ 4.10	2.00@ 3.00	3.50	2.00@ 3.00
Buckwheat No. 1.....	Philadelphia.....	2.14	5.00	4.00	2.25@ 3.50	3.50	2.00@ 3.50
Rice.....	New York.....	2.22	3.00@ 3.25	2.75@ 3.00	1.35@ 2.25	2.50	1.35@ 2.25
Rice.....	Philadelphia.....	2.14	2.50@ 2.75	2.75@ 3.00	1.75@ 2.50	2.50	1.50@ 2.50
Barley.....	New York.....	2.22	1.75@ 2.00	1.50@ 2.00	1.00@ 1.50	1.50	1.10@ 1.50
Barley.....	Philadelphia.....	2.14	1.00@ 1.75	2.00	1.00@ 1.50	1.50	1.00@ 1.50
Barley.....	New York.....	2.22		2.10	1.25@ 1.45	1.60	

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1923			1922
	Dec. 31	Dec. 14	Dec. 17	Dec. 26
Index	179	178	181	349
Weighted average price	\$2.17	\$2.16	\$2.19	\$4.23

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally, shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913, 1918," published by the Geological Survey and the War Industries Board.

coal even including screenings is very dull. Screenings, however, bring 75c. to \$1 over prices of a few weeks back. Some of the Western Kentucky screenings are quoted at \$1.50 a ton, but highest sales found are \$1.25@ \$1.40. Mine run and prepared sizes show no change. Eastern Kentucky shows no material change from a week ago. Trade is light all around.

Northwest Is Quiet Too

A Duluth observer reports that the business is in a state of coma there and that nothing is maintaining the price circulars except an uncertainty as to the attitude the miners' union will take toward a strike April 1. In that city even domestic call is light in spite of a touch of winter.

There is no business in Milwaukee because of the failure of winter to deliver ice and snow but prices are steady. At the Twin Cities activity is lacking except among coal salesmen. Lignite from Dakota has had its effect and is getting some of the trade, even though the fuel value of this material is low.

It is estimated that 900,000 tons of soft coal and 240,000 tons of hard coal are on the docks at the Head-of-the-Lakes.

Little Doing in the West

Western markets are as light as those elsewhere. The surplus of coal that has been accumulating in the Kansas and Oklahoma fields is still on hand and prices have begun to soften in order to move it. During Christmas week the

average working time for the Southwest was two days but even that production could not all be sold.

In Utah and Colorado markets are light for everything and domestic sizes are generally soft. Dealers are not stocking now.

Ohio Markets Quiet

The market in Ohio was quiet during the holiday season. At Columbus buying was at a low point, consisting chiefly of small lots. Only a few large orders were reported as placed and the volume of business looked somewhat smaller than usual for this time of the year. Reduction in domestic consumption caused the closing of more Ohio mines and those operating are on a two to three days' weekly schedule. Retail prices have slumped in keeping with mine prices. In the Cincinnati market slack leads the market in demand, some of the activity coming through industrial and utility plants "covering" because of shut downs of their normal sources of supply. The market for both high and low volatile offerings is firm. Domestic coals are still in a bad way and retail dealers are curtailing their orders. There has been no change in the retail situation either as to price or demand. River business slackened on account of the holiday season. Demand at Cleveland was dull.

The Pittsburgh market continues in poor condition. Sales are hard to put through, there being little open market demand. There is some strike talk, but as yet there is very little disposition on the part of consumers to add to their stocks. Demand for domestic coals has been particularly poor on account of weather conditions. There is practically no demand at Buffalo. Slack is in better demand.

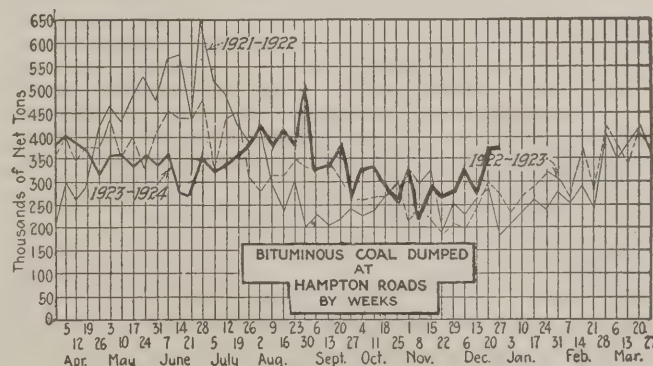
Buying Quiet in New England

In New England the year opens with an extremely quiet market. In no direction is there buying of any moment and receipts, both all-rail and by water, are very light. Scattering purchases that were made some weeks ago when prices were at a minimum have about ceased. The textile and other industries face a more encouraging prospect, but reserves are so large that no favorable reaction on coal is looked for until there is talk of possible labor troubles in April. Railroads and power companies are still receiving tonnage on old contracts, but the volume is notably less than during the first half of 1923. Generally there is an air of such complete dullness that the trade is all but discouraged.

At Hampton Roads the amount of coal at the piers is said to be less than at any time since June, but of course this situation is partly due to no work over the holidays. Quotations are firmer, but not so much because of any improvement in demand. No. 1 Navy acceptable grades can still be bought at \$4.60 per gross ton f.o.b. vessel, but several of the agencies are adhering to a \$4.75 level, preferring to keep the coal in the ground rather than net further losses. In consequence, on-car prices at this end are reasonably well maintained at \$5.75 to \$6 per gross ton for the same coals.

No Activity Along the Seaboard

The soft coal trade along the seaboard is quiet. There are numerous inquiries, and the prospects for better business early in January are bright. Buyers remained out of the market on account of inventory taking. At Philadelphia the trade at times seems to be a bit duller than usual. Consumers showed no interest and the early part of the new



year did not show anything better. Consumption was cut down, due to many mills closing on account of the holiday period, while the iron industry is not working anywhere near the capacity of two months ago. The Birmingham market is quiet. Inquiry is light for both steam and domestic coals. Production was slightly off, due to the holiday season, but there is plenty of coal above ground to meet all requirements.

Demand for Anthracite Easier

There is further easiness in the anthracite market at New York and Philadelphia. Demand fell off and quotations for independent domestic coals were easier. Pea coal is so plentiful that it is reported at New York that some of the large operating companies are cutting their prices in order

to keep the supply moving. At Philadelphia demand is poor for independent coals and the highest quoted prices are nominal. The softened market also hit the retail trade and one dealer has reduced his prices \$1 a ton. Stove and chestnut stocks are accumulating with almost every dealer having capacity stock of pea coal. The steam sizes are moving better, and barley is reasonably tight, some wholesale dealers being sold well ahead.

The coke market is steady. It is said that at least one first quarter contract and possibly two or three others, has been made at \$3.75, and other contracts have been made as high as \$4.40. Spot furnace coke remains at \$3.75@\$.4, and spot foundry coke at \$5@\$.50. A fair number of contracts for foundry coke have been made at \$6@\$.65.

Foreign Market And Export News

British Coal Market

The holiday season resulted in business being practically suspended in the South Wales coal market. Bunker supplies are limited and the demand for steam coals is somewhat easier.

British coal exports during the 11 months ended Nov. 30 were 73,575,713 tons as compared with 73,400,118 tons in the 12 months of 1913, the best previous record, according to official British Board of Trade statistics obtained by the Bankers Trust Co. of New York. Exports in 1922 were approximately 58,243,000 tons.

The Egyptian and Sudan governments are reported to be asking for bids for 200,000 tons of second admiralty and Monmouthshire coals by Feb. 5 and monthly deliveries beginning March. Other substantial inquiries are reported in the market.

Coal and Coke Exports and Imports

During November, 1923 the United States exported 369,429 tons of anthracite and 1,253,445 tons of bituminous coal, as compared with 440,608 tons of hard coal and 1,618,037 tons of soft coal in the corresponding month of 1922. Of the coal sent abroad last November Canada received 1,035,066 tons, Italy, 40,159 tons, France, 30,272 tons and Brazil 24,285 tons. Imports of coal during the same month was 8,690 tons of anthracite and 46,399 tons of bituminous as compared with 12,631 tons of hard coal and 366,423 tons of soft coal in November of 1922. Coke exports in November last amounted to 49,363 tons as compared with 38,397 tons in the previous November, with imports of 2,056 tons in November as compared with 8,543 tons in the corresponding month of the previous year.

Norwegian Coal Output

The annual report of the Great Norwegian Spitzbergen Coal Company for the year ended June 30, 1923, shows that production of coal for the year was 113,620 tons, and machinery installed since the close of the year is expected to bring the output up to 15,000 tons monthly. The quantity shipped during the period was 149,079 tons and the stock in hand at June 30 last 30,739 tons. The company's

largest customers are the Norwegian State Railroads and some large steamship owners.

Export Clearances, Week Ended Dec. 29, 1923

FROM HAMPTON ROADS

For Cuba:	Tons
Nor. SS. Gunnar Heiberg, for Havana.	3,222
Dan. SS. Phoenix, for Santiago.	2,024
For Corsica:	
Amer. SS. Jalapa, for Porto Vecchio	
de Piombino	6,026
For Argentina:	
Ital. SS. Olimpo, for Buenos Aires.	4,313
For Brazil:	
Br. SS. Bedecray, for Rio de Janeiro.	5,103
Ital. SS. Proteo, for Porto Ferrajo.	6,436
For Italy:	
Ital. SS. Valnegrà, for Porto Ferrajo.	6,436

FROM BALTIMORE

For France:	
Fr. SS. Capitaine Boudouin, for Nice.	6,441
For Italy:	
Czechoslovakian SS. Legie, for Genoa.	7,822
For Chile:	
Br. SS. Gibraltar (coke).	4,200

French Coal Output Increases

In order to keep down the high cost of living the French authorities have asked the coal producing companies to reduce the increases recently made on the price of the various coals, the advance on sized coals to be 5 fr. instead of 10 fr. and on flaming coals 3 fr. instead of 5 fr.

During October the French mines produced 3,689,858 metric tons of coal as compared with 3,321,297 tons in September, and 190,225 tons of coke as compared with 181,648 tons in the previous month. The imports consisted of 1,935,821 tons of coal and lignite and 282,806 tons of coke. Imports in September were 2,619,831 tons of coal and lignite and 280,316 tons of coke. In October there was exported 121,915 tons of coal and lignite as compared with 156,137 tons in September; and 44,082 tons of coke, a decrease of 6,862 tons when compared with the previous month.

There was delivered to France and Luxemburg from the Ruhr during November 213,200 tons of coal, 298,800 tons of coke and 28,900 tons of briquets, a total of 540,900 tons, as compared with a total of 354,500 tons delivered in October.

Holiday Dullness at Hampton Roads

Business at Hampton Roads was unchanged last week, with the usual holiday dullness. Variations in price, if any, were slight, and little effort was made in the trade to push business until after Jan. 1.

Coastwise and bunker trade held their own, while a slight increase in foreign movement was noted. General improvement in the Virginian Ry. situation, in spite of the strike of trainmen, was one of the features of the market, and supplies of coal moved to port in a healthy state.

The tone of the market was weak, but shippers looked forward to immediate improvement in trade after the first of the year.

United States November Domestic Coal Exports

	1922	1923
Anthracite.....	440,608	369,429
Value.....	\$4,845,304	\$4,183,717
Bituminous.....	1,618,037	1,253,445
Value.....	\$10,467,872	\$6,214,493
Coke.....	38,397	49,363
Value.....	\$492,495	\$490,443

Eleven Months Ended November

Anthracite.....	1,983,829	4,215,821
Value.....	\$21,130,186	\$45,919,835
Bituminous.....	9,614,195	18,076,953
Value.....	\$56,453,975	\$99,040,142
Coke.....	333,291	1,059,819
Value.....	\$3,469,559	\$11,469,421

Pier and Bunker Prices, Gross Tons

	Dec. 22	Dec. 29.
Pool 9, New York.....	\$5.00@\$.55	\$5.00@\$.55
Pool 10, New York.....	4.75@ 5.00	4.75@ 5.00
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.50@ 4.60	4.50@ 4.65
Pools 5-6-7 Hamp. Rds.....	4.10@ 4.25	4.15@ 4.25
Pool 2, Hamp. Roads.....	4.25@ 4.35	4.25@ 4.30
BUNKERS		
Pool 9, New York.....	5.30@ 5.55	5.30@ 5.55
Pool 10, New York.....	5.05@ 5.30	5.05@ 5.30
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 4.90	4.65@ 4.90
Pool 1, Hamp. Roads.....	4.50@ 4.60	4.50@ 4.60
Pool 2, Hamp. Roads.....	4.25@ 4.35	4.25@ 4.35

Hampton Roads Pier Situation

	Dec. 20	Dec. 27
N. & W. piers, Lambert's Pt.:		
Cars on hand.....	2,142	1,724
Tons on hand.....	124,217	110,586
Tons dumped for week.....	132,439	153,338
Tonnage waiting.....	10,000	9,325
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,092	1,205
Tons on hand.....	66,450	78,800
Tons dumped for week.....	79,742	79,401
Tonnage waiting.....	4,500	8,115
C. & O. piers, Newport News:		
Cars on hand.....	1,417	1,785
Tons on hand.....	71,740	94,735
Tons dumped for week.....	105,611	86,109
Tonnage waiting.....	6,315	6,610

Traffic News

Private-Car Owners Present Strong Case In Assigned-Car Rehearing; Union Hints

Oral arguments in the assigned-car case were presented the Interstate Commerce Commission, Dec. 17, 18 and 19, and the rehearing granted by the commission after its original order of last spring, abolishing the practice stands submitted to the commission for decision. The commission has extended suspension of its original order until April 1, from Feb. 1, which was the last date fixed by the several previous extensions.

Private-car owners are considered to have presented a strong case to the commission. The steel interests were represented by an array of attorneys, the trend of whose arguments was that the steel industry cannot be operated economically without the use of private coal cars. A. G. Gutheim, representing a group of private-car owners who are consumers or shippers or both consumers and shippers, stated that private-car owners do not expect preferential movement of their cars by the carriers.

In behalf of the American Railway Association, Judge R. V. Fletcher stated that the railroads would agree that assigned cars be restricted to mines owned by railroads and to mines under contract with railroads for their entire year's output.

The construction of Paragraph 12 of Section 1 of the Interstate Commerce Act, which provides that all cars set at a mine shall be counted in the mine's rating, was brought into the case as to whether it should be considered literally or whether it really made into statute the principle of the Thayer case some years ago, in which the commission held in effect that it could rate mines from day to day. Commissioner C. B. Aitchison asked Judge Fletcher whether he considered this section a legal or an administrative matter. The attorney replied that he differed from some of his colleagues and considered it administrative. If the section be administrative, then there can be no appeal to the courts from any ruling of the commission under the section.

Individual attorneys representing several railroads which own mines argued that the commission has no jurisdiction over cars sent such mines by the owning roads.

E. S. Ballard, representing the National Coal Association, presented an argument in support of the commission's original ruling as to railroad cars. The association has remained neutral regarding the question of private cars. He further argued that by reason of some mines having assigned cars

and others in the same field lacking this system a competition for labor between mines was created which made the case one of discrimination in favor of the mine with the assigned cars, thus bringing the practice within Section 3 of the Interstate Commerce Act, dealing with discrimination.

A strong argument was presented by Van A. Bittner, special representative of John L. Lewis, president of the United Mine Workers. In his remarks, and also in the testimony he gave at the hearing in October, there was what some of the auditors interpreted as a hint that the United Mine Workers may attempt to abolish all forms of assigned cars in districts which are highly unionized. This was when Mr. Bittner called attention to the contract clause providing for an equal distribution of mine cars within the mine and stated that the U. M. W. stands for an equal distribution of railroad cars outside the mines. A full car supply at one mine and an inadequate supply at an adjoining mine causes unrest among the miners and makes for inequalities which all of the men would be glad to have ironed out, Mr. Bittner said.

Questioned as to whether the mine workers lost more time in 1922 from strikes or from lack of cars, Mr. Bittner said that the strike of 1922 was due in part to the assigned-car practice. Mr. Bittner emphasized in his argument what he stated in his October testimony that in his opinion and that of the officers of the United Mine Workers, the assigned-car practice has done more to overdevelop the coal industry than any other single factor.

Reading Financing Approved

An order of the Interstate Commerce Commission giving formal and final approval to the financing steps taken by the Reading Company to carry out the Supreme Court decree separating its railroad and anthracite interests was entered at Washington on Dec. 27. At the same time the Pennsylvania State Public Service Commission announced its approval of the merger of all the railroad corporations of the Reading system into one company to be known as the Reading Company.

Under the reorganization plan the Reading Company itself was authorized to take over and operate the Philadelphia & Reading R.R. system and its component railroad subsidiaries and to issue \$63,084,666 in new 4½ per cent gold bonds in exchange for old securities. The merger is the result of an

order of the U. S. District Court to segregate its coal and railroad business. As the holding company the Reading Company controls the Philadelphia & Reading Ry. Co. and twelve other underlying companies.

More Anthracite Rate Hearings

Announcement was made on Dec. 27 by the Interstate Commerce Commission that further hearings in its investigation of rates on anthracite and bituminous coal would be held in Washington before Chief Examiner Butler beginning Jan. 14. The investigation involves the question, among other things, of whether joint all-rail rates should be established from the southern West Virginia low-volatile fields to New England and North Atlantic States.

Would Dismiss Rate Complaint

Dismissal of a complaint brought by the Virginia Coal Operators' Association against the Aberdeen & Rockfish and other railroads was recommended on Dec. 27, by Attorney-Examiner W. B. Hunter in a report to the Interstate Commerce Commission. The report said the commission should find that rates on coal from the Appalachian and Dante districts in Virginia to points in North Carolina, South Carolina, Georgia and Florida, and rates from the Harlan County district in Kentucky to the same destinations were not unduly prejudicial as alleged.

Hearing on Higher N. Y. Rates

The Coal & Coke Committee of the Trunk Line Association announces a hearing Jan. 19 at 413 Liberty Street, New York City, on a carrier's proposal to increase the freight rates between Schenectady and Troy, N. Y., on anthracite, bituminous coal and coke, 13c. per net ton each. The present rates are \$1.13 each for anthracite and bituminous coal and \$1.26 for coke.

A hearing also is announced for the same day on a carrier's proposal to adjust bituminous coal rates from mines on the Pittsburgh & Lake Erie R.R., Bessemer & Lake Erie R.R., West Side Belt R.R., Pittsburgh & West Virginia Ry. and Baltimore & Ohio R.R. to Andover, Alfred, Almond, Hornell and other points on the Erie R.R. in New York State.

Coming Meetings

Tug River Coal Operators' Association. Annual meeting Jan. 4, 1924, Bluefield, W. Va. Secretary, C. C. Morfit, Welch, W. Va.

New England Wholesale Coal Association. Annual meeting Jan. 8, 1924, Boston, Mass. Secretary, R. S. Townsend, Boston, Mass.

Engineers' Society of Western Pennsylvania. Annual meeting Jan. 15, 1924, Blue Room, William Penn Hotel, Pittsburgh, Pa. Secretary, K. F. Treschow, Pittsburgh, Pa.

American Wood Preservers' Association. Annual meeting Jan. 15-17, 1924, Hotel Buehlebach, Kansas City, Mo. Secretary, P. R. Hicks, Chicago, Ill.

Northeast Kentucky Coal Association. Annual meeting Jan. 24, 1924, Ashland, Ky. Secretary, C. J. Neekamp, Ashland, Ky.

News Items From Field and Trade

KENTUCKY

The L. & N. railroad is reported to have bought properties at Ermine, three miles from Whiteburg, for the extension of yards there. This is expected to aid in the ready movement of coal from the Harlan and Hazard fields.

Of twenty-three cases decided by the Kentucky Workmen's Compensation Board on Dec. 18, all but four were in connection with accidents of employees of coal companies. In two coal company cases compensation was denied, but it was allowed in all of the others.

The 1923 tax assessment for Harlan County is \$24,302,131, as compared with an assessment of \$20,870,150 in 1922, which was increased by the supervisors to \$23,831,165. Coal has made the southeastern Kentucky district.

Willard R. Jillson has been asked by Governor Fields to continue as state geologist. Mr. Jillson was appointed under the Republican administration, but has handled his office so well that the new régime wishes to keep him on the job.

The Logan Pocahontas Fuel Co., Cincinnati, recently opened a branch sales office in the Inter Southern Building, Louisville, in charge of C. D. Calloway.

Fred M. Sackett, of the Byrne & Speed Coal Co., Louisville, headed a recent successful campaign to finance a Memorial Auditorium Fund of about \$1,500,000. He also is working hard on a campaign for erection of a \$7,000,000 bridge across the Ohio River to connect Louisville with Jeffersonville and New Albany. There are now three railroad bridges, all for steam lines, one having roadways, and two being utilized by electric lines as well.

ILLINOIS

Following the expenditure of \$15,000 for improvements, the Rutland coal mine, which was recently purchased by a group of business men from Ottawa, is expected to reopen soon for operation. Those interested are Lee O'Neil Browne, A. E. Butters, Fred T. Scherer, J. L. Bane, George L. Farnsworth and Louis Gowen.

T. H. Green, formerly superintendent of the mine at Girard, Ill., and more recently holding a similar position with the Standard Oil Co. mine at Shopper, until it recently closed down, has been named superintendent of the "Old Mine" at Auburn, which was recently purchased by the Leland Coal Co. of Chicago.

Drilling on a tract of land—the Hennessy farm—two miles east of Murphysboro is expected to develop a good acreage of No. 1 and No. 2 seam of coal unworked. It has been generally understood that all of this coal was under lease, but this farm was not included. It is on the electric line.

The new Shuler mine, at Alpha, has come into the realm of producing mines, as 100 tons of coal was hoisted Dec. 12, the first day the mine was operated. Charles Shuler, Jr., of Alpha is manager of the mine. Within the first month of operation the hoist will be raised to 300 tons of coal daily, with probable production of 1,000 tons a day when the mine is in full working condition.

The United Electric Coal Co. has acquired during the past year 2,500 acres of coal land within three miles of Cuba, at a cost of over \$300,000. A steel tippie and top works are under construction with a capacity of 4,000 tons per eight hours. Three steam shovels are at work. The total investment in this, one of the largest strip operations in the country, is about \$1,000,000. The Tiger Coal Co. also is opening up a strip mine near Cuba, with a capital invested of \$100,000.

The miners at the Valley Coal Co. mine, north of Duquoin, who sued for wages, have withdrawn their suits. The mine was being prepared for reopening under the direction of J. L. Mitchell of Royalton, who recently died. His death halted the work. The in-

vestors are hopeful of continuing the work, however.

The supply building containing the machine and blacksmith shops of Peabody No. 9 mine near Taylorville was destroyed by fire Christmas week, with a loss of about \$15,000. Defective wiring was the probable cause.

The Cripple Creek Coal Co., which has acquired leases to a large tract of land east of Galesburg, is arranging to have a core bore made on the land.

MINNESOTA

C. A. Bruce, secretary of the Twin City Coal Exchange, announced on Dec. 11 that the exchange will file a formal protest against the proposed increase in through rail rates on anthracite from the principal Pennsylvania mines to Minneapolis and other Northwestern points. The freight rate on anthracite, if changed, will mean an increased transportation cost of \$1.66 on a net ton of hard coal, Mr. Bruce said. Several other Northwestern organizations are planning to protest the proposed rail rate, according to Mr. Bruce.

Freight charges were more than twice the cost of coal recently bought by the City of Minneapolis for the crematory. A recent shipment of 712 tons of coal from Burton, Ill., cost at the mine a total of \$1,068.12, while the freight was \$2,342.64. Thus the coal cost \$1.50 a ton and the freight amounted to \$3.29 a ton.

NEW YORK

Announcement has been made of awards of coal contracts by the New York State Department of Purchases as follows: Shawnee Fuel Co., New York City, Binghamton State Hospital, 1,200 net tons slack, \$1.85 f.o.b. mine, and Central Islip State Hospital, 2,000 tons bituminous run of mine, \$1.63 per ton; Clark Coal & Coke Co., New York City, Elmira Reformatory, 1,200 tons bituminous run of mine, \$1.70 per net ton f.o.b. mine; Savage-Vail Corp., Indiana, Pa., Syracuse State School, 200 net tons run of mine, \$1.69, and Fidelity Fuel Co., New York City, Binghamton State Hospital, 5,000 net tons barley coal, \$1.20 per ton.

Jackson E. Reynolds, president of the First National Bank, has been elected to the board of managers of the Delaware, Lackawanna and Western R.R. to succeed Frank Rysavy, who has resigned. Mr. Reynolds is head of the Jackson E. Reynolds Syndicate, which recently bought the stock of the Lehigh & Wilkes-Barre Coal Co.

The Delaware, Lackawanna & Western Coal Co. on Dec. 26 declared an extra dividend of 5 per cent in addition to the regular quarterly distribution of 2½ per cent.

Stockholders of the Consolidation Coal Co. have approved changes in the certificate of incorporation permitting a change in the par value of the company's common stock and also the creation of an issue of \$10,000,000 7 per cent cumulative preferred stock, the proceeds of which will be used to reimburse the treasury of the company for capital expenditures and the acquisition of new properties.

The votes of the members of the American Institute of Mining and Metallurgical Engineers for officers and directors for the ensuing year are to be counted Feb. 13. Ballots to be counted must reach the secretary on or before Feb. 12. The official ballot of the Committee on Nominations is: William Kelly, director and president; E. DeGolyer, director and vice president; Charles W. Merrill, director and vice president; directors, R. V. Norris, George Otis Smith, P. E. Butler, Bertram D. Quarrie and L. D. Ricketts. Members will vote also to amend the constitution by making a life membership cost \$225 instead of \$150, and also that a junior associate member may remain such not longer than six years, the period to begin Jan. 1 of the year of election. The article now in force reads that a junior associate member may remain such not longer than five years after leaving an engineering school.

OHIO

An issue of \$2,000,000 collateral trust 6 per cent serial gold notes of The Houston Collieries Co., maturing 1924-1933, has been purchased by a Cincinnati financial syndicate. The notes will be offered in the public market at prices to yield 5.75 to 6.50 per cent according to the various maturities.

John Emslie, manager of the Creech Fuel Co., Fred Gore, sales manager of the Blue Diamond Coal Sales Co., and Ernie Howe, manager of the Pocahontas Fuel Co., were elected directors of the Cincinnati Coal Exchange at the annual election held at the Chamber of Commerce.

The Virginia & Kentucky Coal Co. has been incorporated by J. Bert Shumate and Fred Dunker, formerly of the Pocahontas-Kanawha Coal Co., of Dayton. Offices have been taken on the 11th floor of the First National Bank Building in Cincinnati.

W. M. Tobin, who has been fuel inspector for the Milwaukee Coke & Gas Co., for some time at Cincinnati, has been added to the sales force of the Imperial Coal Sales Co., of that city.

PENNSYLVANIA

The Lehigh & Wilkes-Barre Corporation, the holding company for Lehigh & Wilkes-Barre Coal Co., has sold \$10,000,000 5½-per cent collateral trust bonds, dated Jan. 2, 1924. The corporation owns 149,788 shares of the outstanding capital stock of the coal company, formerly the property of the Central Railroad of New Jersey and ordered sold by the courts. These shares are assigned to The First National Bank of New York City, as trustee, of which Jackson E. Reynolds, is president as collateral security for the payment of the principal and interest of the bonds. C. F. Huber is president of the corporation and also president of the coal company. The board of directors of the coal company paid on Dec. 24 an extra cash dividend of \$40 per share on its capital stock.

Judge Thomas F. Bailey at Huntingdon, on Dec. 26 appointed Andrew S. Webb, of Philadelphia, receiver for the Joseph E. Thropp Co., Inc., which operates iron and coal mines and coke ovens in Pennsylvania and Virginia. The assets were given as \$2,400,000, and the liabilities, \$1,300,000, with quick assets of only \$675,000. The slump in the iron business and inability to obtain additional working capital were given as reasons for the receivership. The appointment was made on a petition of creditors although officials of the corporation declared it was solvent and that all its indebtedness would be paid. The business will be continued by the receiver, whose bond was fixed at \$100,000.

A charter for the Philadelphia & Reading Coal & Iron Corporation was filed at the State Department at Dover, Del., Dec. 20. The new concern was created as a result of the segregation of the Reading Company properties, and will take over the interests of the Philadelphia & Reading Coal & Iron Co. and the Reading Iron Co. The new corporation is authorized to issue 1,400,000 shares of capital stock, without nominal or par value. The incorporators are William J. Richards, Pottsville, Pa., president of the old company; Robert J. Montgomery, Philadelphia, vice president and general coal agent, and William H. MacEwan, Haverford, Pa., vice president and secretary.

Fire, which is believed to have been started by an overheated journal, on Dec. 24, destroyed the washery of the Avoca Coal Co. in Avoca, which is valued at about \$70,000. Early this summer the owners spent \$20,000 in repairing and rebuilding the structure. The loss is partly covered by insurance, it is understood.

WISCONSIN

A special committee of the School Board of Milwaukee, is engaged in studying the merits of Western and Eastern soft coal with a view to a possible trial of the former. Heretofore all city contracts have been let to dock companies handling Eastern coal.

WASHINGTON

The Chicago Pneumatic Tool Co. New York, announces the appointment of the General Machinery Co. of Spokane, Washington as their agents in the eastern part of the State of Washington and northern part of Idaho.

WEST VIRGINIA

The W. M. Ritter Lumber Co., of Columbus, Ohio, has acquired by purchase in fee simple a tract of approximately 67,000 acres of coal and timber lands in Wyoming County, W. Va., which is located near the Virginian R.R. The purchase carried a consideration of \$1,600,000. The entire tract is underlaid with coal varying from 36 in. to 72 in. thick and 28,000 acres of which has smokeless grades. The other is about equally divided between the New River and Kanawha veins. The purchase was made from the Dalton-Kelley-Crane interests.

Formal organization of the Sullivan Pocahontas Coal Co. was effected at a meeting held at Tralee when the following officers were elected: J. C. Sullivan, president and treasurer; Dr. J. A. Wood, of Pratt, vice-president; J. B. Frank, of Tralee, secretary. On the board of directors are the above-named officers and the following: Dr. J. H. Craft, of Springing; James Gorman, of Lynchburg, Va.; R. J. Hancock, of Lynchburg, and H. W. McNeil, of Tralee.

Major Appleyard, of England, who owns extensive mining interests in the Durham district of Great Britain, in company with several associates inspected the mines in the Pocahontas district recently.

A dissolution certificate has been filed with the Secretary of State of West Virginia by the Balkan Coal Co., the main offices of which are in Philadelphia. The Loop Coal Co., of Elkins, also has filed notice of dissolution with the Secretary of State of West Virginia.

Thomas H. Laulis, of Shinnston; Charles E. Pitter, of Fairmont, and associates have chartered the Laurel Run Coal Co., with \$250,000 capital for developing coal land on Laurel Run.

It was only after the Charter of Local 4,047, at Grant Town, had been revoked that the five hundred miners employed at Federal Mine No. 1 of the New England Fuel & Transportation Co. returned to work after having been engaged in an illegal strike from Dec. 11 to 15.

E. Macon Jones has resigned his position with the Twin States Fuel Co. of Hington to become assistant to the Western manager of the Chesapeake & Virginian Fuel Co., of Cincinnati.

The Howard Thacker Coal Co. has just been organized by McDowell County coal men, with a capital stock of \$25,000. Headquarters of the company are to be at Welch. Incorporators are: George W. Lambert, James P. Flannagan, Thomas J. Flannagan, E. W. Howard and J. N. Harman, Jr.

The Wheeling Steel Corporation has completed arrangements to purchase a large tract of coal land in Mason County, extending from a point near New Haven to Letart, along the Ohio River. This coal is said to be in the Pittsburgh and Freeport seams.

Announcement has been made that the Raleigh Fire Creek Coal, the Pickshin Coal Co., Tommy Creek Coal Co., Wood-Sullivan Coal Co., Barkers Creek Coal Co., Hartly Coal Co. and the Mead Pocahontas Coal Co. have been merged into the Sullivan Pocahontas Coal Co. The mines of the various individual companies are located on the Virginian, Chesapeake & Ohio and the Norfolk & Western Rwy. The headquarters of the new company will be at Tralee.

The Coal River Co-operative Coal Co. has been organized by Buckhannon people to engage in the development of coal lands in Upshur and other counties of the state. The new concern is capitalized at \$50,000. Identified with the new concern are I. G. Cutright, G. C. Christner, C. A. Winchester, G. E. Stearns and D. A. Barton.

In connection with the visit of three members of the international board of the United Mine Workers to Charleston recently C. F. Keeney denies that the committee was sent to investigate the affairs of the district. The district president said that the committee came to confer with D. C. Kennedy, secretary of the Kanawha Coal Operators Association, and to investigate complaints of inequality. It was explained by Keeney that the inequalities referred to differences in cost of production in different mines and that the operators asked that the inequalities be investigated with a view to appealing for a revision in their wage contracts with the miners.

The Lundale Mining Institute held its annual banquet at the Lundale Club late in December, marking the fifth successful year of the Institute. About three hundred members as well as prominent mining officials and railroad men attended. Among the speakers were George M. Jones president of the Logan County Coal Corporation; Walter R. Thurmond, president of the

Thurmond and Argyle Coal companies, and J. T. Ryan, vice-president and general manager of the Mines Safety Appliance Co., of Pittsburgh, Pa.

The Holly Elk Coal Co., has been organized at Clarksburg with \$250,000 capital and A. C. McIntyre president and general manager, for development of 1,500 acres of coal land in the Eagle and Sewell seams on Elk River in Webster County.

WASHINGTON, D. C.

John B. Pratt has resigned the editorship of *Coal Review* to take effect Jan. 1, after two years in that post. It is understood that he will re-enter the journalistic field with which he was actively connected prior to his becoming associated with the coal industry, four years ago. In 1919, when the Bituminous Operators Committee of the Central Competitive Field was formed to present the operators' case before the Bituminous Coal Commission, he was secretary of that committee and in charge of its publicity work. Early in 1920 he became director of publicity for the National Coal Association. In July, 1921, he was also made editor of *Coal Review*.

The Board of Directors of the National Coal Association will hold their quarterly meeting in Washington, D. C., on Wednesday, Jan. 9, 1924, to consider the work of the association for the past six months. A number of important committee meetings will be held Jan. 8, among them the Government Relations Committee, the Bituminous Operators' Special Committee and the secretaries' of local associations. All of these committees will consider propositions of importance to the industry with a view to making recommendations to the directors' meeting.

CANADA

Output of coal from Canadian mines during September, according to the Dominion Bureau of Statistics, amounted to 1,218,000 net tons, a decrease of 24 per cent from the tonnage for the previous month and 21 per cent from the average for the month for the three preceding years. The output showed decreases of 162,000 tons in Nova Scotia, 171,000 tons in Alberta, 40,000 tons in British Columbia and 1,000 tons in New Brunswick. In Saskatchewan there was an increase of 1,000 tons. The cumulative output from all mines for the first nine months of 1923 amounted to 12,609,000 tons, an increase of 16 per cent over the preceding three-year average for the same period. Comparison of September and August figures covering the total importation of coal from the United States and Great Britain showed a decrease of 23 per cent. September imports amounted to 2,125,000 tons, while in August 2,746,000 tons was brought in. The September importations this year were 38 per cent greater than the three-year average for the month. During the month 78,100 tons was imported from Great Britain. Total importation of all coal for the nine months of 1923 was 17,518,900 tons, an increase of 52 per cent over the preceding three-year average for the same period. Imports of anthracite for September totalled 328,800 tons. This was 33 per cent less than in August, but 29 per cent higher than the three-year average for the month. Anthracite imported from the United States amounted to 287,900 tons, while 41,000 tons came from Great Britain during the month. Classified by grades, 301,100 tons was of egg, grate, stove, etc., sizes, and the balance 27,700 tons of buckwheat and rice sizes. The total amount of anthracite imported during the nine months of 1923 was 4,004,700 tons, an increase of 42 per cent over the three-year average for this period. The exports of Canadian coal for the month of September were 13 per cent less than in August. The quantities were: September 90,600 tons, August 103,500 tons. Comparison of the September exports with the preceding three-year average showed a decrease of 52 per cent.

J. E. McLurg has been appointed vice-president of the British Empire Steel Corporation in charge of operations of all constituent companies with headquarters at Sydney, N. S., to fill the vacancy caused by the resignation of D. H. McDougall. Mr. McLurg has been for some years general manager of Halifax Shipyards, Ltd.

The briquetting plant at Bienfait, Sask., being at present closed down for want of funds, two carloads of carbonized lignite were shipped for further treatment to the Babcock plant at Hebron, N. D. The completed briquettes have been re-shipped to Canada, and the members of the Lignite Utilization Board state that they are of first-class quality and that the success of the experiment has been demonstrated.

Association Activities

At a recent meeting of directors the Alabama Mining Institute re-elected Frank Nelson, Jr., as president for the ensuing year. Other officials named were George F. Peter, vice-president; Charles A. Moffett, chairman of the board, and James L. Davidson was re-elected secretary-treasurer, a position he has acceptably filled for several terms. The board of directors includes G. B. McCormack, J. W. McQueen, A. B. Aldridge, J. B. McClary, C. T. Fairbairn, S. L. Yerkes, George W. Connors, C. F. DeBardeleben and Charles A. Moffett.

At the annual meeting of the Philadelphia Coal Exchange, held Dec. 20, the following officers were elected to serve during 1924: President, Maurice J. Crean; Vice President, Samuel B. Crowell; Secretary-Treasurer, Charles K. Scull; Directors (to serve for three years), Arthur L. Cohn, Martin F. Connor, Samuel E. Donaghy, John E. Lloyd and Harry E. Strathmann. There are ten holdover directors, five for one year and five for two years.

The New River Coal Operators Association held its annual meeting at Mt. Hope Dec. 20 with a large attendance, companies shipping more than 95 per cent of the coal tonnage produced in the field being represented. Transportation and the effort to obtain an adjustment of rail rates to points north and east of the Potomac came in for discussion and there were addresses by H. L. Gandy, secretary of the National Coal Association; A. M. Belcher, attorney for the operators in the Logan armed march cases; Robert M. Lambie, chief of the West Virginia Department of Mines; A. M. Dudley, general freight agent of the Chesapeake & Ohio, and H. F. Brown, superintendent of the Hinton division of the same road. S. A. Scott, of the New River company, was chosen president; Ernest E. Chilson, general manager of the Raleigh Coal & Coke Co., vice president; P. M. Snyder, of Mt. Hope, treasurer; S. C. Higgins of Mt. Hope, secretary and traffic manager; members of the executive board, William McKell, president of the McKell Coal & Coke Co.; R. E. Taggart, of the Stonegate Coal & Coke Co.; G. H. Caperton, New River Coal Co., and M. L. Garvey, of the Maryland and New River Coal Co.

Obituary

Julian Burrell Huff, coal operator and noted polo player, died on Dec. 24 at Philadelphia, Pa. Injuries received on the polo field are believed by physicians to have brought about his death, the immediate cause of which was a cerebral hemorrhage. Mr. Huff was president of the Keystone Coal & Coke Co., the Latrobe-Connellsville Coal Co., the Mountain Coal Co., the Acme Gas & Coal Co. and several other gas and coal companies in western Pennsylvania.

I. N. Hanson, industrial builder and early developer in the coal fields of Alabama, died Dec. 16, at Bayou Le Batre, Miss., after a long illness. Mr. Hanson was a stockholder and director of the DeBardeleben Coal Corporation. He was a brother of the late Major J. F. Hanson, president of the Central of Georgia Ry. Mr. Hanson was 76 years of age and unmarried.

Lyman M. Graham, 78, retired president of the McLean County Coal Co., of Bloomington, Ill., died recently at his home after a long illness. Starting as a bookkeeper he served his company for 55 years of continuous service, retiring on Jan. 3, 1923. The firm was organized in 1867.

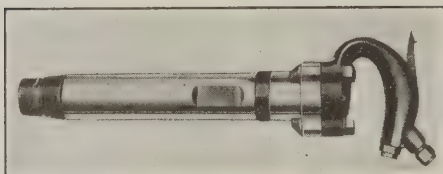
L. L. Legg, director of the Standard Coal Co. and Standard Fuel Co., Salt Lake City, and widely known in the coal-mining industry of Utah, died at Riverside, Cal., recently. He was born in Illinois in 1871.

Charles A. Tribbey, aged 49, died at his home, near Cincinnati, Ohio, Dec. 20. He started in many years ago with the White Oak Coal Co. and rose to be its manager. When that company went out of business, about nine years ago, he was associated with his brothers-in-law connected with the Ulland Coal Co. and in charge of its wholesale department. Six years ago, after the purchase of mines in northeastern Tennessee and southeastern Kentucky, he formed the Tribbey Coal Co. About four years ago he suffered a stroke of paralysis, which failed to yield to treatment and he retired two years ago. The funeral was held Dec. 22.

New Equipment

Riveting Air Hammer

A pneumatic riveting hammer of new type, with many improved and economical features, has been perfected and is now being offered by the Ingersoll-Rand Co., 11 Broadway, New York City. The outstanding features of this new riveter include bolted construction for holding the handle to the barrel, heavy section valve with liberal bearing surfaces; combination poppet and piston type throttle valve; power in excess of all ordinary requirements;



EASILY CONTROLLED AIR HAMMER

This device is made in sizes ranging from 5-in. to 9-in. stroke.

low air consumption and exceptionally easy operation.

The new style hammers are manufactured in three styles, A, B, and C, and are available in a complete range of sizes from a 5-in. to a 9-in. stroke. Each size of this riveter can be purchased with any one of three types of barrels and with either outside or inside trigger handles.

The standard "A" type has a barrel machined to accommodate a rivet set clip only and is furnished on all orders which do not specify either a bridge type or retainer type barrel. Three alloy steel bolts of substantial size, fitted with lock washers, hold the handle to the barrel. This is an exclusive feature of these hammers and enables one to take them apart anywhere for inspection or cleaning with the aid of only a wrench; no vise, crowbar or other tools are necessary.

The throttle valve (except on inside trigger handles) is a combination of the piston and poppet types, having the nicety of control of the piston valve and the freedom from leakage of the poppet type. The beveled seat will remain tight throughout the life of the tool, preventing leakage. The throttle lever, or trigger, is made in one piece from special heat-treated spring steel and has a long bearing in the handle. The control is sensitive, ranging from a light tap to a heavy blow, entirely at the will of the operator.

The valve is a sturdy sleeve made from special alloy steel. It has liberal bearing surfaces and its walls are free from holes or ports, which so often are the starting points for checks or cracks. It operates in a valve box of strong construction, located in the head of the barrel. The valve box is constructed with a solid end which makes

it possible to take it apart easily by the use of a piston for the removal of the valve, without recourse to the use of a screwdriver or similar instrument with subsequent danger of injury. This construction also insures a compression chamber in the valve box which cushions the piston on the return stroke and prevents the piston from striking the handle.

The handles are of high quality steel, drop forged to a shape that fits the hand and are sand-blast finished to give an excellent grip. Either outside or inside trigger handles can be furnished, although the outside type is standard. The exhaust is through the side of the barrel near the handle and can be deflected in any direction desired by the operator, by merely turning the deflector.

They are fast, hard-hitting hammers, yet have less "kick-back" than usual and consume less air. Due, primarily, to the bolted-handle construction, they are lighter in the handle end and consequently are better balanced and easier holding, especially when used in a horizontal or inverted position.

Briquet Binder

A new binder for coal briquets has been developed by the Robeson Process Co., Fifth Avenue, New York City, which the company asserts may be easily handled, is strong, combustible, and burns without offensive characteristics. This substance is called glutrin, which is a trade name used to design-

nate a material made from a product of the pulp mill in the manufacture of paper.

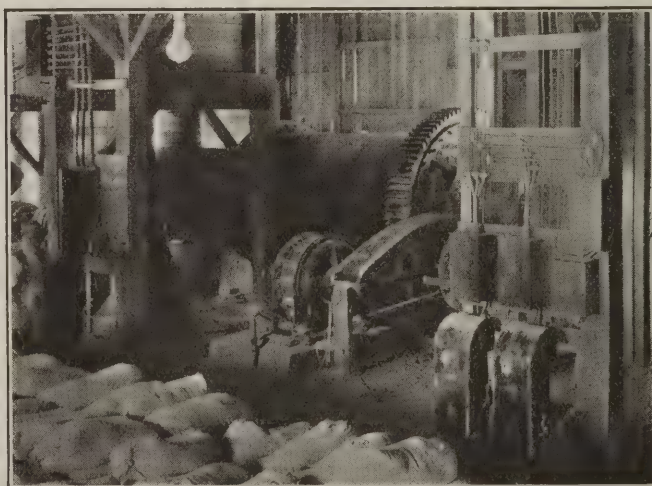
In appearance this material is a liquid of about the consistency of thin molasses. It is unaffected by heat or cold in handling and shipping, is strongly adhesive and will sustain the burden of the fire until the entire briquet is consumed. Being also both smokeless and odorless, its suitability for domestic use is apparent.

Air-Swept Dry Pulverizing Mill Suitable for Coal

The principle of the air-swept mill is to sift the superfluous material from the mass as and when it is finished to the desired fineness. It is a device which will be appreciated by everyone interested in the dry grinding of products, among which is pulverized coal for power purposes.

Unusual features of the plant are the tower drier, which consists of a system of baffling and requires no power to operate it, and the fact that it has no discharge lifters and no means of extracting the material except the velocity of the air through the mill. It is equipped with an air box at the feed end and one at the discharge end. These boxes have valves on both sides so that the quantity of air delivered at the feed end and taken out at the discharge end regulates absolutely the fineness of the product discharged.

The valves on the air box at the discharge end of the mill can be regulated so that the elevating power of the fan is maintained for lifting the material through the cyclones to the bin, as is evidenced by the sifting test. The complete mill equipment is manufactured by Kennedy-Van Saun Mfg. & Eng. Corp., 50 Church St., New York City.



PULVERIZING-MILL EQUIPMENT

Regulation of the air through the mill carries away the ground material when pulverized to the desired fineness.

COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER, Editor

Volume 25

NEW YORK, JANUARY 10, 1924

Number 2

IT IS with much regret that the publishers announce the resignation, as editor of *Coal Age*, of C. E. Leshner, who has so ably conducted the paper during the last three years. His loss will be keenly felt by *Coal Age* and by the industry, for Mr. Leshner, through his clear and forceful discussions, furnished a leadership much needed in these troublesome times in coal production. Mr. Leshner will become assistant to the president of the Pittsburgh Coal Co., the largest producer of bituminous coal in this country.

No changes will be made in the editorial staff. The present organization, trained and inspired by Mr. Leshner, is not only competent to "carry on" but realizes that the opportunity for service to the industry was never greater. *Coal Age* is in a particularly favorable position to help. It has a sympathetic attitude toward the problems of the industry; it commands the industry's respect and confidence. At the same time it is sufficiently detached to see the problems with an impartial eye and to bring to the industry the counsel that results from an appreciation of the industry's obligations to the public. Such a task is not always a pleasant one, but the good of the industry requires that *Coal Age* have its courage high and speak without fear.

R. Dawson Hall, who has been with *Coal Age* since its establishment and who has an intimate acquaintance with the personnel and problems of the coal mining industry, will be in editorial charge of the paper, effective Jan. 18.

Speaking for the editorial staff, the publishers have no hesitancy in assuring the coal industry a service worthy of the respect and confidence in which *Coal Age* is held—a respect and confidence which have been heightened during Mr. Leshner's editorship and which he leaves as a precious heritage and a continuing inspiration to those who succeed him.

THE PUBLISHERS.

FOR the confidence and understanding sympathy of the many friends and readers who have contributed so much to the success of *Coal Age* and to the pleasantness of my editorship in the past few years I am sincerely appreciative. There is a peculiar satisfaction attaching to such work as this that brings one into intimate relationship with the real forces within an industry as large and important as coal.

Coal Age is an institution in the coal industry; my coming and going are but incidents in its history. It has traditions of service and ideals of greater and greater helpfulness to its field. To have been associated with *Coal Age* has been an inspiration and an honor. When next week I relinquish the reins to my present associates and step out of the roll of observer into that, where inclination and opportunity have led me, of active participation in the coal industry, it will be with more than perfunctory regret.

For Mr. Hall, who succeeds me, and his associates I bespeak the good will and co-operation of the men in the industry that it has been my good fortune to enjoy. Their efforts through that inanimate yet living thing, the printed page, to point the way and indeed inspire the men of the coal industry to better methods, safer practices and a larger appreciation of public service cannot bear full fruit without active participation by those in the daily grind of production and distribution.

It is fitting also to record here that which may not be known and appreciated by all, that *Coal Age* is a free agent, its editorial policies untrammelled by special interests, unhampered by exigencies of business policy. *Coal Age* does not speak for the coal industry, but as one of the family it speaks to coal men. To such a journal, as one of the industry, I pledge my loyal support, urging on my new colleagues my belief that *Coal Age* will be valuable as a tool in their work in proportion as they help to make it so.

C. E. LESHER, Editor.

Who Will Urge a Secretary of Mines?

PERENNIALY there rises the question of a Department of Mines. Probably the first recorded effort in that direction was by the American Mining Congress nearly fifteen years ago, when the present Bureau of Mines was authorized and organized. There is argued in favor of a Cabinet portfolio for mining that mining and agriculture are the country's two largest basic industries, that the farmers have a Cabinet officer, and that therefore the miners should have one. Senator Oddie, of Nevada, is advancing the idea strongly this winter. He is chairman of the Senate Committee on Mines and Mining and has given life to that committee by having maneuvered the reference of coal bills to it.

We believe that mining is of sufficient importance to rank with agriculture and would much rather have a Department of Mines to look after coal than have a section in the Interstate Commerce Commission regulate the industry. The railroads rank as high in national importance as mining but they have no Cabinet representative.

We sympathize with the effort Senator Oddie is making. We wish it success. But we cannot refrain from

noting that departments with Cabinet officers at their head are not created unless a large and influential section of the public demands that sort of recognition. The farmers have their department because they have the influence—the votes, if you please—and demanded the service and the representation that flows from a Cabinet official. Labor also has such a department; likewise general industry. When the public wants to regulate an industry it does not demand of its chosen representatives at Washington that they create a department for that purpose, but rather a commission.

The public, and Congress, look on coal as an industry to be regulated. Not until they see coal as an industry to be helped—not until mining comes into higher esteem—can we hope for the happy fruition of Senator Oddie's plan.

Preparing an Alibi

ELLIS SEARLES, unofficial spokesman for John L. Lewis, is reported in the press to have said recently that "a large and powerful element among the coal operators is doing everything within its power to force a strike next April." Chief among those assailed by

Mr. Searles as seeking to tie up the union mines are the "non-union operators of West Virginia, Kentucky, Maryland and southern Pennsylvania. If they can so manipulate matters as to cause a shutdown of the union mines north of the Ohio River, the non-union mines can then continue at work." He asserted that the United Mine Workers do not want a strike, but a continuity of employment.

That the union does not want a strike but plenty of work at the present scale we believe, if by union one means the controlling administration. But there is not plenty of work even at this time, there has not been plenty of work, and there is not going to be plenty of work for the union miners at the present scale. Sooner or later the non-union fields will cut into the union markets with lower costs. So it is obvious that the United Mine Workers cannot have what it desires—plenty of work at the present scale. What will be the second best desire of the United Mine Workers when the consciousness of this fact sinks deeply?

If Lewis elects to have a strike, on what grounds will he justify it? In 1922 he used the shibboleth of the "broken contract." Apparently this year he is laying the foundation well in advance, as he did two years ago, but this time he is preparing to put the blame on the non-union operator. If the outcome of the present uncertain situation is a strike—and why call it softly a suspension?—then, according to Mr. Lewis, it will be the non-union producer that brought it about. Just what this insidious individual has done, is doing, or is about to do, Mr. Searles has not said.

About all that the non-union operator can do is to compete with the union operator and annex all of his business that he can. It is of course a fine thing in a business way for the non-union fields to have the union so conduct itself as to make the organized fields a standby source of fuel for the nation, working when demand is good and shutting down when the market is stocked up. The non-union fields thus have the opportunity for more or less continuous operation, a position buttressed by their ability to adjust costs with fluctuations in the market.

But we think it most unfair for Mr. Lewis to prime Mr. Searles to go about telling the country that those awful non-union operators are planning to have a strike in the union fields, when the only people who can force a strike there are the union miners or the union operators. Are the union fields so weak that the *hope* that non-union producers are said to entertain that there will be a strike constitutes "a powerful influence working for a strike?"

The matter, after all, is clear enough. The United Mine Workers would like nothing better than a renewal of the present scale, and to get that will doubtless ask more in order to have a trading basis. The union operators would welcome a reduction in wages and therefore in costs so as to be able to meet non-union competition, but they have every reason to believe that they cannot accomplish that, even if they put the matter to the test of a prolonged strike. There is no suggestion, so far, of their asking for a reduction. Why, then, the early attempt to establish the alibi? Is President Lewis fearful that he cannot hold his men in line, that they will not be satisfied with a renewal and that there may be a strike despite his efforts to the contrary? Who in the coming summer can longer stand the gaff of short working time, the union miners or the union operators?

Small Cars, Low Tonnage

ONE cannot but feel in entire accord with many of John T. Ryan's reactions in regard to European conditions, as expressed in the article we publish this week. No one can fail to admire the conservational methods of Europe, the saving of coal, to say nothing of the low death rate per man employed if not per ton of product.

However, we cannot see how Europe is justified in its small mine cars. A redoubtable Belgian authority has assured us that the roadways in the mines of that country are large enough to permit of cars of large size and that larger equipment would be justified. That, however, we are informed, is not true of at least many mines in Great Britain.

Standardization is not so necessary in mining as in railroading. In the latter the equipment in many instances must be light enough to pass over the bridges of other railroads and small enough to clear the tunnels of other companies. But each mine is a unit in itself except in so far as it may be cheaper to buy equipment of the size that is being most generally manufactured.

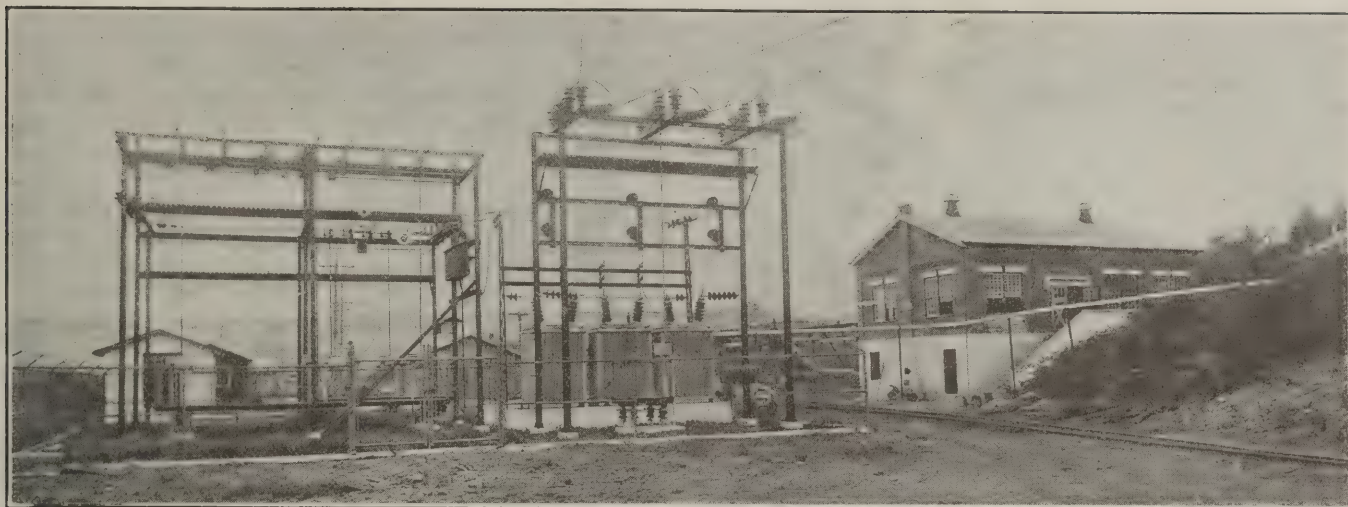
Consequently it would seem that at any mine a larger car might be used, provided that the work of enlarging the shaft and roadways would not be so costly as to make it impossible within a few years to recover the expenditure by savings in haulage, car handling and ventilation, keeping in view always the larger tonnages that bigger cars would make possible.

We are willing to accept the suggestion that in some British mines such alterations as would make the larger car possible would be, if not prohibitive, at least of problematic advantage, especially where the seams are thin and high headings would involve the handling of much rock. But this would not apply to new mines. Great Britain is not opening these as frequently as the United States—fortunately perhaps for that Kingdom—but nevertheless one would expect to see progress, for are not the mines in the deeper deposits in Yorkshire and all those in Kent relatively new? Here is a chance to show what large cars could do.

Great Britain is ahead of the United States in the use of face and roadway conveyors, partly because of the mining of thin seams. The coal, accordingly, frequently is brought to the main roadways by conveyors. On these roadways, therefore, surely big cars could be used. It seems likely that the United States will be induced to put larger cars than ever into its mines in order to keep the conveyors moving with less frequent delays as soon as such means of transportation are introduced. The use of conveyors, however, does not seem to have had any such effect on the methods of our British cousins.

Would that some Sir Isambard Brunel were alive today to urge on the British people the motto which Michael Angelo gave to Raphael in the latter's early years—"Amplius"—so that the British would in this matter seek larger standards of construction.

It will be remembered that Brunel was the man who gave the railroads of Great Britain, for a while, and in spots only, the six-foot gage. He was ahead of his time. Even the United States after trying it gave it up, but today many railroads would wish it had succeeded and the standard gage had failed. Fortunately in mining our car sizes are not standardized in the same way as in railroading.



Novel Application of Dynamic Braking On Large Slope Hoist

Peculiar Requirements of Hoisting and Lowering Speeds Under Widely Differing Loads While Handling Coal, Supplies and Men Necessitate Unusual Type of Control—
Success of Installation Proves Efficacy of Plan

BY R. W. MCNEILL

General Engineering Department
Westinghouse Electric & Manufacturing Co.

EVERY electric hoisting installation is a problem in itself and requires careful study for the best solution. The type of equipment which may be the best for one set of conditions may prove unsuited or uneconomical for a different set of conditions. To decide each problem on its merits is the engineer's problem. In most cases some particular feature of operation or of power supply will be the deciding factor in the choice of the type of equipment to be used. In the case of the hoist for the Packer No. 2 slope of the Lehigh Valley Coal Co., at Shenandoah, Pa., the requirements were such as to impose several unusual operating conditions and the equipment finally selected to meet these conditions makes use of many features not commonly used with electric mine hoists.

The Packer No. 2 slope is in what is known as the Mammoth Vein. The angle of inclination as compared to the horizontal is not uniform, varying between 36 and 45 deg. It is of the single-compartment type equipped with a single track on which cars are hoisted and lowered by a single-drum single-cable hoist to handle men and material. A cross-section of the mine slope is shown in Fig. 1. Material is handled two cars per trip, the maximum weight of the loaded trip being 31,000 lb. and the weight of an empty trip being 9,600 lb. Men also are hoisted in two cars per trip, ten men in each car. Coal, rock and empty cars are handled at a speed of approximately 1,200 ft. per minute while men are handled at approximately 500 ft. per minute. All coal and rock, whether mined above or below the second level, is landed on this level and taken out of

the mine through a tunnel which intersects the slope at this point. Men are handled from the surface to the different levels and are brought to the surface on completion of the shift.

From the foregoing it is readily seen that the operating conditions are quite different from the usual mine hoist in that operation is "unbalanced" at all times and that widely varying loads must be handled in the two directions of travel. To these conditions there was added the stipulation that the operating speed should at all times be completely under the control of the operator with a minimum use of mechanical braking.

Selection of the mechanical parts of the hoist was a fairly simple problem, for the mechanical construction of the hoist was fairly well fixed by the operating conditions as a single-drum geared machine with mechanical brakes of sufficient capacity to hold the load safely in case of power failure, and to take care of a moderate amount of braking without overheating.

Selection of the proper electrical equipment for operation of the hoist was not so simple. Power for operation of the electrical equipment was available at 2,200 volts, 3 phase, 60 cycles, and while it would have been a comparatively simple matter to obtain the required operating characteristics by using a direct-current hoist motor and motor-generator set, using Ward-Leonard control, this would have necessitated a large motor-generator for supplying power to the hoist motor and the outfit would have had a rather high first cost and would have been uneconomical in the use of power.

It was thought best, therefore, to investigate to determine if the required characteristics could not be obtained with a wound rotor induction motor and special control equipment. Satisfactory operation in the hoisting direction did not present any particular prob-

Headpiece shows general view of hoist building. Purchased power is supplied at 66,000 volts and stepped down to 2,300 volts. Ample provision has been made for increasing the transformer capacity. On the extreme left is shown a distributing tower designed to supply other mines in this region also mined under lease from the Girard estate.

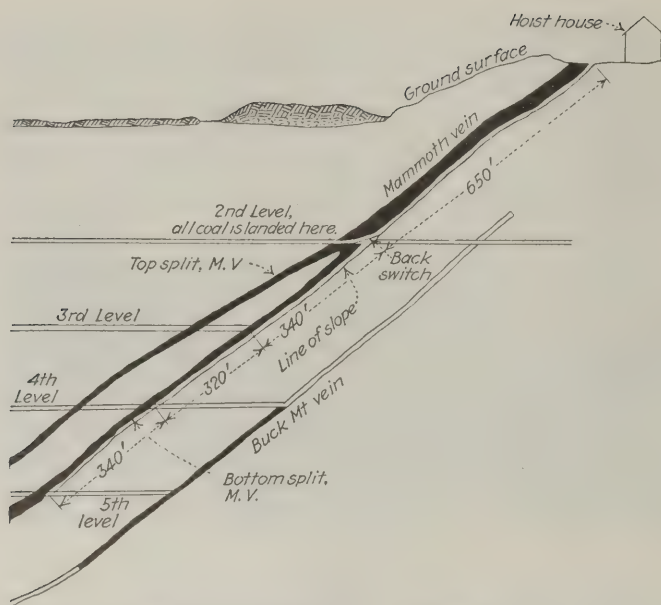


FIG. 1—SECTION THROUGH PACKER NO. 2 SLOPE

Coal hoisting is carried on from the third, fourth and fifth levels to the second level. Supplies and men are hoisted between the various levels and the surface. Occasionally heavily loaded rock cars are hoisted to the surface, thus placing a heavy load upon the hoist.

lem with an induction motor other than that the motor be of sufficient capacity to handle the heaviest loads at full speed, as the problem of obtaining reduced speeds with light loads was simply a question of external resistance and control points to give the required speeds at the different torques necessary.

To obtain satisfactory operating characteristics in the lowering direction was a more perplexing problem. There were available two ways of obtaining electrical braking and speed control with the overhauling loads encountered in lowering. The first and most obvious method was to lower against the torque of the motor, with power applied to the motor primary by the same switches as for the hoisting direction and regulated by the secondary resistance to keep the braking torque of the motor balanced against the overhauling torque produced by the descending load to obtain speed control.

The second method and the one finally adopted makes use of direct-current excitation on the stator of the induction motor to obtain dynamic braking. With this

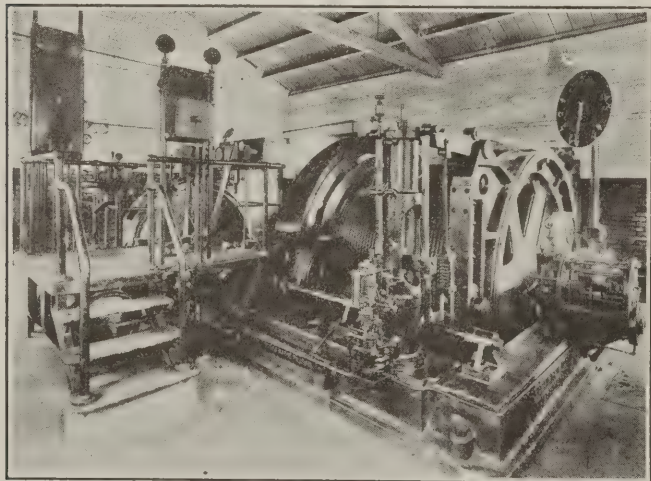


FIG. 2—GENERAL VIEW OF HOIST ROOM

The overspeed governor and limit switch are on the extreme right of the drum shaft. At overspeeds or overhoists in either direction this mechanism operates to stop the hoist automatically. A back-out switch permits the operator to operate the hoist again only in the safe direction after he has made an overhoist and been automatically stopped.

method, as the rotor is turned by the descending load, alternating-current power is generated by the rotor windings. When this power is absorbed in an external secondary resistance, true dynamic braking is obtained. Speed regulation is obtained by variation of the stator excitation and secondary resistance. This method of braking has not been used on mine-hoisting installations to any extent in the past, since on most installations the braking duty is not severe enough to warrant the extra complications and expense involved in the use of this system. Therefore the results which may be obtained by dynamic braking on induction motors are not generally so well understood as is the reverse torque method, which has been used with a great deal of success, particularly on small installations.

Final decision to install the dynamic braking control rather than the reverse torque control was made after a careful analysis of the two systems and was influenced largely by the material savings in power consumption and superior control obtainable with the dynamic braking system, for the difference in cost between the two was very slight.

Use of power while lowering with the dynamic braking system is limited to that necessary for the operation

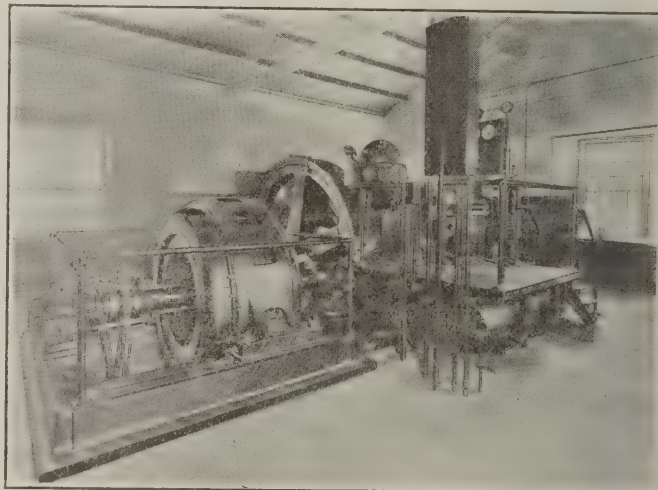


FIG. 3—700-HP. WOUND ROTOR INDUCTION TYPE HOIST MOTOR

To facilitate inspection, cleaning and repair the motor stator may be easily moved to the side. A large flexible coupling connects the motor to the hoist.

of a small exciter, while with the reverse torque method practically as much power is taken from the line in lowering a given load as would be required to hoist the same load and a much larger resistor is required than is the case with the dynamic braking control used because the resistor must not only absorb the power generated by the descending load but must also absorb nearly all of the power taken from the line.

Superior control is possible with the dynamic braking system because of the possibility of adjusting both the stator excitation and the secondary resistance, thus obtaining a wide range of torques and lowering speeds. To obtain the same nicety of operation by the reverse torque method would require a controller with a large number of points.

The equipment finally decided upon and installed at the Packer No. 2 slope consists of a 700-hp. 500-r.p.m. 2,200-volt 3-phase wound-rotor motor geared to a hoist having a cylindrical drum 8 ft. in diameter and 6 ft. wide. Figs. 2 and 3 show the general appearance of the combined hoist unit as installed. The motor is

of the underslung type of construction with low pedestal bearings and includes provision for accurate movement of the stator for adjusting the air gap as well as for sliding the stator off the rotor for the purpose of inspecting or repairing either rotor or stator windings.

The motor is mounted on a bedplate continuous with the hoist bedplate and is connected to the hoist gearing through a flexible coupling. The hoist is equipped with cut steel herringbone gears with an enclosing gear case, a drum brake of the post type, a pinion shaft brake of the band type, an overspeed governor, and a geared limit switch. The brakes are of the gravity-applied, air-released type, air being furnished by a small motor-driven compressor. Emergency operation of the brakes from overtravel, overspeed or failure of power is taken care of by a magnet release device, failure of current on this device causing application of the brakes.

The control equipment consists of a primary circuit-breaker panel, air-break primary reversing contactors, excitation contactor, air-break secondary contactors, grid resistors, master controller, control circuit transformers, and exciter motor-generator set with its control equipment. The scheme of electrical connections and the sequence diagram are shown in Figs. 4 and 5. The appearance of the control equipment as installed is shown in Figs. 6 and 7.

The exciter motor-generator set consists of an 18-kw. 60-volt d.c. generator direct-connected to a 25-hp. a.c. motor, and operates at 1,800 r.p.m. The motor-generator set is operated from the same transformers used to supply current for the operating magnets of the contactors on the control panels. All contactors are magnetically operated with alternating current; no dynamic braking is obtained in case of power failure.

Several interesting problems arose in laying out the control equipment, particularly in regard to convenience of operation, reliability and safety. As finally designed

all operations are logical ones and do not call for unusual concentration on the part of the operator. Movement of the master controller from the "off" position, either hoisting or lowering, tends to give an increase of speed, while slow-down is obtained by an opposite movement. This is accomplished by a different sequence

of operation of the secondary contactors for the two cases.

A study of the curves, Fig. 8, shows that the lowest speeds with dynamic braking are obtained with the lowest resistance, while the reverse is true in hoisting. The design of the secondary resistance, particularly as regards the resistance values at the different control points, had to be a compromise between what would give best results for power and braking operations. Some of the points absolutely necessary for power operation were useless as braking points, and similarly it was necessary to provide braking points not needed for power points.

Reference to Figs. 4 and 5 will show that only four of the secondary contactors used for power operation are used in braking, while one secondary contactor used in braking is not used for power operation at all. Additional contactors for braking operation would have been necessary if advantage had not been taken of variation of the stator excitation to give additional control points. Separate current-limit relays were added

to the control equipment to take care of deceleration on the dynamic-braking connection, as it was desirable to use a different current setting for braking than was desirable for hoisting.

The relays on the braking connections serve a somewhat different purpose than those on the power connections in that their purpose is not to limit the decel-

Sequence of Operation of Contractors From Master Controller																		
Contractor	Control Point	"Hoist"	Off	Control Points	"Lower"	1	2	3	4	5	6	7	8	9	10	11	12	13
1																		
2																		
3																		
4																		
5																		
6																		
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FIG. 5—SEQUENCE TABLE SHOWING WHEN EACH CONTACTOR FUNCTIONS

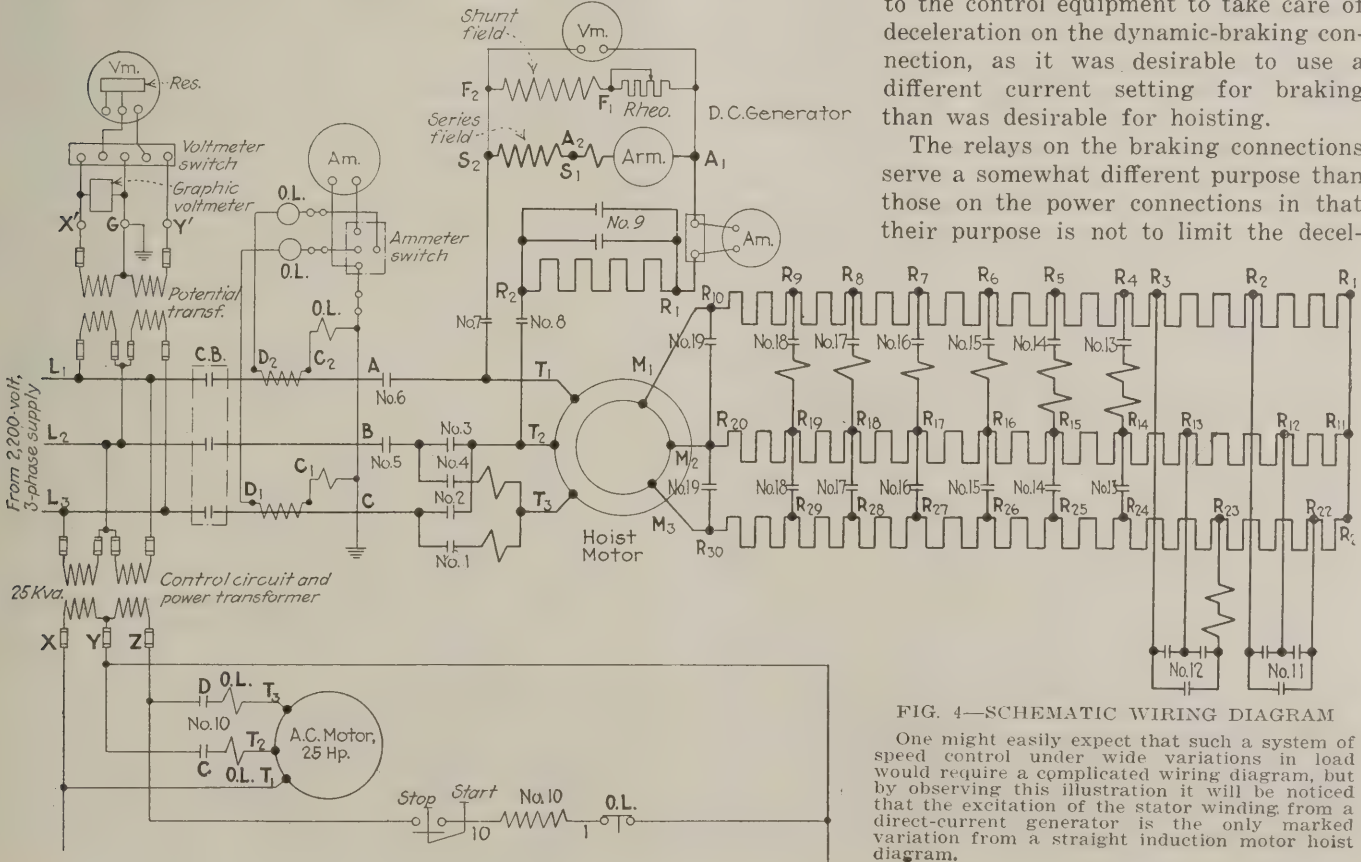


FIG. 4—SCHEMATIC WIRING DIAGRAM

One might easily expect that such a system of speed control under wide variations in load would require a complicated wiring diagram, but by observing this illustration it will be noticed that the excitation of the stator winding from a direct-current generator is the only marked variation from a straight induction motor hoist diagram.

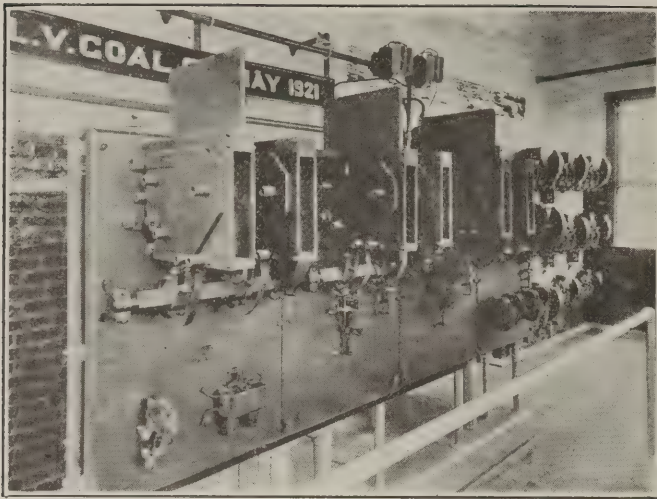


FIG. 6—PRIMARY AND SECONDARY CONTACTORS

All the circuits are made and broken by means of heavy air-break contactors. The contactors in the foreground are the primary reversing switches.

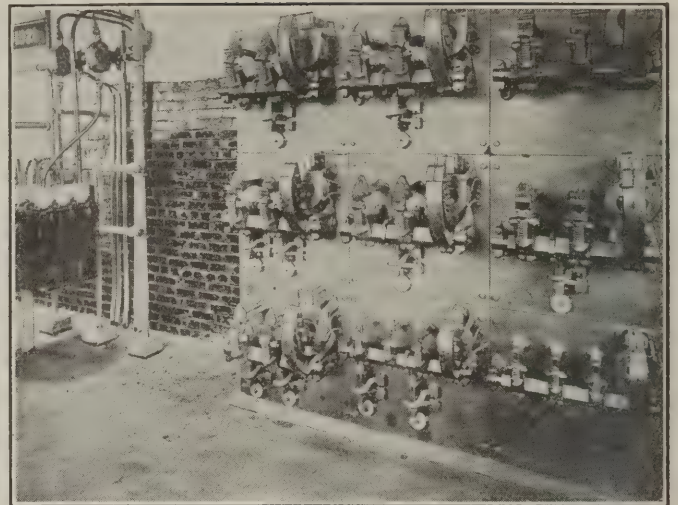


FIG. 7—SECONDARY CONTACTOR PANEL

These switches control the hoisting speed and also assist in controlling the dynamic braking. On the left is the main-line oil switch supplying 2,300 volts to this hoist.

erating torque in any way, but rather to obtain such operation of the control equipment as to insure against loss of braking torque resulting through cutting out resistance too rapidly. Primary reversing contactors and power points in the lowering direction were incorporated into the controller to take care of the necessity of turning the hoist drum over for "slacking" cable. One point was added to the master controller for this purpose, this point being connected in series with a foot-operated switch so that, to get power in "lowering," the master controller must be left on this point and the foot switch operated. In normal operation this point on the master controller is passed over without any operation of the contactor panels.

The fact that this hoist has been giving unusually satisfactory service since it was put into operation, over two years ago, is the best evidence of good engineering in the selection of the equipment. The operations are simple, and do not tend to confuse the hoist operator. In hoisting, the controller is handled in much the same manner as the throttle lever on a steam hoist while in lowering speed control is obtained by the master controller in a manner very similar to that which the operator would use if he were handling his brake lever to lower against the friction of mechanical brakes, or his reverse lever to lower a load against the torque of a steam engine. Braking torques sufficient to control the heaviest loads without recourse to the mechanical brakes, except at very low speeds, are available, and the methods of control of braking torque provided are so flexible that the operator can lower at maximum speed with light or heavy load as the conditions may require.

The manner in which this equipment has been installed is in full accordance with the importance of the installation, and the successful operation of the equipment is in no small measure due to the care and consideration used in laying out the hoist and installing the equipment. The hoist house, shown in the headpiece, is a two-story brick building with two rooms on each floor. The hoist and driving motor are housed in a large room on the second floor while the small room on the second floor houses the circuit breaker, magnetic control panels, control transformers, exciter motor-generator set, and air compressor.

The space under the hoist room is pretty well filled

with foundations, but affords room for a small workshop and place for the storage of materials. The grid resistors are housed in a room directly under the contactor panels, thus affording short connections between the secondary contactors and the resistors. Ample ventilation is provided for the resistors by openings in the walls and a ventilating fan and chimney.

The arrangement of the apparatus on the operating platform of the hoist has been given a great deal of consideration and care. Control and brake operating mechanisms are within easy reach of the operator, as also are the operating panel for the main circuit breaker and the panel for the exciter. Closing of the main breaker puts the whole equipment in readiness for service since the air compressor and exciter motor-generator set are provided with automatic starters. Operation of the air-compressor unit is governed by the

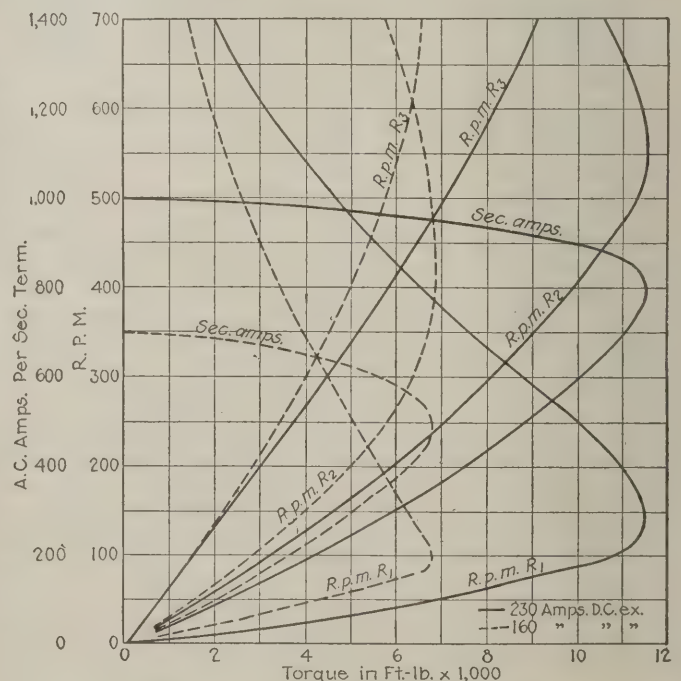


FIG. 8—DYNAMIC BRAKING CURVES

Showing the widely different lowering speeds obtainable on different positions of the master controller. Notice how the speed-torque curves depend upon the direct current excitation of the stator winding.

air pressure. Air gages show operation of the air-braking system while electrical meters do the same for the electrical equipment.

The system used on this installation is well adapted for any type of unbalanced hoist where positive speed control is desired in both directions of operation, and where in normal operation power will only be required in one direction. Effective braking by electrical means is obtained down to very low speeds, reducing mechanical braking to a minimum. The system is not so well adapted to balanced hoists where occasional braking is desired, due to the fact that at times braking may be required in either direction, while at other times power may be required in either direction. However, this condition could be taken care of by the use of a separate reversing controller mechanically or electrically interlocked with the main master controller.

Advantages of Byproduct Coke For Domestic Heating

**Eliminates Smoke, Reduces Need to Clean
Furnace and Flues, Requires Less Attention
Than Coal and Gives Even Temperature**

BY A. R. POWELL*

The Koppers Company, Pittsburgh, Pa.

DURING the last decade the use of byproduct coke for domestic heating purposes has grown by leaps and bounds until at the present time it must be considered one of our staple fuels. The substitution of byproduct coke for raw coal has decreased the smoke nuisance in many of our cities, and it is not impossible to foresee a time when coke will entirely replace bituminous coal, in which event our smoke problem, with its consequent tax on the health and pocketbooks of city dwellers, will be a thing of the past.

In spite of the convincing evidence of the superiority of byproduct coke as compared to the majority of other fuels used for domestic heating, some misunderstanding regarding it still seems to exist. A statement has recently been made which might give the impression that "hard metallurgical coke" has not given satisfactory results when used as a domestic fuel. Without attempting to controvert the possible usefulness of any other type of fuel for domestic heating, we must not lose sight of the fact that coke of the "hard metallurgical" type is giving satisfactory service to thousands of domestic consumers and that the sale of coke for domestic purposes is increasing enormously.

For many years the U. S. Bureau of Mines has conducted experiments on the burning of coke and other fuels in house-heating furnaces. The following quotation is taken from Technical Paper 242, by Henry Kreisinger and A. C. Fieldner:

"Coke should be used for heating houses because it is a clean and convenient fuel. It eliminates smoke, reduces the necessity of cleaning the furnace and flues, requires less attention than coal, and gives a more uniform temperature in the house."

I have first-hand knowledge that at least some of the men who have had charge of fuel investigations for the Bureau of Mines now use byproduct coke of the "hard metallurgical" variety for the heating of their own

homes and these men assert that they will never return to any other fuel now used. If these investigators of many years' experience practice and preach the doctrine of byproduct coke, with no "axe to grind" in so doing, can we conclude that byproduct coke is unsatisfactory as a domestic fuel? The answer is obvious.

And if unprejudiced fuel experts prefer byproduct coke in their own homes, should not the average householder use that fuel also? Perhaps it requires an expert to operate on byproduct coke, and the average citizen would be unable for this reason to enjoy the benefits accruing from its use. The answer is found in a letter written by O. H. Prestemon, a citizen of Minneapolis, where the winters are long and cold and where the fuel problem is of vital importance to all householders. The following is quoted from this letter:

"The proof of the pudding is in the eating.' I have kept an accurate account of the monthly fuel consumption required to comfortably heat my seven-room home for three years. . . . My fuel bill is 15½ per cent less than when I used coal, in spite of increased prices. This is more convincing to me than laboratory tests.

"Besides lower cost, other advantages equally important are:

"Cleanliness.—The furnace is clean and free from soot, thereby increasing its heat radiating efficiency. The furnace room is clean and consequently you are not carrying coal dust on your shoes all over the house. From the point of view of the lady of the house this is important.

"Reduced Labor.—It cuts the trips to the furnace room to about two per day.

"Uniformity of Quality.—When you buy [byproduct] coke you know exactly what you are getting.

"Evenness of Heat.—The heat is steady and even, but easily regulated.

"Low Ash Content.—Perfect combustion reduces the ash nuisance to a minimum."

The experience of this householder must be multiplied many thousands of times to gain a true idea of the enormous quantities of byproduct coke now being successfully used for domestic heating. After all, this is the criterion by which the usefulness of any marketable article must be judged, and in view of the fact that byproduct coke of the "hard metallurgical" type has many thousands of enthusiastic users, we must conclude that it is a satisfactory domestic fuel.

Some consumers of byproduct coke have gained a misconception of its usefulness by improper methods of firing. Coke occupies more volume per given weight than coal and the fuel bed necessarily must be thicker. Also when the fire is once started very little draft is required in the case of coke. If these two rules are followed the fire will maintain a steady rate of heat generation for long periods of time. Clinkering results from the fuel bed getting too hot and any troubles of that kind when coke is used are due to leaving the draft open too wide, thereby getting an intensely hot fuel bed.

The burning out and bending of grate bars will be caused if ashes are allowed to accumulate in the pit, and this is true of coal as much as it is of coke. In fact, any fuel will give bad results if improperly fired. In the early days of anthracite a prejudice existed against its use because it "didn't burn easily." The rules for firing coke are just as simple as those for

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firing coal; but they are somewhat different, and neglect to observe these will result in failure, as will be the case with any fuel if not properly fired.

In some ways it seems useless and foolish to justify the usefulness and practicability of a domestic fuel which has so thoroughly justified itself in many thousands of homes, and which, when subjected to scientifically conducted heating tests, has shown the highest furnace efficiency of any solid fuel on the market. Since some misunderstanding seems to exist, however, and since this may create a false impression, it is well to emphasize the well established position of byproduct coke as an ideal domestic fuel.

The following excerpts from Technical Paper 315 of the U. S. Bureau of Mines on "Comparative Tests of Byproduct Coke and Other Fuels for House-Heating Boilers," give some interesting data to the coke user:

"The first series of tests, 27 in all, was made in the fuels laboratory of the Pittsburgh experiment station with small steam boilers suitable for heating a seven or eight-room house. The fuels were byproduct coke, anthracite, and Pittsburgh coal. The second series, 17 tests, was made in the fuels laboratory—built for these tests—at the Minneapolis station of the Bureau of Mines, with a small steam boiler of similar size to that used in the tests at Pittsburgh, and with another larger boiler of the type used in heating small apartment-houses. The fuels used were byproduct coke, anthracite and Illinois coal.

"As far as possible, the boiler was operated as it would be in actually heating a house. A test usually lasted from Monday morning until Friday or Saturday morning; and at night the fuel was burned at lower rates than in the day time. A more detailed description of the method of operation will be found under 'Method of Conducting Tests.'

"A brief summary of the results is given in Table I, which shows that the efficiency was as high with byproduct coke as with anthracite. In fact, the two Capitol boilers gave somewhat higher efficiencies with coke than with anthracite. The efficiencies obtained with Pittsburgh and Illinois coal were 8 to 20 per cent lower than that obtained with byproduct coke.

"The relative quantities of bituminous coal, coke, and anthracite needed to maintain a house at a comfortable temperature during the winter depend upon the calorific values of the fuels as well as the thermal efficiencies; and the calorific values of all three fuels may vary considerably, owing principally to their variable ash and moisture content. The Pittsburgh tests showed that about 10 tons of Pittsburgh coal was equal to 9 tons of coke, or 8½ tons of anthracite when the fuels were burned in the Arco boiler; and to 10 tons of coke or 9 tons of anthracite when burned in the Dunning boiler.

"The Minneapolis tests showed that about 10 tons of Illinois coal was equal to 7½ tons of coke or anthracite when burned in the smaller Capitol Winchester boiler, and equal to 8½ tons of coke or anthracite when burned in the larger Capitol boiler.

"With the same attention to the fire, coke gives a much more uniform temperature than bituminous coal. In addition, coke is a clean fuel and makes neither smoke nor soot, an advantage difficult to express in exact figures. It is nearly as good a fuel as the domestic sizes of anthracite, and if anthracite is unavailable at reasonable prices a byproduct coke makes a good substitute.

TABLE I—EFFICIENCY OBTAINED WITH DIFFERENT FUELS WHEN THE BOILERS WERE ABSORBING HEAT AT RATE OF 2,500 B.T.U. PER SQUARE FOOT OF HEATING SURFACE PER HOUR.

Name of Boiler	Size		Thermal Efficiency. Heat Absorbed by Water in Boiler in Per Cent of Heat in Coal Fired			
	Heating Surface, Square Feet	Grate Area, Square Feet	By-product Coke	Anthracite Coal	Pittsburgh Coal	Illinois Coal
Arco, No. 6-23-S.....	39	2.9	70	70	54	..
Dunning, No. 303-S.....	46	3.6	70	70	62	..
Capitol Winchester, No. 3450...	33	3.3	70	69	..	49
Capitol, No. 257.....	106	8.6	66	60	..	50

"The quality of the fuels used in the Pittsburgh series of tests was as follows:

"The anthracite was taken from the bureau stock. It was a mixture of egg and nut sizes, and was considerably cleaner than that ordinarily obtained in the Pittsburgh market.

"The Pittsburgh coal was also a mixture of egg and nut sizes. It was purchased from a local coal dealer, and was of good average quality.

"The byproduct coke was furnished by the Carnegie Steel Co., and was made in that company's byproduct plant at Clairton, Pa. It was domestic-size coke, similar to nut-size anthracite, and was taken from a stock bin containing a mixture of 60 per cent 21-hour and 40 per cent 19-hour byproduct coke. The coal from which the coke was made was a mixture of several coals from the Klondike region near Pittsburgh.

"The anthracite and Illinois coal used in the Minneapolis tests were purchased from local coal dealers. They were a mixture of egg and nut sizes, and were of good average quality.

"The byproduct coke was purchased from the Minnesota Byproduct Co., St. Paul, Minn., and was made from Eastern coal. It was of domestic size, similar to the nut-size anthracite.

"None of the three fuels gave particular trouble with clinker. Although the coke clinkered considerably more than any of the other fuels, the clinker was light and porous. It formed a circular disk covering the central part of the grate, and if the fire was not too hot, the whole disk was easily removed in one piece through the firing door. With a hot fire, the clinker was soft and broke into small pieces when an attempt was made to remove it. For this reason, the best time to clean the fire is in the morning when the fire is cool after the night period of low rate of combustion.

"The Pittsburgh and Illinois coals made practically no clinker. However, to offset that, a heavy deposit of soot formed on the surface of the boiler. If good results are to be obtained, the soot should be swept off the boiler's surface frequently, preferably every morning.

Rules for Burning Coke.—A complete set of instructions on how to burn coke in house-heating equipment has been given in Technical Paper 242. The following rules contain the instructions in condensed form:

"(1) Carry a deep bed of fuel; one about 18 in. thick gives the best results.

"(2) Use very little draft after the fire is started, and keep it always under control. The success of even heating depends on careful draft regulation.

"(3) Do not stir the fuel bed; clean the fire in the morning.

"(4) Use sized coke: ½ to 2 in. for furnaces, boilers, and stoves; ½ to 4 in. for open grates.

"(5) Do not allow ash to accumulate in the ashpit."

What American Coal Mining May Learn From Europe's Mines

With Limited Coal Resources That Continent Is More Conservational Than America and Spends More Labor and Capital to Save Coal—Depth and Thin Beds Also Reduce Output—Great Care Expended to Protect Life—Wage Provisions in Great Britain and Excellent Housing on Continent Reduce Discontent

BY JOHN T. RYAN

President, Mine Safety Appliances Co., Pittsburgh, Pa.



ABOUT 90 per cent of the world's coal comes from two areas, relatively small when compared to the total surface of the earth. One of these embraces the coal fields of the eastern part of the United States, and the other includes the fields of Great Britain, Germany, Belgium and northern France. The European area supplies about 40 per cent of the world's coal and about 45 per cent comes from the coal fields of the United States. For the first half of the year 1923 the data collected by our Geological Survey show a total production for the world of approximately 660,000,000 metric tons of 2,205 lb. The United Kingdom of Great Britain produced 21.5 per cent of this total, Belgium 1.6 per cent, France 2.71 per cent, the United States' percentage of the total being 44.18.

To give an idea of how the relative production has changed we will go back to the year 1865, when Great Britain alone produced 100,000,000 tons, which was four-fifths of the world's output, and the United States supplied only approximately 20,000,000 tons, which was 16 per cent of the total world production. Great Britain's output increased steadily until 1913, when it reached its peak with a production of 287,000,000 tons. In 1922 it produced 249,000,000 tons, but in proportion to the world's production its output shrank steadily, being 80 per cent in 1865 and only 21 per cent in 1922.

It is interesting to note also the trend of the production per miner per year during recent years. The output per underground miner in the United States in 1901 was 651 gross tons, and in 1918 it was 1,012 tons, whereas the output per underground miner in Great Britain decreased from 357 tons in 1901 to 301 tons, in 1918. As there are many more workers on the surface at the mines of Great Britain than at those of the United States, if the comparison was made for all employees the difference would be greater. Thus the production per man per day involving all employees of

the British mines in 1922 was only 0.95 ton, and the production per man per day in Belgium and France is now only about 0.6 ton, whereas in the United States in 1922 it was approximately 3.6 tons for all employees.

There are many causes for this great difference in the productive capacity of the miner. One vital reason is the fact that nature has not been so good to the European countries as to us. Their coal outcrops are comparatively few compared with ours. Few valleys are so deeply eroded as to expose the coal seams whereas in western Pennsylvania and West Virginia such exposures are relatively common. Then again the coal has been mined in Europe for a much longer time. In fact there are authentic records that coal mining was practiced over 1,000 years ago, and at a point near Dunfermline, in the West Fife coal field of Scotland, the monks were mining coal as far back as the year 1291.

NO LONGER ARE OUTCROPPING SEAMS AVAILABLE

Naturally in the early years of mining in Europe coal miners followed the lines of least resistance, as we are doing in this country. They mined the seams nearest the surface, of the greatest thickness and the best quality without proper regard to the possibility of removing later the seams above and below. I would estimate that 90 per cent of the coal production in Great Britain comes from shaft mines from a few hundred feet to 3,500 ft. in depth and about 95 per cent of the production of Belgium and France comes from shaft mines.

Many of the mines in these latter countries descend to a depth of over 3,000 ft. and several are now being sunk which will go to a depth of 4,000 ft. In France and Belgium seams of coal are being worked as thin as 15 in. and some of these are at considerable depth. Few of the seams in their present coal fields are over 3 ft. thick. Practically all of the mining in these countries is by longwall.

In Great Britain there are fourteen separate coal fields. The thickness of the coal varies considerably in thickness, as does the number of workable seams. In the North Staffordshire field, as an illustration, there

Article entitled "Some Observations on Mining in Europe" read before the Coal Mining Institute of America, Dec. 19, 1923, at the annual session held at the U. S. Bureau of Mines, Pittsburgh, Pa.

The illustration in the title shows one of the many girls on the tipples of Scotland. Mr. Ryan says that this is one of the reasons why Sandy hates to leave his native heather. When Parliament, before the war, threatened to dispossess the girls of their jobs they sent a delegation of protest to London, and Parliament relented.



MINE NO. 11, LENS COMPANY, UNDER RECONSTRUCTION

This mine had been running twenty-five years when it was destroyed by the Germans. It is expected to be active for another 100 years.

are about thirty seams of coal having a thickness of 2 ft. or over, making a total thickness of 140 ft. A number of other seams range from 1 ft. to 2 ft. in thickness, making a total of 150 ft. of available coal. Many of the shafts from which they are now hoisting coal have been in operation for several hundred years. For instance one, at least, in the town of Newcastle-on-Tyne has been in operation for over 200 years.

Many of these old shafts were sunk originally to one of the thicker beds near the surface and after they were exhausted they were deepened to tap lower seams. In some of the shafts six or seven different seams are being worked. These old shafts were rather small, usually accommodating cars having a track gage of only 20 to 22 in. The cars, or "tubs," held about 800 lb. As these standards have continued with the deeper shaft workings and as the distances from the shaft have increased, one can readily form an idea as to the way in which these narrow gages and small cars reduce production.

TROLLEY WIRES EXCLUDED FROM BRITISH MINES

Another vital fact which affects production is the almost entire exclusion of electricity from underground workings. It is excluded absolutely for haulage purposes, as the British regulations state "Haulage by electric locomotives of the overhead trolley-wire system is prohibited in any of the coal mines." The same regulations are in effect in Belgium and France. This means that all their transportation is by rope, horses and man power, for, indeed, there is much of the latter at the working faces.

Labor-saving machinery is used comparatively little in the European areas described. Whereas about 65 per cent of the coal of the United States is mined by machinery, only about 15 per cent of the European coal is mined in that manner.

Two other factors that I think enter to a great extent in the decreasing production rate of Great Britain are the introduction of the seven-hour day from bank to bank, which means that the face worker works only five and one-half to six hours. The other is the fact that our miner here actually works harder and is much happier and more contented than the British miner. I do not believe, however, that our miners work any harder than the French and Belgian miners or are any more contented. Reference to the reasons for this statement will be made later.

Our American mining men will find little in European

production and mining methods of interest to them, for few of the practices in these mines can be applied to the conditions in the United States, unless, indeed, the mine operator is an optimist and expects to live 500 years longer. It will be approximately that length of time before we will be mining under physical conditions comparable with those faced at present in the coal fields of Europe.

Another condition which must be taken into consideration also is that in Europe the coal resources are not, as in America, almost unlimited, for with the average production in Great Britain of 250,000,000 tons per year the British will exhaust their present probable coal resources in 744 years, whereas the United States, at an average rate of production of 600,000,000 tons per year, will not complete the mining of its coal for 7,677 years.

Consequently in Europe they are obliged to pay more regard to the economic value of the coal in the ground and to the conservation of their coal resources. Taking these facts into account as well as the unfavorable natural conditions for mining as compared with our own, their engineers are doing a good job in the mining of their coal.

There are several phases of European mining, however, that American mining men would do well to study, for their effects will be reflected on this side of the Atlantic, and regarding these I desire to say something. Though our mining and production methods are not comparable, the question of "What's in the worker's mind" and how to keep the miner and his family contented is not dissimilar in the two great mining regions. The problems of education, living conditions, recreation and wages are matters which are important and comparable, and hence worthy of our consideration.

UNIFORM LAWS IN ENGLAND, SCOTLAND AND WALES

Then there is the big question of safety, and from the experiences, practices and mining legislation of the European countries we can learn much. Practically everything pertaining to safety in Great Britain is covered by regulations dating back to 1872, and revised from time to time to bring them up to date. The regulations are uniform for all the mining districts of England, Scotland and Wales, which is a great advantage from the standpoint of safety.

In addition to the Coal Mines Act, which was codified and modernized in 1911, the Secretary of State may by order make such general regulations as may appear best



WINTERSLAG COLLIERY, NORTHEASTERN BELGIUM

A mine in a new field. It employs 5,500 men, about 4,000 being underground workers. The output per day is about 2,300 tons.

calculated to provide for the safety, health, convenience and proper discipline of the persons employed in and about the mines. This provision of the act has enabled the Mines Department to put into effect in recent years a number of general regulations pertaining more particularly to rescue work, safety lamps, use of explosives, coal-dust explosion hazards and the like.

For convenience, the fourteen separate coal fields are divided into six separate divisions by the Mines Department. The staff of inspectors in addition to the chief and deputy chief, consists of six divisional inspectors, fourteen senior inspectors, thirty-two junior inspectors, twenty-one sub-inspectors, eight quarry inspectors and eight horse inspectors. Each of the six divisions has a divisional inspector, from one to four senior inspectors and from two to six junior inspectors, and sub-inspectors depending upon the size of the division. The rates of pay and cost of living bonus are as follows:

Divisional inspector	\$5,000 to \$6,250
Senior inspector	3,850 to 5,000
Junior inspector	2,500 to 3,500

The inspection department is made up of high-grade, well-paid, efficient men, and the department has the necessary power to enforce uniform regulations. The average rate of pay to the British miner is only one-half to one-third of our miner's pay, whereas the salary of the inspector is about double the average received by our inspectors. This comparison is a great discredit to the United States, and our mining men should take steps to increase the salaries of our mine inspectors, paying them more nearly what they are worth, and building up the departments for an even better inspection service in the future. We should also take steps to bring about more uniform regulations in all our coal-mining states.

The Belgian and French regulations are, if anything, more severe than in Great Britain. In France the government holds title to all the coal land and leases it by grants or concessions, and the safety of the mines is under the control of the government inspection corps, which has the power to make and enforce regulations. It is a well-paid, highly efficient body of men, and that fact is reflected in the excellent accident record of the mines it supervises. The death rate from accidents in and about the mines in Great Britain per 1,000 persons employed has dropped from 2.24 in the year 1873 to 0.95, or less than one, in 1922. The death rate for each million tons of coal raised decreased from 7.42 in 1873 to 4.32 in 1922.

Statistics for the United States in the same period show that in 1873 the number killed per 1,000 was 5.46 and the number killed per million net tons mined was 10.06. In 1922 the number killed per thousand employed was 2.3, and the number killed per million net tons mined was 4.3.

WHY FALLS CAUSE LARGE PART OF ACCIDENTS

In analyzing and comparing the causes of accidents, we find that in Great Britain in 1922, falls of roof were responsible for 55 per cent of all the underground accidents, and haulage accidents for 21 per cent. In the coal fields of the north of France for 1922, falls accounted for 71 per cent of all underground accidents and haulage for 14 per cent.

In the large coal fields of the north of France, producing about two-thirds of France's total output, it is interesting to note that the death rate in 1922 was only



PLANT OF LENS COMPANY NOW NO LONGER IN RUINS

The plant which preceded this was destroyed only a few days before the armistice, but it had been under fire for no less than four years. Order and permanence are distinguishing features of European mines.

one per two thousand men employed, and there was not a fatality from either gas or coal-dust explosion. Yet this in a field in which all the mines are gaseous, very deep and dry. This field, employing 100,000 men, has not had a gas explosion since 1917.

The statistics for both of these countries show that the larger percentage of accidents occurs from falls—even a greater percentage than in the United States, for in 1922 only 50 per cent of our underground fatalities were from this cause. The reason for this higher percentage in the European countries named is that the roof they have to control is much worse. They have cut down fatalities from other causes to a greater extent than we have, and in consequence the percentage of accidents from falls and haulage accidents looms higher than it would otherwise.

In France centralized rescue stations have been erected to serve all mines, but the regulations also require that each mine must have on hand two sets of apparatus. The French had a fine central rescue station at Bruay, in the northern field, before the war, but it was completely destroyed by the Germans. However, they are now just completing a magnificent central station near by Bruay but on the outskirts of the city of Lens. This would cost, if duplicated in this country, about \$300,000.

The wage problem and method of determining the wage scale is an interesting phase of European coal mining, and particularly in Great Britain. It is so badly complicated there that it almost takes an accountant to figure it out. I will endeavor to give you briefly the operation of the national wage agreement as contained in the annual report of the Secretary of Mines of Great Britain for 1922:

"The object of the agreement is to provide machinery by which wages may from time to time be automatically adjusted in accordance with the selling price of coal. Its purpose is that the proceeds available for wages and profits (i.e., the gross proceeds less costs other than wage costs), commonly known as the 'net proceeds,' shall be shared in an agreed proportion which works out at about 85 to 15, or, in other words, of every £100 available, wages are to have about £85 and profits about £15.

"For instance, if the 'net proceeds' per ton are 12s.6d., wages are to be paid at such a level as will make the wages cost per ton 10s. 8d., leaving 1s. 10d. profit; if they are 15s. the proportions will be 12s. 9d. and 2s. 3d.;



BICYCLE GARAGE AT WINTERSLAG COLLIERY

About 4,000 bicycles can be stored in this building. In Europe miners ride to work on bicycles instead of in Fords.

if 17s. 6d., they will be 14s. 11d. and 2s. 7d.; if 20s., they will be 17s. and 3s., and so on.

"This is to be secured by determining the actual amount of the 'net proceeds' during a period of two months and fixing a percentage to be added to basic wage rates during a future two-month period, at such a level that wages will absorb, during that period, a sum equal to the agreed proportion of the amount of the 'net proceeds' during the past period.

WAGES MUST NOT FALL BELOW FIXED LEVEL

"This process is, however, subject to one important qualification: That the miners' rate of wages per shift must never fall below a certain specified level. If 85 per cent of the 'net proceeds' shown by any ascertainment is insufficient to pay wages at this guaranteed level, the 15 per cent must be encroached upon or foregone altogether, or even a sum greater than the whole amount of the 'net proceeds' must, if necessary, be provided. When the agreed share applicable to profits is thus diminished, the owners are entitled, according to the actual terms of the Agreement, to recoup themselves in certain circumstances for some part of these overpayments, but in all ordinary circumstances this provision, for reasons which it is unnecessary to examine here, will be inoperative, and the owners in fact must write off their losses at once.

"In theory, of course, this principle might be applied to any unit, from the single mine at the one end of the scale to the whole of the British coal fields at the other. In practice, the unit is the 'district'; that is to say, a number of mines geographically adjacent to one another, the natural conditions of which are similar. Great Britain is divided into thirteen such districts.

At the base of this national agreement is also a minimum-wage provision which guarantees the men a minimum daily wage which at the present time is approximately, for the average of all the districts, 9s. per day, and this is arrived at in the following manner: Before the war the average daily wage of the miner was approximately 4s., or \$1. During the war the base rate was increased 50 per cent, or from 4s. to 6s. In 1919, when the working day was decreased from eight to seven hours, the pieceworkers were awarded an increase of 14.2 per cent for the loss of this one hour, but this did not include the daymen. This was known as the Sankey Award. After the strike of 1921, which brought about the national wage agreement on the profit-sharing basis, the base rate was increased an additional 28 per cent, making it now approximately 9s., or \$2.07.

The average wage of the 1,129,539 men employed for 1922, working an average of 251 days a year, was 9s. 11½d. per day, or \$2.29 in our money today.

In addition to the provisions of the national wage agreement and the minimum wage there is an unemployment wage, or "dole," which is paid by the government.

BIGGEST PAY IS \$1.33 PER DAY

In France the wage scale is based on the average pre-war wage plus a percentage equivalent to the increased cost of living as compared with the pre-war cost, subject to variations due to the number of dependents. The French mines have been practically free of wage controversy since the war, but in November of last year they had a suspension of a few days' duration, as the men asserted that the wages had not been adjusted to take care of recent increased costs of living. This controversy was settled by granting an increase varying from 1 to 3 fr., which in our money would be 5c. to 15c.

The average wage for men working at the face, prior to this last advance, was 25 fr. per day or the equivalent of \$1.33 in our money.* The average for outside work was 17 fr. (\$0.90) per day, and the majority of this outside work is done by girls. The average for all men and boys about the mines is 17 fr. (\$0.90) per day. Children from 13 to 15 years of age made from 2 to 5 fr. (10c. to 26c.) per day. The 8-hour day is in general operation.

A study of how the miner lives, what he does above ground, what provisions are made for the comfort and welfare of the family in these European countries will

*Figured at 5.32c. per franc. It is now just about 5c.

EARNINGS OF MINERS IN THE SEVERAL DISTRICTS OF GREAT BRITAIN

District	Average Earnings Per Manshift (All Classes)		Period During Which District Was on the "Minimum"	Average Number of Shifts Worked Per Year	Average Earnings Per Man Per Year		Average Output Per Man Per Year	
	s.	d.			£	s. d.		
1. Kent.....	12	9½	\$3.11	Whole year	254	162 5 11	\$790.38	255
2. Eastern.....	11	7½	2.83	1 month	242	140 5 9	683.20	247
3. Cumberland.....	9	10½	2.40	Whole year	252	124 3 8	604.77	175
4. South Wales and Monmouth.....	9	7½	2.35	Whole year	263	126 17 0	617.76	221
5. Scotland.....	9	7½	2.34	8 months	272	130 16 7	637.14	269
6. Lancashire, North Staffordshire and Cheshire.....	9	3½	2.26	7 months	231	107 4 3	522.12	169
7. Durham.....	9	1	2.21	7 months	247	112 5 4	546.74	220
8. Northumberland.....	8	7½	2.11	5 months	258	111 11 10	543.45	224
9. North Wales.....	8	2½	2.00	10 months	266	109 3 10	531.76	175
10. Bristol.....	7	11½	1.94	8 months	263	105 3 11	512.30	147
11. Somerset.....	7	10	1.91	5 months	242	94 14 11	461.41	162
12. Forest of Dean.....	9	9½	1.89	11 months	262	101 17 1	496.03	179
13. South Staffordshire and Shropshire.....	7	7	1.85	Whole year	273	103 7 9	503.50	226
Average for all districts	9	11½	2.43		251	125 2 0	609.24	226

This table is based on normal exchange, \$4.87 per pound sterling. The present rate is \$4.34, or 11 per cent less.

be of interest. Great Britain has been backward along these lines, particularly in the way of proper housing, recreation facilities and miners' baths, etc., but recently steps have been taken to correct this by the Miners' Welfare Fund, established under the Mining Industry Act of 1920, "for the purpose of improving the essential wellbeing, recreation and conditions of living of the workers in, or above, the coal mines and for mining education and research." This fund is maintained by a levy upon all collieries of 2c. per ton of output over a period of five and one-half years. This levy will create a fund of approximately \$5,000,000 per year.

Bathhouses, or washhouses, as we term them, are practically unknown in Great Britain and only a handful of collieries are equipped with them and then only partly so. When you go across the channel to Belgium and France and visit their mines one of the first things to strike your eye is their magnificent bathhouses, the construction of which is required by law.

Due largely to the thin seams, the great depth at which they are found and the severity with which they are faulted, coal can be mined in France only by the exercise of unusual engineering talent. Perhaps for this reason all the officials down to the sub-foreman must have technical training. They do their mining work well and take excellent care of the safety of their men, but what excites most interest in the visitor is the manner in which they take care of the miner and his family on the surface. Fine homes with large gardens have been provided. Good playgrounds, unrivaled recreation facilities and good schools make life happy for the children. Some of the houses just constructed in the devastated area are equipped with running water and electric lights and are provided with a large plot of ground. Double houses of ten rooms cost 50,000 fr., which would represent in our money today about \$2,700. They rent for 10 to 15 fr. per month, or from 55c. to 85c.

One naturally wonders how with the working conditions worse than in Great Britain, on account of the low seams, the French operators can run their mines with a much lower wage scale and yet have far fewer labor disturbances and keep their men better satisfied. I believe the biggest factor in promoting this condition is the manner in which the operator takes care of the miner and his family on the surface.

A word about the devastation of the French coal mines by the Germans. The coal basin located in the northern part of France spreads over a large part of



NEW MINER'S HOUSE AT LENS, FRANCE.

The French companies are rebuilding homes at a rate of 5,000 a year, replacing those destroyed by the Germans.

two departments, or counties, the Nord and the Pas de Calais. This basin is an extension of the Belgian coal field. It extends practically across northern France, and its width ranges from ten to twenty-five miles.

Here also is the industrial center of France. It was invaded by the Germans, Aug. 24, 1914, their lines extending to the vicinity of Lens and Béthune. They captured about 80 per cent of the mines. The battle lines of this particular section varied but a few miles from 1914 to 1918. When the invasion took place it was so rapid that little destruction was done, and the mines captured were practically unaffected. In consequence the Germans were able to work them continuously until about Nov. 1, 1918.

TWO HUNDRED AND TWENTY SHAFTS RECONSTRUCTED

When they started to retreat and knew they were defeated and would not come back, they wilfully destroyed a total of 124 pits having 220 shafts. One hundred and forty of the shafts were dynamited. Practically all the surface plants were entirely destroyed. Out of a total of 30,000 miners' houses in the area, 16,000 were totally destroyed and most of the remainder badly damaged. The Germans occupied and worked these mines during the entire war but, though when they gutted the French mines they completely destroyed them, they left the Belgian mines practically intact.

The French have done wonderful work in the reconstruction of their mines and their mining towns, and they will complete this reconstruction work several years earlier than the best engineers estimated it could be done. It has been a remarkable accomplishment, and it is no wonder that the French who have had to provide the money for this re-establishment of the industry feel keenly the necessity for collecting reparations from the Germans.



CITÉ IN LENS REPLACING VILLAGE GERMANS BURNED

House construction at European mines is no more a source of profit to European operators than the houses in American towns are to the operators of America.

LIQUID OXYGEN THOUGHT DANGEROUS IN COAL MINES.—Liquid oxygen explosives are being extensively used in France and Germany in metal mining and quarrying operations, according to George S. Rice, of the U. S. Bureau of Mines, who recently returned from a trip to Europe. This type of explosive is not, however, being employed in coal mines because of the assumed danger of causing coal dust explosions. Tests employing liquid-oxygen explosives in quarries and metal mines in the United States are now being made by the Bureau of Mines at Pittsburgh, Pa., and at other field stations, Congress having at the last session, appropriated funds for the work.

The Miner's Torch

Giving Thought to the Under Dog

NOT long ago a friend of mine who is superintendent at a large coal-mine operation said to me in conversation that he wished he could find some bosses who would show enough interest in the company that employed them to fight for it if necessary; he said it earnestly, indicating that he had been giving the matter much thought. By way of continuing the conversation I asked him if he had ever had any men in his employ for whom he had been tempted to wage fight with his superiors to get for these men all that he thought was coming to them, or had he ever even mentioned any of these men to his superiors. His answer was not very satisfactory nor has his manner toward me been very cordial since.

A few days later I saw an article in a political monthly indicating that the labor legislation next proposed would endeavor to make a workingman's job something that could be depended upon in fair weather and foul. The argument for such a measure was something like this: Property rights are guaranteed to owners under our laws, and without such guarantees property would have little value. Certainly a laboring man's job is just as important to him and his family as property is to a land-owning farmer and his family, and it is just as reasonable to protect one by law as it is the other. I cut out the article, affixed my initials and mailed it without comment to my friend the superintendent, and as yet he has not acknowledged it.

I happen to know that this man has inaugurated an employment system that requires from each applicant for employment almost a life history, a doctor's examination, and a file of testimonials or references that are of equivalent value. He takes no chances at getting into his employ men who are likely to be injured because of inherited or previously acquired physical infirmities and in this way he keeps down to a minimum the payments required by the Workingmen's Compensation Act. If any of his employees lose a leg or an arm or an eye he tries to arrange a settlement with them that will be truly a final settlement so that they will seek employment elsewhere. He has stated publicly time and time again that he has a perfect horror of seeing cripples around his operations.

There is nothing peculiar or unusual about my friend's viewpoint on the accident question. Every superintendent who has been connected with mining operations for a number of years can recall times when it looked as if his company must surely become a bankrupt because of damage suits won or pending, and to such the merest mention of the words "claim for damages" is sufficient to produce a spell of "nerves."

But—every man feels that he has a right to earn a living, be he lame, halt or blind and unless more of our higher-ups forget the extremes of the past, when the ambulance chasers were in the saddle, and pay more attention to the extremes being inaugurated by the employment departments of the present day, the employees who are willing to fight for the employers will entirely disappear from the face of the earth and the labor problem will be a sure-enough problem. If you think

I am unduly worked up over this matter get your employment manager to show you his files of employment applications with all of the pertinent correspondence attached and note the comments added on the margins, then try to place yourself in the position of the men whose names are signed to the application.

Or, better yet, just drop in on your employment manager occasionally and listen in on the conversations between the applicants and the questioners, also the comments being made about rejected applicants when there are no applicants in the office and your "help" is in reminiscent mood.

For Flame Safety Lamps, Which Is Best: Flat or Round Wick?

BY J. W. PAUL

Chief of Coal Mine Investigations, U. S. Bureau of Mines,
Pittsburgh, Pa.

For a given percentage of gas the height of the gas cap in any lamp depends upon the temperature of the testing flame and the draught of the lamp. The hotter the flame the longer will be the cap. By special construction the cap may be elongated, and this may be accomplished by surrounding the flame with a small cylinder, usually of glass, which prevents loss of heat by convection or radiation. However, with the low percentage of gas, from 1 to 2 per cent, the heat evolved by the testing flame and the gas cap is not sufficient to increase materially the gas cap over that which is obtained with the ordinary lamp unequipped with the special chimney.

In determining the height of gas caps the reduced flame of the lamp is used, and this testing flame is approximately 0.1 in. high measured from the top of the wick holder. All gas-cap flames should be measured from the top of the wick holder as the line of demarcation between the test flame and the gas cap becomes lost after passing 2 per cent of gas.

Up to that percentage there is little difference in the length of the gas cap as shown in lamps used for general purposes, and in 2-per cent gas the round and flat wick lamps of the same design give the same gas cap; in 2½-per cent gas the round wick of one make of lamp gives a gas cap 0.05 in. larger than the flat wick and above 3 per cent the flat wick gives the higher cap.

The Bureau of Mines will soon have ready for distribution a bulletin on the miners' flame safety lamp in which elaborate data will be given on gas caps, also a number of charts giving a reproduction of the appearance of gas caps in different types of safety lamps.

The gas caps in the approved types of lamps have definite heights for each lamp, but the differences for low percentages are very slight, as may be observed from the following statement of gas caps:

With 1 per cent of gas the gas cap ranges from 0.15 in. to 0.3 in.; 2 per cent gas, 0.4 in. to 0.5 in.; 3 per cent gas, 0.6 in. to 0.9 in.; 3.5 per cent gas, 0.9 in. for round wick to 1.7 in. for flat wick; 4 per cent gas, 1.3 in. for round wick to over 1.7 in. for flat wick. With 4 per cent gas, the gas cap on all the approved lamps, except one round wick type goes above the top of the glass globe, and by interpolation the particular round wick cap reaches the top of the glass globe with 4½ per cent of gas.

Discussion presented Dec. 19 at the meeting of the Coal Mining Institute of America in Pittsburgh, Pa.

Sees Revolutionary Era Just Ahead Of Coal Industry



Impressed with High Order of Intelligence of British Coal Men, *Coal Age* Correspondent Stresses Mutual Advantage of Exchange of Experience with Mining Leaders in This Country

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

THE coal industry in South Wales has profited greatly by the employment of private cars for the transportation of its product. Now that the railroads in England have been grouped, there is some agitation on the part of the carriers for the pooling of cars or for the absolute change to a system car basis. This is opposed by most mine operators. The British law provides that the railroad must supply side-track facilities sufficient to take care of all cars offered. This is a great asset to the producers as they can hold their own cars under load as long as they wish without demurrage. It allows great flexibility in being prepared for any sudden demand such as the simultaneous arrival of a number of ships. In the north of England the cars are largely railroad owned as in America.

There are other reasons, in addition to the desire to do away with private cars, why the consolidation of railroads is not popular among the Welsh coal operators. Before the grouping each of the separate lines was anxious to offer some inducement to obtain business. Now with one system the railroad is much less obliging, it is asserted.

The Great Western R.R., which has absorbed the other lines in southwestern England and in south Wales, is taking an active interest, however, in stimulating the demand for Welsh anthracite. The railroad is more interested in expanding the domestic market for that fuel, which the British have not learned to use extensively, than it is in promoting export trade, because the former trade has for it greater tonnage possibilities. The road, however, is anxious to encourage exports as well, as a larger volume of production would reduce costs.

SUPERIORITY CLAIMED FOR WELSH ANTHRACITE

Officials of the Great Western were much pleased when American orders were placed for Welsh anthracite prior to our anthracite strike, as the wide publicity given the fact that Americans were sufficiently desirous of obtaining that coal to pay for its transport across the Atlantic had a psychological effect on the people of England. Thought is being given a plan whereby the Great Western and the Welsh anthracite owners may join in an effort to popularize the use of anthracite in Great Britain. A slight superiority over our anthracite is claimed for the Welsh product.

One of the outstanding things which impressed me in my contacts with the British coal industry is the high order of intelligence among the men who conduct it. The brain power of the industry is not confined to the principal executives. It is much in evidence all the way down the line, even to the subordinate grades of employees. It seems to me that it is a mistake not to have closer relationships between the men engaged in the coal business in the two great coal-producing nations. One of the lessons of the war has been that it is difficult for

one nation to be prosperous unless its neighbors also are prosperous. Great Britain, for instance, has learned that its own prosperity depends to a great extent upon the prosperity of Germany. Many of our own industries have suffered severely, and all of them have been hurt to some extent, by lack of prosperity in Europe. It is particularly the case that anything which contributes to the prosperity of Great Britain contributes directly to our own prosperity. Since coal is the basis on which British trade is built, the United States would suffer were that industry to languish. At any rate, there always should be co-operation in the exchange of experience and in developments which promote efficiency in the industry as a whole.

INDUSTRIAL TREND CALLS FOR CLEAR THINKING

The coal industry is on the threshold of an era of revolution. The advent of the internal-combustion engine, the increasing demand for the byproducts of coal and the burning of coal in large central power plants with the distribution of the resulting power as electricity, are examples of trends already exercising far-reaching effects. If the coal industry is to keep step with world progress and with progress in other industries, all of its brain power should be co-ordinated. A long step in that direction has been taken by the recent agreement between the governments of the United States and of Great Britain correlating their mining research.

Much constructive work could be done were machinery set up for the systematic consideration of problems common to the British and American industries. But lacking that, I believe there would be actual profit to the average American coal operator and to the average British operator in paying occasional visits to the other country. My experience with the British operators leads me to think they would take the broad view of any exchange of helpful information. An occasional one might take the position that a competitor—just at this time he might have to say "potential competitor"—should not be given the advantage of British experience, but that view would be held by very few.

BRITISH COAL INDUSTRY CAN LEARN FROM AMERICA

While there is much the American industry can learn to its advantage in British coal mines, there is also much the British can learn here. Now that the British are confronted with the absolute necessity of pulling up their low output per man and have turned definitely to a mechanical program in underground workings, one way in which they could benefit materially would be by visiting those mines in this country which now are so thoroughly equipped in a mechanical way.

This is the concluding article in the series written by Mr. Wooton as the result of his observation of the British coal industry.

New Western Maryland Ry. Coal Pier Is Electrically Operated

UTILIZING the site and foundations of the original gravity pier of the company, which was built in 1904 and destroyed by fire in September, 1919, the Western Maryland Ry. has constructed a new coal pier at Port Covington, Baltimore, that is operated by electricity. The original pier was of the timber trestle type, with forty coal pockets—twenty on each side—through which coal was transferred directly from cars to ships by gravity. This pier was 60 ft. high and 1,200 ft. long, extending 729 ft. out from the shore on timber piles.

The equipment of the new pier consists of a stationary car dumper of the lift and turnover type, with mechanical trimming apparatus for loading boats directly from the dumper pan, and an auxiliary conveying system and trimming apparatus to permit the loading of boats on the side of the pier opposite that on which the dumper pan is located. All of the pier equipment is electrically driven by direct-current motors, power being supplied at 230 volts from a 1,500-kw. rotary converter substation located on the pier.

CAR OVERTURNED WHEN DUMPING

As soon as the loaded car has been properly stopped on the cradle the operation of the cradle hoist is started. The starting of the hoist automatically shoves the car, which is now resting on a platen mounted on rollers, over to the side of the cradle and clamps it securely in the cradle, after which the cradle starts on its upward trip. When near the upper limit of travel the cradle strikes a turning pin and starts overturning, continuing until the car has been turned through approximately 150 deg., and spilling the coal onto a pan, which in turn empties into a chute reaching into the hold of the vessel being loaded. The illustration shows the dumper with a car completely overturned in the dumping position, and with the end of the loading chute in the hold of a vessel.

The dumper is designed to handle 100-ton capacity cars, although at the present time 50-ton capacity cars are being used. It is estimated that the maximum amount of coal that can be handled with 50-ton capacity cars per day (two 10-hour shifts) is 25,000 to 30,000 tons; with 100-ton capacity cars this would be increased to 40,000 to 50,000 tons per day.



VIEW OF PIER AND INCLINE

The electrical drive operates the turnover dumper, which turns the car through 150 deg., thus delivering the coal into a chute that carries it directly into the hold of the vessel.

As an auxiliary to the car dumper, the pier is equipped with a conveying system, a small storage bin and an auxiliary chute and trimming device. This auxiliary equipment permits the bunkering or loading of a vessel on the side of the pier opposite that on which the dumper is located. To put this auxiliary equipment into service, the hopper forming part of the main dumper pan is designed with a movable bottom plate in such a way that when this plate is hoisted the neck of the hopper connecting with the loading chute is cut off and the coal delivered directly into the vessel.

The control of the two barney haul motors is accomplished by means of two full magnetic type controllers designed to control the operation of the two motors in multiple from a single master controller. This controller is of the plain reversing type with armature shunt points provided for slow-speed operation. The principal feature in connection with the barney haul-control equipment is the method used for interlocking with the barney gate-control equipment and the methods provided for automatic slowdown. This is accomplished by the use of geared limit switches of the traveling nut type. The barney gate mechanism also is provided with a limit switch of the same type, and the scheme is worked out so that it is impossible to move the barney before entering the track gates unless these gates are in the correct position. The same switch also gives slowdown when approaching the upper limit of travel. The equipment was designed and manufactured by the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

THE WADGE and the Wolf Creek coal beds of the middle group in the Twentymile Park district of Colorado, according to a Bulletin 748 of the U. S. Geological Survey, are remarkably regular in thickness and distribution, ranging in thickness from 5 to 20 ft., and the beds in the lower group are remarkably irregular in both thickness and distribution. On Oak Creek the Pinnacle coal bed probably is the most valuable bed of the group, and persistent efforts have been made to show that this bed is the one worked on Yampa River near the mouth of Indian Creek. However, the thick coal beds on Oak Creek break up and diminish in thickness toward the west, and coal bed No. 3, which overlies the Pinnacle, is the only valuable one in Dunkley Canyon. Hence, the Pinnacle bed probably is not present at the mouth of Indian Creek, the beds mined there being members of No. 3 on Oak Creek, which here has expanded into a group.

USE OF ROCK DUST OBLIGATORY IN EUROPE.—In Great Britain and France, says George S. Rice on his return from a trip to Europe in behalf of the U. S. Bureau of Mines, the employment of rock dust as a screen or barrier for the limitation of coal-dust explosions to the immediate area of the explosion has been made compulsory. The efficacy of this method was strikingly demonstrated in the case of a gas explosion in a Yorkshire colliery, where the stone dusting confined the explosion to its immediate place of origin and prevented the great loss of life that must have occurred had the explosion spread through the mine. Much experimental work along this line has been performed in the United States by the Bureau of Mines, but the states have as yet enacted no legislation to compel the adoption of this system in the mines of the country.

News Of the Industry

Work Rejects Retailers' Plea to Abolish Government Fuel Yard

Secretary of Interior Says Retailers' Proposal Would Cause Loss of 37.6-49.5c. per Ton to Taxpayer—Suggests Restudy and New Proposal—Cost Compilations Differ

The taxpayer would suffer, says Dr. Hubert Work, Secretary of the Interior, were the government to accept the proposal of the National Retail Coal Merchants' Association to abolish the Government Fuel Yard and turn over the business of supplying the departments with coal to the Washington retailers. "Upon analysis of the proposals and of the figures taken from the records of the fuel yards," says Secretary Work in denying the plea of the retailers, "it appears that acceptance would result in the net loss to the taxpayer of 37.6 to 49.5c. per ton."

Secretary Work also makes the point that the retailers' proposal fails to give any satisfactory guarantee that any losses incurred by the retailers in handling the government's business would not be made up by additional charges against private consumers in the District of Columbia. In his communication, however, the Secretary resubmits this question: "At what margin per ton above mine cost and freight are the merchants prepared to sell coal of the various grades in the district?" To this Secretary Work adds: "It is possible that, on restudy of the matter, you may be able to propose a scale of margins that will permit the government to turn over to the local merchants the handling of all of its coal business in the District of Columbia."

Another point made by the Secretary of the Interior is as follows: "The taking over by the local merchants of the

unloading, trucking and delivery of coal to the curb, as proposed, would not relieve the government of the cost of purchasing the coal, making payment to mines and railroads, collecting from the departments, auditing accounts, weighing and inspecting all coal as provided by statute, arranging for and inspecting stowage, demurrage and loss, if any, between mine weights and delivered weights, interest on capital used in performing these functions and amortization of the investment in the present plant (less salvage) or cost of holding the yard in standby condition in the future. All these items have been urged by you as entering into the true cost of handling coal, as indeed they do."

In his reply to the retailers, Secretary Work submitted the accompanying comparison of present Fuel Yard costs with those which would prevail under the terms of the dealers' proposal.

With his reply Secretary Work made public the brief submitted in this connection by the National Retail Coal Merchants' Association. At the request of Secretary Work, this brief has heretofore been withheld from publication.

In a letter accompanying the brief of the retailers Roderick Stephens, chairman of the Government Relations Committee of the merchants' association, reiterates portions of the brief, stating that "the retail merchants in the District of Columbia have storage and han-

dling facilities more than adequate to supply coal to the government departments at all times, as well as to serve the local trade.

"The operating costs of the Government Fuel Yard have conformed to the 'government system of accounts,' but they have not included all direct or indirect costs of doing business," says Mr. Stephens. "Although the published cost for the period July 1, 1916, to June 30, 1921, was slightly less than \$1 per ton, the real cost per ton to the government of unloading cars, storage and delivery, including indirect overhead expense, arrived at after complete agreement between officials of the Bureau of the Budget, Government Fuel Yard and National Retail Coal Merchants' Association, for the same period was found to be \$1.78 per gross ton. Therefore by turning this business over to the retail dealers, at their agreed figure of 92c. per gross ton, the government will effect saving of 86c. per ton, or upward of \$1,000,000 in the period covered by the attached bids."

Pittsburgh-Great Lakes Co. Merger in Ohio

Merger of the Ohio properties of the Pittsburgh Coal Co. and the properties of the Great Lakes Coal Co., which had been operated by the Columbus (Ohio) office of the Pittsburgh Coal Co., has been completed under the name of the New Pittsburgh Coal Co. Papers of incorporation have been taken out at Columbus and the new company, with an authorized capital of \$2,100,000, will have charge of the operation of all properties and the sale of the product. The general offices will be in the Rowlands Building, Columbus, with C. G. Weitzell as president and J. A. Rundio sales manager.

The property consists of large mines in the Hocking Valley, eastern Ohio field, Pomeroy Bend field and in Kentucky. The Kentucky property has one operating mine with a capacity of 2,000 tons daily at Betsy Layne, on the Big Sandy division of the Chesapeake & Ohio R.R. This property will be further developed to a point where the output will be 5,000 tons daily. The eastern Ohio mines are on the Wheeling & Lake Erie and are located in Harrison, Jefferson and Belmont counties. The Hocking Valley mines are on the Hocking Valley R.R. and the Pomeroy Bend mines also are important operations. The Great Lakes Coal Co. formerly was a P. Reiss interest. The merger became effective Jan. 1.

COMPARISON OF PRESENT FUEL YARD COSTS WITH THOSE NECESSARY UNDER TERMS OF DEALERS' PROPOSAL

Proposed Plan		Present Plan	
Dealers' average bid for unloading, trucking and delivery.....	\$0.920	Fuel Yard legal cost fiscal year 1923.....	\$0.850
Cost to government of coal purchase, auditing, bookkeeping, etc. (At new compensation schedule rates for force employed).....	0.120	Degradation cost on anthracite.....	0.006
Cost to government of weighing and inspecting coal as required by Act March 15, 1898.....	0.080	Indirect cost to taxpayer.....	0.372
Cost to government of inspecting deliveries and storage.....	0.024	Interest on liquid capital \$200,000 at 5½%.....	0.056
Cost to government for demurrage and guarantee of railway weights.....	0.100	Total cost per ton to taxpayer.....	\$1.284
Investment less if yard be abolished, prorated on coal deliveries of five years.....	0.479		
Interest at 5½ per cent on liquid capital of \$200,000.....	0.056		
Total cost per ton to taxpayer.....	\$1.779	Net loss per ton to taxpayer.....	0.495
Total cost per ton to taxpayer if yard be kept in standby condition and deliveries resumed at end of period.....	1.660	Net loss per ton to taxpayer.....	0.376

Supreme Court Sustains Recapture Clauses

The right of Congress to divert the earnings of the stronger railroads to the relief of the weaker, as provided for in Section 15A of the Transportation Act—known as the "recapture clauses"—was declared constitutional in an opinion handed down by the U. S. Supreme Court Jan. 7. Chief Justice Taft wrote and read the opinion. The Dayton-Goose Creek Ry., a small line in Texas, was the complainant, but nineteen of the largest railroads in the country joined in the contention that the recapture clauses were invalid. Chief Justice Taft, in his opinion, upheld the Federal Court for the Eastern District of Texas, which dismissed the original complaint by the Dayton-Goose Creek company.

Southern Gem Corporation In Hands of Receivers

The Southern Gem Coal Corporation, of Chicago, is in the hands of receivers. On Jan. 2 Federal Judge English, in East St. Louis, granted the petition of W. S. Wilson, of Pinckneyville, Ill., and seven other creditors and appointed Mr. Wilson, a veteran Illinois coal man, and Judge C. B. Thomas, a federal referee in bankruptcy, as receivers. Officials of the Southern Gem Corporation said they had had no notice of the petition and that since the major creditors and stockholders of the concern were not in favor of the receivership, they probably would ask the court to lift it. The corporation has been operating mines in several Illinois counties.

Simon Levy, of the Boylston Coal Co. of Chicago, a direct-to-consumer dealer, who signed a five-year contract for the entire output of the two Franklin County mines of the corporation, thereby putting about 1,500,000 tons of Franklin County coal into snowbird trade, said he thought his contract was bullet-proof and that the receivership would not interfere with the delivery of the coal to him. He said on Jan. 5 that deliveries had already started. Others interested said the receivership doubtless would upset the snowbird contract, which has caused such consternation among Illinois coal men.

In the receivership petition, signed by Mr. Wilson, the Wilson-Richey Stores Co., Sherman S. Richey, W. T. Richey, William Crawford, George F. Meade, Ephraim Cliburn and Alex Wilson, it is set up that the Southern Gem Coal Corporation is bankrupt through mismanagement and the payment of exorbitant salaries to officials and that bond issues have been floated on the Perry County mines and on the two Franklin County mines in order to prevent payment of creditors' claims. The receivers took over control of the mines as well as the Wabash, Chester & Western R.R., a short line in southwestern Illinois, a large lumber company, an insurance company, an automobile sales agency and a sales agency for handling the coal.

Slidin' on the Levee

River coal operators on the levee at Louisville, Ky., had their troubles on Jan. 2, when the levee was covered with glaze, from a freezing rain. Trucks could not negotiate the hill from the water level, and about a dozen trucks and cars were pulled out of the river during the morning, after making long slides on the ice. One sliding pleasure car is reported to have kicked three trucks into the river.

Says Union Favors Ohio to Detriment of Kanawha

Kanawha operators, speaking through D. C. Kennedy, secretary of the Kanawha Coal Operators' Association, assert that conditions have been imposed on them by the union which make it much more costly to produce coal than in Ohio mines. As an instance, it is pointed out that in Ohio 70 per cent of the men employed are tonnage workers. In the Kanawha field the percentage is but 54.

More helpers have to be employed in the West Virginia mines, Mr. Kennedy contends, than in the Ohio mines, it being pointed out that in the mines of the latter state car tracks are laid to the opening of rooms, the miners being required to lay the tracks back to the face of the coal, whereas in West Virginia all tracks are laid to the face of the coal for the miners. This necessitates the employment of additional labor. Helpers or assistants are required to be furnished in West Virginia, it is claimed, but not in Ohio. Because of the necessity of employing more labor, Kanawha operators assert that the cost of production is greatly increased and that such an increase in

Germans Get North Dakota Lignite Fields?

It is reported that August Thysen, of the Mannheim (Germany) firm of Thyssen & Co., has taken options on lignite fields in North Dakota and will engage in the production of briquetted lignite under a new German process. Dr. Hans Holzwarth, chief engineer for the firm, has been in Minneapolis, Minn., after a trip of inspection of the lignite fields, and is said to have taken options on some promising lignite fields. A rotary distillation process, which recovers numerous byproducts and produces a "hema-coke" is to be used. This coke is ground and briquetted with pitch recovered from the raw material. It is asserted that this product can be produced and sold in the Twin Cities at \$8 a ton. It is also possible that machines for the process will be manufactured in this country, possibly in the Twin Cities.

the cost of production constitutes another handicap to reasonable competition with coal mined in Ohio.

A conference has been called for early in January between a committee from the International office of the United Mine Workers and D. C. Kennedy, secretary of the Kanawha Coal Operators Association, with a view to ironing out the existing inequalities.

Bay State Coal Committee Presents Findings

The Joint Special Coal Investigating Committee, appointed by the Massachusetts Legislature to probe the coal business, in a report just released, finds among other things the following:

(1) The Legislature cannot assure a continuous and adequate supply of anthracite.

(2) Adoption of lower-cost fuels, especially bituminous coal, by the public is the way to meet the problems of fuel supply.

(3) There is no justification for the \$16 retail price asked for domestic coal by Boston retailers, as the maximum should be not more than \$15.50.

(4) There should be federal legislation providing for complete publicity with respect to the anthracite industry, this including operators, sales organizations, transportation companies and the miners' union.

(5) The President should be authorized, in case of actual or threatened suspension, to name a special commission of inquiry and conciliation.

(6) The contract between operators and the union should be amended to provide penalties in case of a breach by either party.

(7) Congress should authorize some federal agency to standardize anthracite sizes and quality.

(8) In case of a fuel emergency the Interstate Commerce Commission or some other federal agency should receive power to prevent speculation in coal by jobbers and wholesalers.

(9) The State of Pennsylvania should repeal "the now notorious anthracite tonnage tax."

Rail Coal Consumption Heavy During October

Class 1 railroads of the United States consumed 9,411,000 net tons of coal during October, 1923, as charged to account 394, compared with 8,521,000 tons in the preceding month and 9,281,000 tons in October, 1922, according to a report by the Bureau of Statistics of the Interstate Commerce Commission covering 176 steam roads. During the first ten months of 1923 these roads consumed 91,715,000 tons as compared with 76,159,000 tons in the corresponding period of 1922. The delivered cost per ton in October last was \$3.30 as against \$4.26 in October a year ago.

Consumption of fuel oil during October was 198,760,000 gallons, compared with 175,943,000 in the preceding month, and 154,749,000 gallons in October, 1922.

Oddie Legislation to Provide Minimum Federal Role in Coal Industry

Nevada Senator Discounts Proposals to Fix Prices and Limit Margins — Sees Need of Assistance—Constructive Report of Massachusetts Commission Occasions Surprise

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

In introducing legislation suggested by the report of the Harding Coal Commission, Senator Oddie will not follow exactly the recommendations which the commission put forward. The Nevada Senator, who is chairman of the Committee on Mines and Mining, to which the Coal Commission's report was referred, has not determined finally the exact provisions he will put forward in the legislation that he will introduce. He is much impressed with the intricacy of the problems presented, but he views with particular approval those features of the commission's recommendations which emphasize the need for fostering and developing the coal industry in putting it on a stable basis.

As a man familiar with the problems of actual mining, he is inclined to discount the proposals for regulation, which include price fixing, limitation of margins and the like. He has not committed himself as yet as to just how far he is willing to suggest any extreme measure until other means have had a fair trial. He recognizes that the important thing to be accomplished is to insure the public of a constant and adequate supply of bituminous coal. If that can be accomplished, he believes prices and profits will take care of themselves.

Senator Oddie is thoroughly convinced that the coal industry needs the same sort of careful assistance which he is proposing for the mining industry in general in his bill providing for the establishment of a Department of Mines.

It is evident that the views of Senator Oddie are at variance with those of Representatives Treadway, Luce and Rodgers, and with those of Governor Pinchot.

In connection with the legislation suggested by the New England members of the House of Representatives mentioned, it is pointed out that the report of the Massachusetts commission appointed by the Legislature of that state takes a more constructive position. It does not advocate limitation of margins, fixing of prices, nor other extremes of legislation, although it does advocate publication of essential facts through a central agency with powers to prescribe forms of accounts.

The restraint and good sense which is shown in that report came as something of a surprise to Washington, which has been accustomed to expect rather radical suggestions from New England. The outbursts of certain members of Congress from that section are regarded with much tolerance because it is realized generally that their section

of the country has gone through some very disagreeable experiences.

If the report of the Massachusetts committee correctly interprets the feeling of the people of New England, it would indicate that they believe some federal action is necessary, but that they are not ready to go to the length of putting coal on a public-utility basis.

While the legislation Senator Oddie is drafting is certain to reflect his interest in a Department of Mines, it is known definitely that it will provide for a minimum amount of federal intervention in the conduct of the coal business.

As a step toward obtaining a Department of Mines, a compromise proposal is being considered. It is quite evident that the addition of a Secretary of Mines to the Cabinet can be effected only after a hard fight, which, necessarily, must extend over a considerable period. An important step in that direction, however, would be marked by the simple addition of the two words "and Mines" to the "Department of Commerce," making the official designation of that branch of the executive machine read "Department of Commerce and Mines."

The early transfer of the Bureau of Mines to the Department of Commerce seems probable. The President is committed to a policy of strengthening the Bureau of Mines. Arrangements already are being made for increased activities on the part of that bureau. If while these changes are being made, the designation of the department can be changed as mentioned it will give increased recognition to the mining industry by the federal government and will mark great progress toward a separate department that will deal with mining matters only.

Governor Smith Says New York Can't Handle Coal Situation

In his address to the Legislature on Jan. 2, Governor Smith referred to coal in the following words:

"This time a year ago the state was suffering from a shortage of coal due to a prolonged strike at the mines and we were obliged to invoke the extraordinary police powers of the state for the protection of our people. While there is no shortage apparent at this time the price of coal has been increased to meet settlements made because of another strike threatened during the month of September.

"In my opinion the coal problem is one we cannot handle in this state ef-

fectively. No coal is mined in the State of New York and costs of production, taxation by the state where it is mined, and the rates fixed by the Interstate Commerce Commission are all entirely outside of our control. We can only turn the searchlight of public opinion on those who would take advantage of the situation to profiteer. We have done this by creating the fair-price coal commissions in the various cities where it has been certified to me by the chief executive of the municipality that conditions warrant it.

"I call this to your attention at this time in order that appropriate committees of your honorable bodies may have the matter under consideration so that if an emergency should arise through shortage or failure of adequate transportation, the state may be ready at a moment's notice to take such action under our police power as might be required for the preservation of the public health."

Says Searles Is Preparing "Usual Alibi"

Walter H. Cunningham, secretary of the West Virginia Coal Association, commenting on the statement attributed to Ellis Searles, editor of the *United Mine Workers Journal*, that the non-union operators are trying to bring about a strike in union fields in order to make unholy profits, said: "Searles has adopted the same publicity tactics that marked the preliminary phases of the union miners' walkout in 1922. It would appear it has become the fixed policy of union officers to provide in advance an alibi and thus maneuver into a position where they can take advantage of their own misdeeds.

"The charge that non-union operators of southern West Virginia are attempting to force a suspension of work in the union fields is as ridiculous as his charge that operators 'made millions of dollars in unholy profits in the strike of 1922.' Operators in the non-union districts have no more control over events in the union coal fields than they have over the actions of the officers of the United Mine Workers of America."

CHARLES H. DORRANCE HAS RESIGNED his position as vice president in charge of operations of the Hudson Coal Co., with offices at Scranton, Pa., because of ill health and need of rest. Mr. Dorrance's duties will be taken over by A. M. Fine, who will also continue as vice president in charge of the auditing department.

BIDS FOR FURNISHING and delivering 10,000 gross tons of bituminous coal for navy vessels will be received by the U. S. Navy Department at Washington on Jan. 16. The coal is to be delivered as needed alongside ships New York harbor or at the Brooklyn Navy Yard and must conform to the following analysis: Volatile, 23 per cent maximum; ash, 7 per cent maximum; sulphur, 1.5 per cent maximum, and B.t.u., 14,700 minimum.

Davis Invited to Address Union Miners' Convention

James J. Davis, Secretary of Labor of the United States, has been invited to make an address the first day of the annual convention of the United Mine Workers in Indianapolis, Jan. 22. About 1,800 delegates are expected. Officials of the union say it is impossible to say at the present time just what the wage demands of the miners will be, that question being entirely in the hands of the wage-scale committee and the body as a whole, but they say that no cut in wages will be countenanced.

Last year more than 600 resolutions were submitted on wage and working conditions alone and officials expect as many this year. A change in the method of allotting delegates will reduce the number at the convention this year by about 400. More than 2,200 delegates were present at the last convention. The same number of votes will be in evidence, however, a delegate being empowered to declare all the votes he represents.

Buyers' Year Ahead Is Opinion Of Statisticians

The real purpose of the American Statistical Association meeting in Washington recently was to discuss forecasting in business and the prospects of 1924. This gathering, which included many of the brightest minds engaged in statistical work, reached the conclusion that 1924 promises to be very much like 1911. An analysis of the situation at the close of 1910 shows that much the same influences were at work at the close of 1923.

On that and other assumptions, it seems to have been the consensus of opinion that 1924 will follow a course midway between prosperity and depression. There will be little unemployment. Wage schedules will undergo little change. Price fluctuations will be small. Business will be cautious but not dull. Competition will be keen. The volume of business will be less than in 1923 but will be greater than that of 1922. It will be a buyers' year, rather than a sellers' year.

The thought of the meeting with regard to coal seems to have been that it will be a year of serious competition, one in which the public may expect an ample supply of coal at reasonable prices provided it does its part in spreading purchases evenly enough throughout the twelve months to prevent a peak in the fall, which the railroads would not be able to handle.

R. M. RANDALL, of Saginaw, Mich., general manager of mines for the Consolidated Coal Co. of Michigan, died Jan. 1. For years he had been the operating head of the company's four Michigan mines, producing nearly half a million tons of coal annually. He represented the company, and usually the State of Michigan, in all labor negotiations and was a vice-president of the National Coal Association.

International Mine-Rescue Meet at Huntington

Huntington, W. Va., has been selected by the U. S. Bureau of Mines as the place for holding this year's International First-Aid and Mine-Rescue Meet. The meet probably will be held in September.

Winslow to Draft Coolidge's Coal Plan for House

Legislation representing President Coolidge's views on coal and transportation problems are to be placed before the House soon by Representative Winslow, of Massachusetts, chairman of the House Committee on Interstate Commerce, before which such matters come. At a conference Jan. 3 the President clarified the administration policies as set forth in his message to Congress. As a result of the conference Representative Winslow intimated that he would draft bills embodying the President's ideas for presentation to his committee this week.

Mr. Winslow said that the President advocated the establishment of a commission empowered to deal with future emergencies in the coal industry, the bringing about of greater unity in the ownership of coal mines and the formation of common coal-selling agencies for limited districts.

The administration legislation also will cover consolidation of the railroads, both regional and route, providing federal machinery for the stimulation of such consolidation and will propose a reorganization of freight rates.

Bituminous-Wage Parley Feb. 11 in Florida

Union representatives and operators of Ohio, Indiana, Illinois and probably western Pennsylvania will meet at Jacksonville, Fla., Feb. 11 to negotiate a new wage agreement for bituminous-coal miners, to become effective April 1. This was agreed upon at a meeting of representatives of the miners and operators of Ohio, Indiana and Illinois held in Cleveland, Ohio, Jan. 4.

Western Pennsylvania was not represented at the Cleveland meeting but in the call to be issued for the Jacksonville conference the miners and operators of that state will be included. It was specified at a joint conference in New York last January that in case a wage scale meeting is called this year all four states be included, despite the fact that the western Pennsylvania men are not signatories to the present wage agreement, which expires March 31. If western Pennsylvania declines the invitation, a three-state conference will be held.

Treadway Presents Coal Bill In Trust-Busting Speech

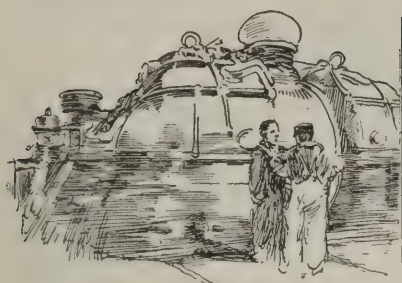
Something of the temper of the House of Representatives may be judged from the fact that it burst into applause when Representative Treadway, of Massachusetts, in the course of an old-fashioned trust-busting speech, declared that he agrees heartily with Governor Pinchot in his expression that the company operations in Pennsylvania constitute a "hard-boiled monopoly, whose prime interest in the public is that it shall consume their coal at their price." There also was vigorous applause for his demand that the anthracite companies be required to give publicity to their accounts. He did not spare the mine workers in his excoriation of the anthracite industry. He condemned the state license system and the limitation placed upon output.

Representative Treadway reviewed such portions of the Coal Commission's report as supported the bill which he has introduced. He was not particularly complimentary to the Coal Commission, but declined to concur in an expression by Representative Blanton, of Texas, that \$600,000 had been spent on a useless commission. He contended that the federal government is the only agency which can grapple with the situation with any hope of success. He expressed himself as being against government ownership, but feared the public demand eventually will be such as to force it. Mr. Blanton again interrupted to say that government ownership would mean a cost at the mine of \$25 a ton.

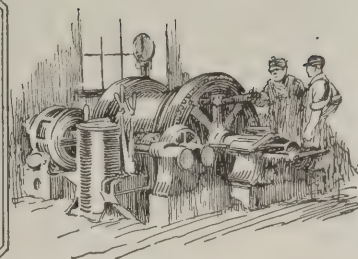
Corona Co. Files Two Appeal Writs; One Dismissed

The writ filed by the Corona Coal Co. of Alabama, to appeal from a decision of the Court of Claims in a suit against the U. S. Railroad Administration was dismissed Jan. 7 by the U. S. Supreme Court on the ground that the company had also filed suit in a federal district court and that it could not proceed by both methods. The company had a contract to supply coal to several railroads. When the Railroad Administration took over the carriers it attempted to enforce the contracts, but this was denied. The Fuel Administration then requisitioned the coal. The Railroad Administration paid the contract price for the coal it used. As this price was lower than the price declared fair by the Fuel Administration, the Corona company sought to collect the difference.

THE INTERSTATE COMMERCE COMMISSION has called a hearing in Minneapolis for Jan. 17 in connection with the protest against withdrawing the joint-all-rail rate on anthracite. If the joint rate is withdrawn and the sum of the locals applied, it will cause an increase in freight of \$1.66.



Practical Pointers For Electrical And Mechanical Men



Explanation of Fan in Electrical Terms; Increasing Efficiency with New Drive

A shunt-wound generator driven at a certain speed produces a certain pressure or voltage, which as long as the speed remains constant will be reduced only by the resistance to the current flowing through the generator winding itself. The amount of this current will depend on the resistance of the external circuit or path connected to the generator, the resistance of this path being proportional to its length and inversely proportional to its cross-section. Similarly, the mine ventilating fan driven at a certain speed produces a certain pressure or water gage which as long as the speed remains constant will be reduced only by the friction of the air flowing through the fan itself, and the amount or volume of this current of air will depend on the resistance of the external path connected to the fan, the resistance of this path being proportional to its length and inversely proportional to its cross-section.

The water gage as generally read, as being the friction drop in the mine, corresponds to the drop in voltage in the electrical circuit. The greater distance the current of electricity or air is to be carried, the greater the pressure that is necessary to force it through the circuit whether it be an electrical conductor or a mine gangway. To produce greater pressure either the armature or fan must be run at a higher velocity or the diameter must be greater to produce a higher peripheral speed. If the electric current or current of air is to be greater than a greater path area is necessary both internally and externally if the flow is to be produced efficiently—that is, the generator must have a larger area of conductor, whether it be obtained by one large conductor or several smaller

ones in parallel, and the fan must have a larger area whether it be widened out or have multiple inlets, to give a larger air passageway. The method of obtaining greater area of section to permit the flow is similar in the external path—that is, one large path or several smaller ones in parallel.

If a generator were purchased to produce 250 volts and 1,000 amperes, it would not be expected to produce either 500 volts or 2,000 amperes, even disregarding the efficiency; in fact, the generator, if not protected by fuse or circuit-breaker, probably would burn up, while the fan, if driven by a motor or engine of sufficient power, would continue to operate, but inefficiently.

If the generator is operating with a heavy load and the pressure is low at the end of the line, tests are made for

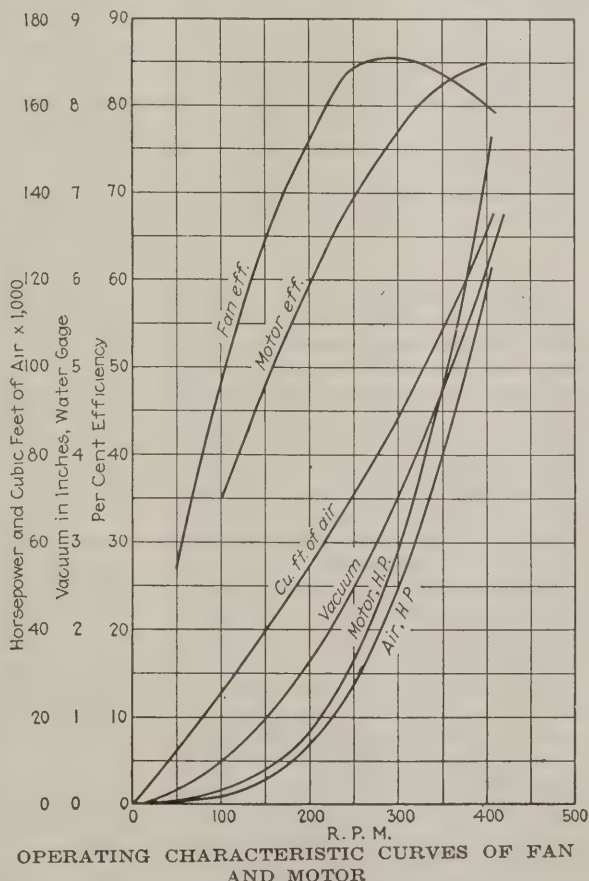
short-circuits, the area of conductors is checked and if small is increased, and if conditions are such that the generator is still overloaded, additional capacity is installed; but in the case of the fan, in many cases it is speeded up and made to run inefficiently and given no further consideration.

In the case of the generator, the current forced out by the pressure must return to the generator, and as no efficient path has been provided by nature we are forced to provide a path of sufficient area. By sinking a shaft at the far end of the mine we are enabled to use a path of infinite area for the fan return.

Because in many cases the power cost of pumping and ventilation is 60 per cent of the total power cost, it appears that greater care should be taken to make the fan deliver its air efficiently. Short-circuits in the air course and restricted air courses will show only in the power bill, unless accurate instruments are installed and readings carefully noted.

The following are tests made on a number of fans scattered throughout the coal region: Fan 6 ft. x 3 ft. 6 in. installed on shaft, delivering 105,000 cu.ft. of air per minute; water gage, 2.9 in.; input to motor, 180 hp.; in the air, 48 hp.; efficiency of installation, 26½ per cent. Fan 6 ft. x 3 ft. 6 in. installed on shaft, delivering 66,300 cu.ft. of air per minute; water gage, 3.6 in. input to motor, 142 hp.; in the air, 37.6 hp.; efficiency of installation, 26.4 per cent. Fan 6 ft. x 3 ft. installed on drift, delivering 60,000 cu.ft. of air per minute; water gage, 0.5 in.; input to motor, 9 hp.; in the air, 4.7 hp.; efficiency of installation, 52.2 per cent. Fan 4 ft. x 2 ft. 6 in. installed on shaft improperly located, delivering 45,000 cu.ft. of air; water gage, 2.5 in.; input to motor, 42.9 hp.; in the air, 17.7 hp.; efficiency over all, 41.3 per cent.

For one of our new fans 90,000 cu.ft. of air per minute was necessary, so a new shaft was sunk at the proper location and a 6 ft. x 3 ft. Jeffrey fan installed. As the fan could be run at reduced speed at night and on idle days, a General Electric variable speed brush-shifting motor was connected to the fan. This motor was arranged to run from 100 to 243 r.p.m. with windings in star and from 243 to 450 r.p.m. with windings in delta, the motor being direct-connected to the fan. The curves show that the 90,000 cu.ft. was obtained with an input to the motor of 60 hp., and if this had to be obtained with the old



Much of the mine power bill is due to the fan; therefore any saving in efficiency in the fan and motor drive is highly desirable and soon pays for itself. These curves cover a modern fan and a brush-shifting motor.

installation it would have required 350 hp. input. This fan was installed in a position where at some future date it will be used to ventilate an adjoining mine.

It would seem that the ventilating system of the mine should receive the same careful study as the electrical system; otherwise it will be found that in many cases the flow will be sufficient but the efficiency very poor.

J. F. MACWILLIAMS,
Electrical Engineer.

Pennsylvania Coal & Coke Corp.,
Cresson, Pa.

Almost a Serious Accident on Ungrounded Machine

Several days ago I was sent to a coal mine in one of the Southern states to locate and repair some trouble on a motor-generator set. The generator was a 275-volt machine and the motor operated at 2,200 volts. The details of the trouble were not given me, so I had no idea what the trouble was. After reaching the substation, which was about 2,000 feet underground and in an extraordinarily dry place for a coal mine, I began my investigation.

The substation equipment was enclosed with a wire fence and the superintendent reached over and touched the machine which was still running, explaining to me at the same time that it shocked anyone who touched it. Several of the other men who were to help repair the machine touched it also. Seeing that they were not seriously shocked I touched it with the back of my left hand.

My conclusion was that the d.-c., or low-voltage, side of the machine was grounded slightly. But when the machine was shut down there was no ground found on the d.-c. end. Accordingly the motor winding was tested and showed a dead ground. We had all been flirting with death, handling 2,200 volts while standing on the ground. I looked around the machine for a ground wire but it had not been installed, nor was there a ground to the switch framework. I cleared the ground on the motor by cutting out a defective coil. Then I reported the lack of a ground wire and its function to the superintendent. He promised to see that the machine was properly grounded the next day.

If any of the attendants of that substation had been killed or injured I have no doubt that if the case were taken to court it would return a verdict of "criminal negligence" on the part of the company operating the station ungrounded.

The importance of grounding apparatus which is classed as high-potential electrical machinery cannot be overestimated, especially around a mine, where the earth generally is damp. To leave machinery of this class ungrounded is to break both the mining laws and the laws of the Underwriters. Following is a list of the sizes of wire

to use for grounding purposes as specified by the Board of Fire Underwriters:

SIZES OF WIRE REQUIRED FOR GROUNDING

(As listed by National Board of Fire Underwriters Under Rule 15A Section m)

Capacity of Nearest Cutout Protecting the Equipment	Size of Ground Conductor
0 to 100 amp.	No. 10 B & S gage
101 to 200 amp.	No. 6 B & S gage
201 to 500 amp.	No. 4 B & S gage
500 and above	No. 2 B & S gage

The above is for copper wire only. The place of connection should be in plain sight. A piece of trolley wire is all right for a ground wire.

GRADY H. EMERSON,
Birmingham, Ala. Electrician.

Charges to Capital and Maintenance Accounts

One thing that the Coal Commission noticed in its survey of the coal industry was the lack of definite information of the capital invested at the coal mines. Only the larger companies have any system whatever of knowing just how much capital investment they have in their property and what the maintenance costs on the plant are.

It certainly is not proper to charge all the expenditures for equipment and changes to the mine plant to the capital account. Most mining expenditures may be charged either to capital or to maintenance, but some charges require considerable thought before the proper amount can be charged to either of these accounts.

Another important consideration is the charging off of the value of portions of the property which have been abandoned or which have become obsolete. Unless this is done the capital charge will reflect a much higher investment than could actually be considered the capitalization of the property.

Charges for work done on contract usually are very easily placed against capital account. Maintenance charges, such as are ordinarily necessary for the upkeep of the equipment, easily fall into their proper class. Some large companies have authorization forms for all new work. Before any material or labor is done on the job, instructions are given as to what class the work falls under. However, the charges cannot be made until the work is done, since, depending upon the charges and the extent of the work, certain amounts must be charged to either the capital or maintenance accounts.

To decapitalize a part of the investment, a report is made and forwarded to the controller's department. Here a trace is made to ascertain positively the amount of the decapitalization and its value. Due to the ever changing costs of materials it is often a question as to the value of the decapitalized property or material. Nevertheless, an accounting department following up this work usually would have little difficulty in writing off the proper value.

Sealing a Centrifugal Pump Against Air Leaks

Everyone knows the importance of preventing air entering a centrifugal pump. Once air enters the pump it causes several difficulties; most important, however, is the fact that it cuts down the capacity and makes the pump rattle. Depending upon the design of a pump, air leaks happen at joints and pump connections and through the stuffing boxes. Air leaks in pipe connections are not always obvious, while leaks at the stuffing boxes are more easily traced.

In horizontally split pumps the connection between the upper and lower parts of the casing often are neglected and cause air leaks which usually are not easy to find. In taking the pump apart the gasket between the two parts frequently is broken, thus causing ridges and leaks.

To avoid the breaking of this gasket and thus to keep the joints free from leaks, our company has made a practice of using a heavy paper gasket and thoroughly shellacking it to the lower half of the casing. When this shellac has dried the upper surface of the gasket is thoroughly soaked with a lubricating oil. The upper half of the casing is then placed on top of the oiled surface and the two parts are tightly bolted together. The oil tends to some extent to soften the paper and at the same time fills in the pores or slight imperfections in the castings. In this way a very tight joint is made and when the upper half of the casting is removed from the pump, the separation is made without damaging the gasket. By proper care the same gasket can be used several times and yet never be broken.

MINE MECHANIC.

One kilowatt equals:

1,000	watts.
1.3410	horsepower.
2,655,180	ft.-lb. per hour.
44,253	ft.-lb. per minute.
737.56	ft.-lb. per second.
3,415	heat units per hour.
56.92	heat units per min.
0.9846	heat units per second.
0.234	lb. carbon oxidized per hour.
3.52	lb. water evaporated per hour from and at 212 deg. F.

One kw.-hr. equals:

1,000	watt-hours.
1.341	horsepower hours.
2,655,180	ft.-lb.
3,600,000	joules.
3,415	heat units.
367,100	kilogram meters.
0.234	lb. carbon oxidized with perfect efficiency.
3.52	lb. water evaporated from and at 212 deg. F.
22.77	lb. of water raised from 62 deg. to 212 deg. F.



Problems In Underground Management



Would Ventilate Mine Fire Area With Inert Gas

Why Stopping Intake Is Inadvisable—Small Fire Area If Shut In May Explode—Can Extinguish Crop Fires Only If Dead Air Is Driven in Fast Enough to Keep Surface Air Out

BY JOSEPH J. WALSH

Secretary of Mines, State of Pennsylvania, Harrisburg, Pa.

When sealing a mine fire in a gaseous mine, the question whether the return or the intake seal should be erected first frequently arises. Various answers are given to this question, depending upon conditions in the mine.

Under any condition it is an extremely dangerous practice in a gaseous mine to erect the intake seal first. This is particularly true if an exhaust fan is used, for the reason that when the intake seal is erected first, the gases generated by the fire are free to move to the fan, and any firedamp that may accumulate in the air course leading to the fire will move, of course, in that direction and become ignited.

On the other hand, if the return stopping is erected first, the gases generated by the fire will spread in all directions, forming a zone of inert gases around the fire, thus creating a condition that will not support the combustion of methane or firedamp.

It is a hazardous undertaking to seal a small fire in a gaseous mine, because it cannot generate sufficient inert gases to create a zone sufficiently reduced in oxygen to prevent the explosion of firedamp. If a fire is known to be small and must be extinguished by the sealing method, fresh air should be applied, if necessary, until the fire extends across the face of one chamber, at least. The size of a mine fire can be determined readily even though it is inaccessible and cannot be seen.

The conditions, however, surrounding the crop fires render their sealing of little value. It is practically impossible to exclude fresh air from these fires because of the broken strata and the closeness of the fire to the surface.

For extinguishing fires of this nature I propose the inert-gas method, that is ventilating (if we may use the term)

the affected area with a gas consisting chiefly of nitrogen and carbon dioxide, together with small percentages of carbon monoxide and oxygen, the latter being in such small proportion that they will not support combustion.

In order that this system may be used successfully it is necessary that the gas be forced into the mine with a force sufficient to create a pressure within the fire area greater than the pressure of the atmosphere surrounding this area. When this is done, every opening or crevice leading from the surface into the fire section will be converted into an outlet for the inert gas, thus assuring the exclusion of fresh air. In other words, all the openings through which fresh air might enter the mine will be sealed by the inert gas.

This gas would be generated simply by burning the oxygen out of the air. The products of combustion then would be passed through a cooling system, thence to a fan, by means of which they would be forced into the mine.

ESTIMATION OF PLANT NEEDED

The size of the plant, of course, would depend on the volume of gas required each minute. For example, assuming that a plant capable of producing 10,000 cu.ft. of gas per minute is required, four furnaces with grates 7 ft. wide and 6 ft. deep would be necessary, these being arranged in batteries of two furnaces to the battery.

The grates should be of the dumping type, as the low carbon dioxide and high oxygen prevailing during fire cleaning make it essential that these periods be curtailed as much as possible, and this can best be attained by the use of dumping grates. The furnaces should be provided with a blast equipment capable of supplying 10,000 cu.ft. of air at a suitable water gage, and with appropriate dampers, so that the furnace may be isolated at will.

The hot gases from each furnace will enter a firebrick-lined header, from which it will be distributed to six cooling flues about 35 ft. long and 18 in.

in diameter. These cooling flues will be immersed for 30 ft. of their length in a tank of cooling water. The partly cooled gases will be gathered at the far end of these cooling flues and conducted through an airway to the cooling tower.

The purpose of these flues is to give the gases a preliminary cooling so that the latter may be handled without difficulty. The inert gas leaving the furnaces will be at a temperature of about 2,200 deg. F. and these flues are designed to drop this temperature to about 600 to 700 deg. F. This partly cooled inert gas will enter the base of a cooling tower 30 ft. in height and 16 ft. in diameter, constructed of hollow tile. In this cooling tower its velocity would be reduced to about 50 ft. a minute.

GAS COOLED TO 80 DEG.

Five feet from the top of this tower sprays would be provided that would discharge 400 gallons of water per minute at a pressure of $7\frac{1}{2}$ lb. to the square inch into the ascending hot gas, dropping its temperature to about 80 deg. F. The cooled gas would leave the tower at its top and be carried by a downcast to its base, where a fan capable of producing 10,000 cu.ft. of air per minute at a 3-in. water gage would deliver it for distribution to the mine workings. The hot water leaving this cooling tower might be used to supply the preliminary cooling tank, and it might be advantageous to locate the tower at such a height that this water would flow by gravity to the cooling tank.

If we assume that 1 sq.ft. of fire grate will consume 20 lb. of coal each hour, the area of a fire grate that will consume sufficient coal to produce 10,000 cu.ft. of an inert gas per minute may be found as follows:

Admitting a 30-per cent excess air supply to the furnace 1 sq.ft. of fire grate consuming 20 lb. of coal each hour would produce each minute:

$$\frac{16.6 \times 20}{60} = 5.5 \text{ lb.}$$

or 72 cu.ft. of gas. To produce 10,000 cu. ft. of gas each minute a grate area will be required of

$$\frac{10,000}{72} \text{ or about } 140 \text{ sq.ft.}$$

The coal used in a plant of this size, after making an allowance of 30 per cent for the coal wasted, would be about 4,000 lb. per hour.

Article entitled "Mine Fires and Some Methods for Extinguishing Them," delivered before the Coal Mining Institute of America, Dec. 20, 1923, at its Pittsburgh meeting. A description of this method, without many details which Mr. Walsh has since added, was contained in an article which appeared in *Coal Age*, Feb. 23, 1922, pp. 328 and 329.

Discussion

Operators Should Formulate Better Laws That Coal Mining May Be Made Safe

A member of the American Association of Labor Legislation in giving his views has found some who do not agree with him on additional legislation as a means of enforcing safety in mines, especially where he favors abolishing the use of black powder from mines, and again where he advocates placing police power in the U. S. Bureau of Mines. One writer in answer says that there are now few mines where permissibles should be used that are not using them and says further that resistance doesn't come from the operator so much as from the miner and that safety is to be obtained through education rather than legislation.

One can readily agree that education is the foundation of safety, for, broadly speaking, education is the foundation of all things, but I believe we will all agree that the education of the individual is a slow process, so slow in fact that little can be accomplished. For this reason it would be well to consider educating legislators rather than individuals and through wise legislation enforcing safety on those who oppose it. This would be preferable to placing police power in the Bureau of Mines. The operators in mining states should meet the legislators at every session and discuss what legislation should be passed to lessen the dangers of mining.

No doubt there are legislators in some mining states who are familiar with mining needs, but the number in most of these probably is small. When the draft of a mining law is presented it usually is held over for further discussion, which means that the legislators do not know how to act on it, and in consequence the draft is never enacted into law. Going back over my own experience, I can recall few instances where anybody took the initiative in revolutionizing any phase of mining so as to enhance its safety. I can recall, on the other hand, that almost every important step in safety has been enforced through legislation.

The attitude that the average individual takes is, Does the law say I must do this? or Can the law compel me to install this or that safety equipment or practice? The truth is, most of our accomplishments in safety have resulted from remedial legislation, even though some mining men have taken the initiative and gone far ahead of all requirements of the law to make their mines safe and satisfactory to work in.

Education must continue—it would be a sad world without it—but nevertheless we will always have many individuals who will not consent to be edu-

cated into safety and can be reached only through the strong arm of the law. Pineville, Ky. GEORGE EDWARDS.

Workman's Share in Britain Exceeds Even 85 per Cent

As Paul Wooton has correctly stated, the original arrangement in the National Wage Agreement of Great Britain was that the net proceeds obtained by the coal operators should be divided between the employees and employers on the basis of 83 per cent and 17 per cent, but it actually works out 85 per cent to 15 per cent, as a number of items of necessary expense should be included, for in drawing up the agreement no allowance was made to the operator for such expenses as rent allowances and free or cheap coal to the workmen.

I have taken as my authority the annual report of the Secretary for Mines for 1922, and as a matter of fact practically all the data given in my paper were taken from pages 6-8 of that report, as I have stated in my article. The Secretary says in effect:

The gross proceeds left after all charges are paid other than wages and wages costs are commonly known as the net proceeds, and these are available for wages and profits, "and shall be shared in an agreed proportion which works out at about 85 to 15 per cent."

As a matter of fact, in 1922, on account of some of the districts being on the "minimum" for most of the year, the average for all the districts when worked out proved to be on the basis of 92½ per cent to 7½ per cent.

Pittsburgh, Pa. JOHN T. RYAN.

Sprayed Concrete at Bruceton

In the test explosion at the Bruceton Mine the U. S. Bureau of Mines sprinkled 600 ft. of entry with one pound of coal dust from the West Kentucky No. 9 seam per lineal foot of entry and by a blown-out shot of 4 lb. of F. F. F. black powder produced an explosion the flame of which extended

300 ft. beyond the point where the coal dust was sprinkled. Gunite had been placed on the inner portion of this entry on the roof and ribs and within a few feet of the face. On examination the coating was found to be everywhere intact, despite the severe test thus incidentally made on it.

Large Automatic Drop-Bottom Cars in Effective Service

In your Oct. 18 issue, p. 594, was an article in which reference was made to a statement of Frank Haas as follows:

"As regards bottom-dump cars, he believed that they could hardly be constructed safely in excess of 1½ or 2 tons capacity."

This is a rather serious criticism of the automatic drop-bottom car. I feel that it is my duty and yours to give publicity to the facts. Let me say, at least for the Sanford-Day Iron Works, that we have never had complaint in regard to the strength of this type of car except in regard to some bumper castings of defective steel. Furthermore, no weakness has since developed. One car was loaded with 11,200 lb. of pig iron with no noticeable deflection of the bottom doors.

Now, as to actual practice: After about seven years of continuous service the First Creek Coal Co., of Blue Diamond, Ky., which installed the first fifty cars of this type which we made, wrote us that their cars carried on an average 2½ tons of coal and that they sometimes have loaded 6 tons of slate upon them.

The 10-ton incline monitor of another coal company broke down and the management arranged to build up the sides of two automatic drop-bottom cars (with 2¼-in. round axles) until they held between 5 and 6 tons of coal each. These cars gave complete satisfaction until new monitors were built.

The accompanying table gives an incomplete list of corporations using automatic drop-bottom cars with the average loads carried by the cars.

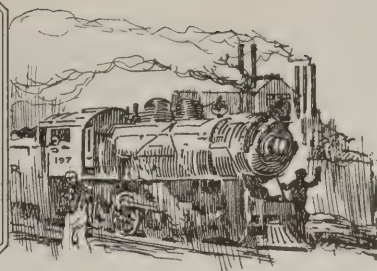
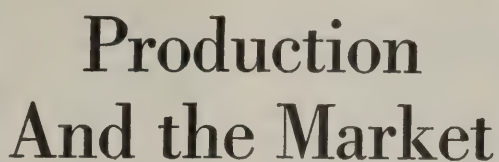
This type of car can be built to carry satisfactorily 6 to 10 tons. As you will note, the average load of the U. S. Gypsum Co. is 6.75 tons. In fact cars recently have been designed with a capacity exceeding 200 cu.ft., level full.

Despite what Mr. Haas has said, no objection has been made to the strength of the car even when it is loaded in excess of 2 tons. The cars are used not only for coal but for limestone, iron pyrites and silver ore, and they are built to support a load that only a 3-in. axle will carry safely.

LOADS CARRIED BY DROP-BOTTOM CARS

Company	Post Office	Average Loads in Net Tons	Maximum Loads in Net Tons
Glogora Coal Co.	Stickney, W. Va.	3.00	4.00
Winona Coal Co.	Birmingham, Ala.	5.00	6.00
U. S. Gypsum Co.	Oakfield, N. Y.	6.75	7.42
Bear Canon Coal Co.	Trinidad, Colo.	3.00	3.80
Hardy Coal Co.	Panther, W. Va.	3.60	5.00
Helena-Straven Coal Co.	Straven, Ala.	2.60	3.00
Hanover-Bessemer Iron & Copper Co.	Fierro, N. M.	5.00	6.00
Silver Dyke Mining Co.	Niehart, Mont.	3.70	4.03

List as originally received contained 22 items.



Descent of Wintry Blast Stirs Coal Markets; Prices Are Not Affected to Marked Extent

A sudden drop in temperatures over the greater part of the country last week created a stir in the coal market, but failed to affect prices materially. Some industrial consumers who had delayed buying because of the inventory period were forced into the market, while demand for domestic coals took a sudden spurt.

Production of soft coal during 1923 was 545,300,000 net tons, according to the preliminary estimate of the Geological Survey. This was an increase of 123,032,000 tons over the previous year's output, and has been exceeded only by three years, 1920, 1918 and 1917. Output during the week ended Dec. 29 dropped to 6,684,000 net tons, the lowest figure for any week during the last year, and a decrease of 3,859,000 tons when compared with the previous week's production. The loss in output was due to the holiday as well as the stoppage of work the day before and the day after. Production, however, during the last three days of the week recovered to about the previous week's level.

Price Index Advances

Coal Age Index as of Jan. 7 registers 182, an increase of three points, when compared with the previous week, with an average price of \$2.20. There were increases in southern Illinois, Mount Olive, Springfield, Standard and Kanawha and slight decreases in eastern and western Kentucky and Pocahontas districts.

The Western markets felt the effects of the lower temperatures which spread over most of the country. There was a lively jump in demand, but prices showed comparatively little change. Retail dealers were soon cleaned out of supplies and shippers were called upon to ship anything they had. Mines operating on part time were soon operating to capacity. In Ohio there was an active demand for domestic coals and similar conditions were reported at Pittsburgh. There was no improvement noted in the steam-coal situation in New England.

and buyers continue to show the same lack of interest in the soft-coal situation as during the past several weeks. Trade along the Atlantic seaboard continues dull.

Hard-coal production took a heavy drop during the last week of the year, declining 754,000 net tons to 1,236,000 tons, while preliminary reports indicate an output of about 95,000,000 net tons for the year 1923, a decrease of about 3,000,000 tons when compared with 1918, but about 74 per cent more than 1922.

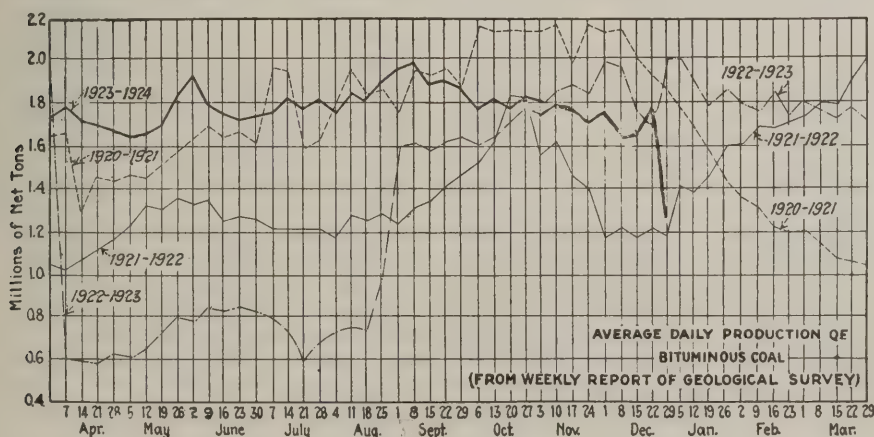
Quotations for independent domestic coals continue to go downward, accompanied by less demand. All sizes are easier and retail dealers in most parts of the country are in good shape to meet any immediate requirements. Pea coal continues easy and can frequently be gotten below company prices.

Soft coal dumped at the lower Lake Erie ports for Lake shipment during the 1923 season amounted to 31,446,823 net tons up to Dec. 30, an increase of 12,095,500 tons over 1922 and 8,275,374 tons over 1921.

The export market was quiet. Some inquiries are being received but comparatively little business was reported as closed. Dumpings at Baltimore during December amounted to 21,030 tons of cargo coal and 4,697 tons of coke, as compared with 59,349 tons of cargo coal and 4,050 tons of coke in the previous month. Dumpings for all accounts at Hampton Roads during the week ended Jan. 3 were 265,413 net tons, as compared with 357,110 tons the week previous.

Joy Reigns in Middle West

There is much happiness and activity in the Midwest coal trade at last. Winter came with a vengeance. At the end of the week the mercury had dropped repeatedly far below zero throughout the Chicago region and the Northwest trade territory. Retailers with small stocks on hand quickly emptied their yards and shippers shipped everything available. Mine tracks have been burdened with "no bills"



Estimates of Production

(Net Tons)

BITUMINOUS

	1922	1923
Dec. 15 (a).....	10,667,000	9,938,000
Dec. 22 (b).....	10,138,000	10,543,000
Dec. 29 (a).....	10,171,000	6,684,000
Daily average.....	2,034,000	1,337,000
Calendar year.....	422,268,000	545,300,000
Daily av. cal. year.....	1,180,000	1,178,000

ANTHRACITE

Dec. 15.....	2,237,000	2,013,000
Dec. 22.....	2,065,000	1,990,000
Dec. 29.....	1,588,000	1,236,000
Calendar year.....	54,683,000	95,197,000

COKE

Dec. 22 (b)	281,000	256,000
Dec. 29 (a)	260,000	221,000
Calendar year	8,033,000	17,919,000

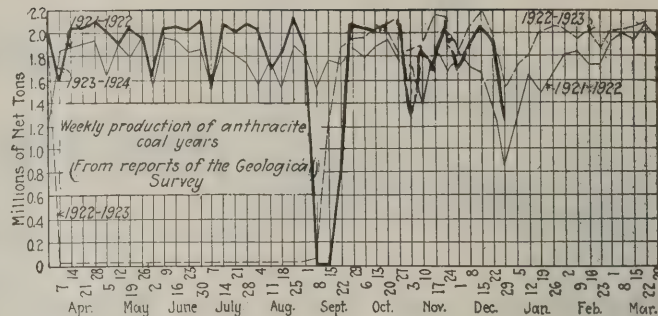
(a) Subject to revision. (b) Revised from last report.

in all domestic sizes, so that producers were ready for the first burst of the demand. Not many changes of price were felt by the end of the week, except some increases in screenings, but they are expected.

In Illinois and Indiana every mine not completely closed up for the winter, was in nearly full-time operation by Friday. However, there are a great many mines in all Illinois and Indiana which are not expected to resume unless the winter is abnormally cold. The extreme cold had a retarding effect on coal, even though no snowstorms accompanied it. Friday and Saturday the coal railroads reported their motive power to be reduced about 40 per cent in efficiency. Extreme cold also kept a good many miners at home, operators reported. On Friday and Saturday wire trouble developed all through Illinois and Indiana, so that many a mine was temporarily cut off from headquarters.

St. Louis Trade Is Lively

Cold weather brought business back to its normal stand. The demand is for the middle and cheaper grades principally, with some high grade moving and occasionally a report of anthracite and a little smokeless and a better



volume of coke. Local carload is quiet, but the demand is strong enough to keep the screenings market safe. Country steam is slow, excepting demand for nut from the Northwestern market and some movement of screenings to Chicago.

The Kentucky coal trade is feeling more optimistic, especially as the new year came in with the first seasonable weather of the winter. Over the holiday period production slumped a little, while many industrial consumers got closer

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Jan. 8 1923	Dec. 24 1923	Dec. 31 1923	Jan. 7 1924†
Smokeless lump.....	Columbus....	\$7.25	\$3.35	\$3.35	\$3.15@3.50	
Smokeless mine run.....	Columbus....	6.60	1.85	1.85	1.75@2.00	
Smokeless screenings.....	Columbus....	5.85	1.25	1.25	1.20@1.35	
Smokeless lump.....	Chicago....	7.75	3.50	3.50	3.00@3.25	
Smokeless mine run.....	Chicago....	6.35	2.10	2.10	2.00@2.25	
Smokeless lump.....	Cincinnati....	7.50	3.10	3.10	2.00	
Smokeless mine run.....	Cincinnati....	6.25	2.00	2.10	2.00	
Smokeless screenings.....	Cincinnati....	6.25	1.75	1.75	1.50@2.00	
*Smokeless mine run.....	Boston....	8.35	4.45	4.65	4.60@4.75	
Clearfield mine run.....	Boston....	5.10	1.80	1.85	1.50@2.25	
Cambria mine run.....	Boston....	5.60	2.35	2.50	2.25@2.75	
Somerset mine run.....	Boston....	5.35	2.10	2.10	1.75@2.50	
Pool 1 (Navy Standard).....	New York....	6.35	3.00	3.00	2.75@3.25	
Pool 1 (Navy Standard).....	Philadelphia..	6.00	2.95	3.00	2.75@3.25	
Pool 1 (Navy Standard).....	Baltimore....	6.60				
Pool 9 (Super. Low Vol.).....	New York....	5.85	2.25	2.10	2.00@2.50	
Pool 9 (Super. Low Vol.).....	Philadelphia..	5.75	2.35	2.30	2.10@2.50	
Pool 9 (Super. Low Vol.).....	Baltimore....	6.10	2.00	2.00	1.75@2.00	
Pool 10 (H.Gr. Low Vol.).....	New York....	5.35	1.95	1.85	1.75@2.00	
Pool 10 (H.Gr. Low Vol.).....	Philadelphia..	5.25	1.85	1.85	1.70@2.00	
Pool 10 (H.Gr. Low Vol.).....	Baltimore....	5.60	1.90	1.90	1.75@1.90	
Pool 11 (Low Vol.).....	New York....	4.35	1.60	1.60	1.50@1.75	
Pool 11 (Low Vol.).....	Philadelphia..	4.35	1.65	1.65	1.55@1.75	
Pool 11 (Low Vol.).....	Baltimore....	5.00	1.75	1.75	1.65	
High-Volatile, Eastern		Market Quoted	Jan. 8 1923	Dec. 24 1923	Dec. 31 1923	Jan. 7 1924†
Pool 54-64 (Gas and St.).....	New York....	4.00	1.60	1.60	1.50@1.75	
Pool 54-64 (Gas and St.).....	Philadelphia..	4.30	1.70	1.70	1.60@1.80	
Pool 54-64 (Gas and St.).....	Baltimore....	4.25	1.50	1.50	1.50	
Pittsburgh sc'd gas.....	Pittsburgh....	5.25	2.40	2.25	2.25@2.50	
Pittsburgh gas mine run.....	Pittsburgh....	3.60	2.00	2.00	1.90@2.10	
Pittsburgh slack (Gas).....	Pittsburgh....	3.25	1.65	1.65	1.60@1.65	
Kanawha lump.....	Columbus....	6.25	2.60	2.60	2.50@2.75	
Kanawha mine run.....	Columbus....	3.75	1.60	1.60	1.50@1.75	
Kanawha screenings.....	Columbus....	3.35	1.05	1.10	1.00@1.25	
W. Va. lump.....	Cincinnati....	6.50	2.55	2.60	2.25@3.00	
W. Va. Gas mine run.....	Cincinnati....	3.85	1.45	1.55	1.40@1.90	
W. Va. Steam mine run.....	Cincinnati....	3.60	1.45	1.55	1.40@1.90	
W. Va. screenings.....	Cincinnati....	3.35	1.20	1.30	1.25@1.40	
Hooking lump.....	Columbus....	5.25	2.60	2.60	2.50@2.75	
Hooking mine run.....	Columbus....	3.10	1.75	1.80	1.65@2.00	
Hooking screenings.....	Columbus....	2.85	1.30	1.30	1.25@1.40	
Pitts. No. 8 lump.....	Cleveland....	5.10	2.45	2.45	2.00@2.90	
Pitts. No. 8 mine run.....	Cleveland....	3.50	1.90	1.90	1.90@2.00	
Pitts. No. 8 screenings.....	Cleveland....	3.30	1.50	1.55	1.50@1.60	
Midwest		Market Quoted	Jan. 8 1923	Dec. 24 1923	Dec. 31 1923	Jan. 7 1924†
Franklin, Ill. lump.....	Chicago....	\$5.35	\$3.50	\$3.35	\$3.50@3.75	
Franklin, Ill. mine run.....	Chicago....	4.10	2.35	2.35	2.25@2.50	
Franklin, Ill. screenings.....	Chicago....	2.85	1.95	1.85	1.90@2.25	
Central, Ill. lump.....	Chicago....	4.35	3.00	3.00	3.00@3.25	
Central, Ill. mine run.....	Chicago....	3.50	2.10	2.10	2.00@2.25	
Central, Ill. screenings.....	Chicago....	2.25	1.55	1.35	1.75	
Ind. 4th Vein lump.....	Chicago....	5.10	3.25	3.10	3.00@3.25	
Ind. 4th Vein mine run.....	Chicago....	3.85	2.60	2.60	2.50@2.75	
Ind. 4th Vein screenings.....	Chicago....	2.50	1.70	1.65	1.75@2.00	
Ind. 5th Vein lump.....	Chicago....	4.75	2.50	2.50	2.25@2.75	
Ind. 5th Vein mine run.....	Chicago....	3.60	2.10	2.10	2.00@2.25	
Ind. 5th Vein screenings.....	Chicago....	2.10	1.55	1.55	1.60@1.80	
Mt. Olive lump.....	St. Louis....		3.10	3.10	3.00@3.25	
Mt. Olive mine run.....	St. Louis....		2.50	2.50	2.50	
Mt. Olive screenings.....	St. Louis....		1.75	1.85	1.75@2.00	
Standard lump.....	St. Louis....	4.10	2.85	2.85	2.85@3.00	
Standard mine run.....	St. Louis....	2.60	1.95	1.95	1.90@2.00	
Standard screenings.....	St. Louis....	1.35	1.35	1.55	1.50@1.65	
West Ky. lump.....	Louisville....	4.50	3.00	2.85	2.75@3.00	
West Ky. mine run.....	Louisville....	2.75	1.60	1.65	1.40@1.75	
West Ky. screenings.....	Louisville....	2.10	1.30	1.35	1.25@1.60	
West Ky. lump.....	Chicago....	4.25	2.85	2.85	2.75@3.00	
West Ky. mine run.....	Chicago....	2.75	1.75	1.75	1.50@2.00	
South and Southwest		Market Quoted	Jan. 8 1923	Dec. 24 1923	Dec. 31 1923	Jan. 7 1924†
Big Seam lump.....	Birmingham..	3.95	3.85	3.85	3.75@4.00	
Big Seam mine run.....	Birmingham..	2.50	1.95	1.95	1.75@2.15	
Big Seam (washed).....	Birmingham..	2.60	2.35	2.35	2.25@2.50	
S. E. Ky. lump.....	Chicago....	6.25	3.10	3.10	3.00@3.25	
S. E. Ky. mine run.....	Chicago....	3.85	1.85	1.85	1.75@2.00	
S. E. Ky. lump.....	Louisville....	6.60	3.00	3.00	2.75@3.25	
S. E. Ky. mine run.....	Louisville....	3.75	1.60	1.75	1.50@1.90	
S. E. Ky. screenings.....	Louisville....	3.35	1.20	1.35	1.50@1.75	
S. E. Ky. mine run.....	Cincinnati....	6.50	2.85	2.85	2.25@3.00	
S. E. Ky. mine run.....	Cincinnati....	3.65	1.55	1.50	1.30@1.75	
S. E. Ky. screenings.....	Cincinnati....	3.35	1.00	1.25	1.10@1.50	
Kansas lump.....	Kansas City..	5.50	4.75	4.75	5.00	
Kansas mine run.....	Kansas City..	3.75	3.25	3.00	3.25	
Kansas screenings.....	Kansas City..	2.50	2.00	2.00	2.00	

* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Dec. 26, 1922		Dec. 31, 1923		Jan. 7, 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken.....	New York....	\$2.34	\$9.00	\$7.75@8.25	\$8.00	\$8.00@9.25		\$8.00@9.25
Broken.....	Philadelphia..	2.39		7.90@8.10				
Egg.....	New York....	2.34	9.25@12.00	8.00@8.35	9.50@10.00	8.75@9.25	8.50@10.00	8.75@9.25
Egg.....	Philadelphia..	2.39	9.25@11.00	8.10@8.35	9.85@11.00	8.75@9.25	9.50@10.00	8.75@9.25
Egg.....	Chicago....	5.06	12.50@13.00	7.20@8.25	9.60@12.50	8.00@8.35	9.60@12.50	8.00@8.35
Stove.....	New York....	2.34	9.25@12.00	8.00@8.35	9.85@11.00	8.75@9.25	9.85@10.50	8.75@9.25
Stove.....	Philadelphia..	2.39	9.25@11.00	8.15@8.35	9.85@11.00	8.90@9.25	9.85@11.00	8.90@9.25
Stove.....	Chicago....	5.06	12.50@13.00	7.35@8.25	9.60@12.50	8.00@8.35	9.60@12.50	8.00@8.35
Chestnut.....	New York....	2.34	9.25@12.00	8.00@8.35	9.85@11.00	8.75@9.25	9.85@10.50	8.75@9.25
Chestnut.....	Philadelphia..	2.39	9.25@11.00	8.15@8.35	9.85@11.50	8.90@9.25	9.85@11.50	8.90@9.25
Chestnut.....	Chicago....	5.06	12.50@13.00	7.35@8.35	9.60@12.50	8.00@8.35	9.60@12.50	8.00@8.35
Range.....	New York....	2.34		8.25		9.00		9.00
Pea.....	New York....	2.22	7.00@11.00	6.15@6.30	5.75@6.25	6.15@6.65	5.50@6.50	6.15@6.65
Pea.....	Philadelphia..	2.14	7.00@8.00	6.15@6.20	6.00@7.25	6.35@6.60	6.00@7.25	6.35@6.60
Pea.....	Chicago....	4.79	7.00@8.00	5.49@6.03	6.00@6.75	5.40@6.05	6.00@6.75	5.40@6.05
Buckwheat No. 1.....	New York....	2.22	4.00@5.00	4.00@4.10	2.00@3.00	3.50	1.75@2.50	3.50
Buckwheat No. 1.....	Philadelphia..	2.14	5.00	4.00	2.00@3.50	3.50	2.00@3.50	3.50
Rice.....	New York....	2.22	3.00@3.25	2.75@3.00	1.35@2.25	2.50	1.35@2.50	2.50
Rice.....	Philadelphia..	2.14	2.50@2.75	2.75@3.00	1.50@2.50	2.50	1.50@2.50	2.50
Barley.....	New York....	2.22	1.75@2.00	1.50@2.00	1.10@1.50	1.50	1.25@1.50	1.50
Barley.....	Philadelphia..	2.14	1.00@1.75	2.00	1.00@1.50	1.50	1.00@1.50	1.50
Birdseye.....	New York....	2.22		2.10		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics

Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1924	1923		
	Jan. 7	Dec. 31	Dec. 24	Jan. 8
Index	182	179	178	375
Weighted average price.	\$2.20	\$2.17	\$2.16	\$4.54

to the bottom of their stocks, but cold weather brought the domestic consumers into the market and started better tonnage movement to the retailer.

Some of the operators, in an effort to force movement of prepared coal, have been quoting jobbers nut and slack only where accompanied with orders for an equal amount of lump, egg or nut, or half the amount where it is block coal. The cold ended that practice. Screenings are scarce and high in price as compared with what they have been for some weeks past. Industrial demand is picking up noticeably and many Elkhorn and Hazard operations that had been down have reopened. Western Kentucky is producing again at a good clip after briefer idle time than was expected during holiday week. Screenings in that field are firm at \$1.25 and mine-run at \$1.40@ \$1.90. Domestic sizes had not ascended at the end of the week.

Northwest Wide Awake Now

Blustery weather with temperatures running down to 25 deg. below zero at the Head-of-the-Lakes and varying below zero all through the Northwest has set the coal trade on edge. Talk of price cutting at Duluth has passed now and bituminous coal is moving inland from the docks at a tremendous rate. A reduction in smokeless at Duluth docks was the only price change recorded. The range now is: Lump, \$9.50; run of mine, \$6.50; screenings, \$5.50. This cut was made in order to gain more smokeless business from the regular anthracite trade. There is some talk once more of a shortage in the most desired sizes of anthracite.

Inquiry for coal for commercial building heating has been most healthy and the independent mining companies on the iron ranges are putting in orders. Many are starting their steam plants for the first time in three years. This is due to the lack of water power. Some of these mining companies will use from 10,000 to 20,000 tons this winter. The railroads are giving especially good dispatch from the docks and the docks are employing extra men to care for the loading rush.

Milwaukee dealers and shippers report a brisk business. The coke trade is correspondingly lively. Pocahontas lump, egg and nut were cut \$1.50 per ton on Jan. 1.

Western Trade Stronger

The winter wave sweeping over the West livened things up a good deal, especially in Colorado. There producers felt a marked improvement in demand for all sizes. The mines of the state were getting a little better than three days running time a week. In Utah general trade conditions improved also, though dealers were not keen to buy until they began to see the bottom of their stocks. Real winter was operating to empty the yards swiftly.

A week of winter around Kansas City with the thermometer registering near zero steadied the price of domestic grades in the Southwest. Mines are working four and five days a week, domestic "no-bills" have been cleaned up, and there no longer is any price shading. "No bills" of steam coal still are reported, but their number has diminished in the last week, in spite of increased production.

Ohio Trade Stimulated

The domestic trade at Columbus was stimulated temporarily last week by colder weather, with the result that retail dealers showed a disposition to come into the market. Some large users of steam grades are inclined to replenish their reserves, railroad demand appears to be better and some roads are taking bids for coal for stocking purposes. It is believed that the approaching end of the present wage contract, on April 1, is having some effect on the trade. During the week ended Dec. 22 the Southern Ohio Coal Exchange reports show an output of 148,232 tons out of a

total capacity of 686,065 tons from 446 mines reporting. "No market" was responsible for a loss of 488,228 tons. Colder weather raised the hopes of the trade at Cincinnati, but it did not affect prices. Screenings in the low-volatile and slack in the high-volatile coals were the features of the market. Mine-run is moving moderately. There is small demand for domestic coals and more than enough supply to go around. Pocahontas lump is now generally \$9. It has ranged as high as \$10.

Pittsburgh had its first real cold snap last week, but it not only failed to affect demand upon the mines but also failed to influence the sellers' position with regard to prices. Householders' supplies are lasting much longer than expected and it would take quite a spell of low temperatures to cause such consumption as would result in much demand for domestic coals. Now that inventory time is past, manufacturers may be slightly freer buyers, but so far there has been no definite evidence of this in the market. Dealers and consumers ridicule the idea of there being a real strike or contest, but admit there may be a voluntary agreement for a short time, to help liquidate consumers' stocks.

New England Shows No Improvement

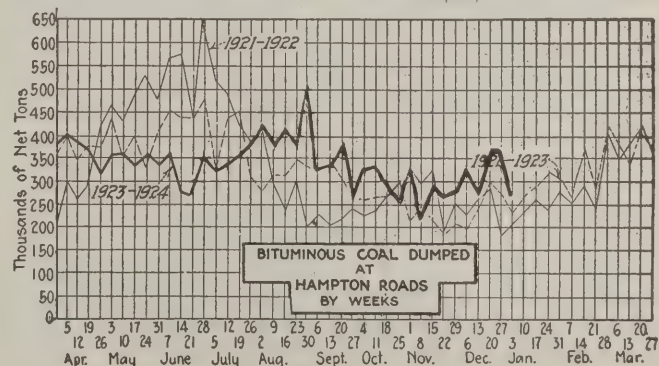
Notwithstanding colder weather and the slow movement of vessels there is no improvement in the steam coal situation in New England. Buyers show the same lack of interest that was characteristic of the latter part of 1923, and in spite of anxious search the trade is able to find no possible ground for an advance in prices beyond the generally low level that has obtained now for several weeks. The holiday suspension of mining has meant light receipts at all points, but even with minimum tonnages available there has been next to no inquiry for spot coal. Whatever hopefulness may exist for the near future in the industries is confined to certain specialties and is by no means evident to the coal man. Reserves are unusually large. All the storage wharves have a surplus, and in the absence of strike scare there is likely to be only mild request for steam coal during the next month or two.

The dullness at Hampton Roads drags along without interruption. The No. 1 Navy coals are still being quoted at \$4.60@ \$4.75 per gross ton f.o.b. vessel. Sales of cargo lots in this market have become unusual. On cars at Boston there are nominal quotations of \$5.75@ \$6 per gross ton.

The agencies for the higher grade Pennsylvania coals have about abandoned efforts to move tonnage to New England for the present, so large a portion of consuming area there having been restricted by high tariffs on the all-rail route to Pocahontas and New River rehandled at points like New Haven, Providence, Boston and Portland for shipment inland. Until the smokeless coals via Hampton Roads move up in price there will be little doing here for shippers of other coals. High volatiles in the Fairmont district are in the same plight, so far as New England is concerned, and prices are \$1.75 and less per net ton at the mine for mine-run, with almost no sale. It will take something drastic to invigorate the market here for any variety of bituminous.

Seaboard Markets Await Better Demand

The soft coal market along the Atlantic seaboard is waiting for a better demand. Indications point to better



business, but no one seems to be willing or ready to say when it will come. No one appears to be anxious with regard to conditions after April 1. Some consumers are asking about contracts but no big business is reported as closed. The Baltimore market reports an increasing line of inquiry and the supply of coal shipped is larger than the demand. Contracting is taking some attention and it is understood that some good grade of coal, ranging well up with Pool 9, has been contracted for at \$2 per net ton for the early months of the year, but this is below the average, as other contracts for Pool 9 coal are reported as having been placed at \$2.25@ \$2.50.

Colder weather did not stimulate the West Virginia market, and in Alabama the trade is quiet and inquiries are few for either steam or domestic coals.

Foreign Market And Export News

British Coal Output Declines

Some anxiety is shown by British mine owners as to the outcome of the miners' ballot on the question of terminating the present wages agreement.

Production during the week ended Dec. 22 was 5,886,000 tons, a decrease of 70,000 tons when compared with the previous week, but an increase of 157,000 tons over the week ended Dec. 8.

After the recent unusual activity in the Welsh market conditions have become more settled. Most buyers have covered their requirements and efforts are chiefly directed to clearing tonnage so as to avoid delay. Most of the mines are well booked and are holding present prices for delivery during the next few weeks. In some cases concessions have been made so as to effect clearances. The refusal of the tippers to operate a third shift is proving of considerable hindrance to trade and the docks are crowded with steamers waiting their turn to load.

The Newcastle market is on the whole steady though there are irregularities here and there. Best steam coals are going well, present prices being maintained and the operators are asking an advance for January. In some cases stocks are being cleared at reduced prices.

French Coal Market Quiet

A decrease in the production and importation of coal was expected in France during the last few weeks of 1923, on account of the holiday season.

Supplies were, however, sufficient to meet both home and industrial demand and no shortage was feared.

The Nord and Pas-de-Calais collieries definitely decided to postpone until early in January putting into effect the increase of 5 fr. on flaming coals, and to reduce from 10 fr. to 5 fr. per ton the proposed increase on semi-bituminous coals. However, similar increases are already in effect in all other coal fields.

Export Clearances, Week Ended Jan. 5, 1924

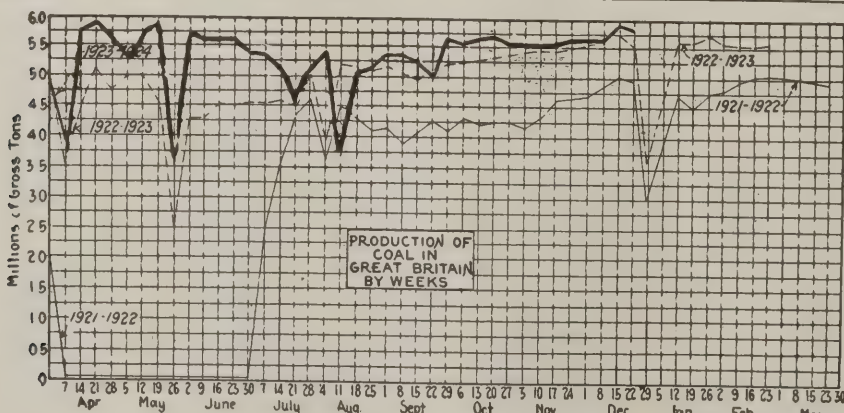
FROM HAMPTON ROADS		
For France:		Tons
Amer. SS. Ansable, for Nantes.....	4,717	
Amer. Schr. Gladys M. Taylor, for St. Georges	1,384	
Br. SS. Gloria De Larrinaga, for La Pallice	7,313	
Swed. SS. Frost, for Castries.....	2,418	
For Argentina:		
Nor. SS. Anna Sofie, for Guayabal ...	2,997	
For Spain:		
Amer. Schr. Frank A. Morey, for Cartagena	809	
For West Indies:		
Nor. SS. Munorway, for Fort de France	5,515	
For Cuba:		
Br. SS. Berwindmoor, for Havana....	9,553	
For Italy:		
Nor. SS. Asmund for Genoa	3,000	
For Belgium:		
Ital. SS. Valreale, for Antwerp.....	7,442	

FROM PHILADELPHIA

For Cuba:	
Amer. Schr. Eugenie Owen, for Sagua la Grande	

FROM BALTIMORE

For Italy:	
Dan. SS. Dorte Jensen	4,160



Independent Anthracite Quotations Decline

Lack of demand further affected the anthracite market, and in most sections quotations for independent coals showed a decline from last week. Retail dealers appear to be well stocked and ready to meet immediate needs, while some are soliciting orders. Lower temperatures did not bolster the trade to any extent, while the holiday season which resulted in lower production, was responsible for smaller shipments from the mines. Steam coals continue to be troublesome, with barley in best demand.

There was a sharp decline in the production of beehive coke the last week in December, it amounting to 221,000 net tons, as compared with 256,000 tons during the week ended Dec. 22.

Slight Improvement at Hampton Roads

Very little improvement in the coal situation was noticed at Hampton Roads last week, though prices stiffened slightly. The advance was attributed to lack of supply at the mines rather than to demand, many operations closed for the holidays having manifested reluctance in resuming work in view of low prices.

Coastwise trade and bunkers held their own, while foreign business showed a little life. The Virginian Ry. piers were still behind their schedule, due to the trainmen's strike and lack of coal. Inquiries of shippers were rare and no immediate business of large volume was forecast in the trade.

Shippers made less effort to book cargoes, because of prices that allowed little profit.

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Dec. 27	Jan. 3
Cars on hand.....	1,724	1,229
Tons on hand.....	110,586	77,320
Tons dumped for week.....	153,338	134,028
Tonnage waiting.....	9,325	15,000

Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,205	855
Tons on hand.....	78,800	56,800
Tons dumped for week.....	79,401	37,752
Tonnage waiting.....	8,115	1,455

C. & O. piers, Newport News:		
Cars on hand.....	1,785	1,441
Tons on hand.....	94,735	75,500
Tons dumped for week.....	86,109	65,196
Tonnage waiting.....	6,610	635

Pier and Bunker Prices, Gross Tons

	Dec. 29	Jan. 5†
Pool 9, New York.....	\$5.00@ \$5.25	\$5.00@ \$5.25
Pool 10, New York.....	4.75@ 5.00	4.75@ 5.00
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.50@ 4.65	4.85
Pools 5-6-7 Hamp. Rds....	4.15@ 4.25	4.25
Pool 2, Hamp. Roads.....	4.25@ 4.30	4.50@ 4.60
BUNKERS		
Pool 9, New York.....	5.30@ 5.55	5.30@ 5.55
Pool 10, New York.....	5.05@ 5.30	5.05@ 5.30
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 4.90	4.65@ 4.90
Pool 1, Hamp. Roads.....	4.50@ 4.60	4.85
Pool 2, Hamp. Roads.....	4.25@ 4.35	4.50@ 4.60

Current Quotations British Coal f.o.b. Port, Gross Tons

	Dec. 29	Jan. 5†
Admiralty, large	29s. @ 30s.	29s. @ 30s.
Steam smalls...	20s. @ 23s.	21s. @ 22s.
Newcastle:		
Best steams.....	24s. 3d. @ 25s. 6d.	24s. 3d. @ 25s. 6d.
Best gas.....	24s. @ 25s.	24s. @ 25s.
Best bunkers.....	25s. @ 26s.	25s. @ 26s.

† Advances over previous week shown in heavy type, declines in italics.

Traffic News

Suspend Higher Hard-Coal Rates

The Interstate Commerce Commission has suspended from Jan. 1 to April 30 the operation of certain schedules which purposed to cancel rates on anthracite from Buffalo, Black Rock and Suspension Bridge, N. Y., to Minneapolis, St. Paul and other stations in Minnesota. The proposed schedules provided for a rate of \$6.25 per gross ton instead of \$4.38 between the points named and a rate of \$9.21 instead of \$7.34 from the Pennsylvania mines to Minneapolis and St. Paul.

New Coal Rates in Alabama

The Alabama Public Utility Commission has promulgated an order effective March 1, establishing a new schedule of rates on intrastate movement of coal and coke, which will affect a material saving to consumers of steam and domestic fuel. Only a comparatively small number of increases were shown in the general adjustment. The schedule has been under consideration by the commission for several months and public hearings have been granted both the railroads and the public.

Rate Finding Affirmed

The previous finding of the Interstate Commerce Commission in the matter of rates on coal from the Appalachian District to Spartanburg, S. C., and points beyond, on rehearing has been affirmed.

Suspend New Rates for Scrutiny

In the matter of proposed changes in the rates on coal from Illinois, Indiana, Wisconsin and St. Louis to Iowa, Minnesota, North Dakota and South Dakota, the Interstate Commerce Commission has ordered the new rates suspended until May 1 for investigation.

Monongahela Ry. Adds Tracks

As part of a plan to relieve congestion at its Madsville yards, where a junction is effected with the Morgantown & Wheeling Ry., one of the principal feeders, the Monongahela Ry. has put in commission a four-mile stretch of track extending from the north end of the Madsville yards to Lock 9, which is to be used for second running track service. The company also is putting in thirteen new tracks at Madsville, each a mile long, in order to handle coal and other freight more expeditiously.

As a step toward handling loads and empties to and from the Morgantown & Wheeling Ry., operating on Scott's Run, acquired not long ago by the

Monongahela, that road is pushing construction work on the lower leg of a "Y". When the "Y" is completed loads can be accepted from the M. & W. without blocking traffic while empties are being shunted at the junction point.

"Soo" Coal Traffic Doubles

During the season of 1923 there passed through the Canals at Sault Ste. Marie, Michigan and Ontario, 16,709,305 net tons of soft coal and 1,686,006 net tons of anthracite, as compared with 8,790,571 tons of soft coal and 670,447 tons of hard coal in the season of 1922, according to the report of L. C. Sabin, general superintendent. Shipments during December were 113,600 tons of soft coal and 48,900 tons of hard coal, all of which passed through the United States Canal. Of the season's shipments, 16,547,771 tons of bituminous coal and 1,659,874 tons of hard coal were sent through the United States Canal.

Manley Moves Up

W. J. Manley has been appointed general traffic manager of the Pittsburgh & West Virginia and West Side Belt railroads effective Jan. 2. Mr. Manley has served as general traffic agent of those lines since last October. For three years prior to last October Mr. Manley served as traffic manager of the Logan Coal Operators' Association of West Virginia. Mr. Manley takes to his new position twenty years of practical railroad experience which covers all phases of railroading in the transportation as well as traffic fields, having been raised on the Great Northern, as well as operating a railroad in Peru for a considerable period. For three years Mr. Manley was associated with the Commission on Car Service of the Railway War Board and the Car Service Section of the Railroad Administration at Washington, D. C.

G. E. White Promoted

George E. White was promoted Jan. 1 to be general freight agent of the Chicago, Rock Island & Pacific Ry., headquarters Chicago, Ill., succeeding M. A. Patterson, deceased.

Trade Literature

The Smith & Serrell Co., of Newark, N. J., manufacturers of flexible couplings, have just issued a new bulletin, No. 37, which combines a new catalog describing many of the different types of flexible couplings which this company makes and gives some interesting information on the care and maintenance of couplings, together with engineering data covering the application of each type. A new high-speed coupling for use on high-speed

geared motor and turbine drives also is described, showing the details of construction, method of lubrication and application. Another new product of this company is the pressed steel type coupling for use on fractional horsepower motor drives. One section of the bulletin is devoted to the method of installing equipment with flexible couplings and describes in detail how the machines and couplings should be lined up before put in operation.

The Silent Hoist Co., of 302 McDougall St., Brooklyn, N. Y., manufacturer of hoisting machinery, has just issued Bulletin No. 22, describing the silent hoist electric car puller. This new bulletin describes the method of installing one of these hoists, its simplicity of design, method of drive and capacity.

Obituary

James C. Dennis, manager of the mine forging department of the Pittsburgh Knife & Forge Co., Pittsburgh, Pa., died Dec. 7, 1923.

James Gideon Steel, superintendent of the mines of the Eureka Coal Co. at Birmingham, Ala., died Dec. 23. Mr. Steel was 56 years of age and well known in the Birmingham district.

Martin Allen Patterson, general freight agent of the Chicago, Rock Island & Pacific Ry., with which he was associated for more than forty-two years, died Dec. 18, at Santa Barbara, Calif.

Coming Meetings

Engineers' Society of Western Pennsylvania. Annual meeting Jan. 15, 1924, Blue Room, William Penn Hotel, Pittsburgh, Pa. Secretary, K. F. Treschow, Pittsburgh, Pa.

American Wood Preservers' Association. Annual meeting Jan. 15-17, 1924, Hotel Muehlebach, Kansas City, Mo. Secretary, P. R. Hicks, Chicago, Ill.

Northeast Kentucky Coal Association. Annual meeting Jan. 24, 1924, Ashland, Ky. Secretary, C. J. Neekamp, Ashland, Ky.

Association Activities

The annual election of the Cincinnati Coal Exchange resulted in E. F. Bardin, of the MacBard Coal Co., being named president; Fred Gore, of the Blue Diamond Coal Sales Co., vice president; John Emslie, of the Crech Fuel Co., secretary, and R. C. Fitzgerald, of the Southern Coal & Coke Co., treasurer. The annual meeting will be held on the last Thursday in January and a nationally prominent speaker will address the members.

The Pennsylvania Coal Mining Institute, of Johnston, Pa., elected the following officers at its regular meeting on Dec. 28: President, W. A. Swift; vice presidents, B. F. Baldwin, Dennis L. Boyle and Thomas J. Davies; secretary, William Fleming, and treasurer, Vincent A. Stanton. Captain Edmund Steidle, of the Carnegie Institute of Technology, delivered an address on "The Occurrence and Detection of Mine Gases." At the meeting to be held Jan. 18 Prof. R. Z. Virgin will make an address.

The Northern West Virginia Coal Operators Association has launched a campaign for new members. In a recent statement John A. Clark, Jr., president of the association, called upon the membership to put forth every effort to have coal companies not members do their share in carrying on the work for the district as a whole. He directed attention to the money expended by the association in defending two cases before the Interstate Commerce Commission and said that the traffic situation is one of a number of critical matters which confront the coal industry of northern West Virginia and that offer opportunity for active co-operation and for constructive ideas and suggestions. It is asserted by President Clark that 50 per cent of the tonnage of the district is now carrying the burden, both financially and otherwise of helping all the operators. If members will endeavor to enroll others, it will lessen their burden, President Clark points out.

News Items From Field and Trade

ALABAMA

Negotiations are under way between Governor Brandon and owners of mines which are now working state and county convicts under the lease system to arrive at an agreement whereby the convicts will be worked under the complete jurisdiction of the convict department. A contract is being sought by which the coal would be mined and delivered at the mouth of the room or the haulageway at a stipulated rate per ton, the convicts to be worked, fed, clothed, guarded and maintained by the state. A large number of state and county convicts are employed in coal mines in the Birmingham district and there has been a strong sentiment worked up for abolition of the lease system in so far as it pertained to coal mining.

In a suit brought by J. L. King against the Kershaw Mining Co. for alleged damage to farming lands from overflow of water from its coal washeries in Walker County, a verdict was rendered in favor of the defendant, the first time a mining company has won a suit of this character in many years.

The Paramount Coal Co. has announced it will soon open two more mines near Helena, making three in all with a producing capacity of about 700 tons a day. The operations will be in a 250-acre tract leased from the Tennessee Coal, Iron & Railroad Co.

ARKANSAS

A new tippie is being erected at the Bernice semi-anthracite mine in Russellville, replacing the one burned in October. Origin of the fire was unknown. The old tippie was said to have been the largest in the Southwest.

COLORADO

A move to eliminate "fly-by-night" coal dealers, who are alleged to specialize on short-weight coal deliveries, by an increase in the annual license for the coal business from \$20 to \$250 was urged by representatives of the larger established Denver coal companies at a recent meeting before members of the City Council.

Production of coal in the state for the first eleven months of 1923 was 9,279,334 tons, according to the report of James Dalrymple, State Coal Mine Inspector. This compares with 8,847,833 tons for the corresponding period of 1922. The average number of men employed in and about the mines was 13,185 and the number of days worked per mine was 141.7.

DELAWARE

A charter has been issued to the Johnson Coal & Briquette Co., of Wilmington, with a capital of \$500,000.

ILLINOIS

A delegation of Carlinville citizens recently called on officials of the Standard Oil Co. of Indiana at Chicago in an effort to get the company to resume operations at its two mines near Carlinville, closed some time ago because of the high cost of production and the fact that coal could be purchased in the open market cheaper than it could be produced. Colonel Robert W. Stewart, chairman of the board of the Standard Oil Co., told the delegation that reopening will depend entirely on market conditions and the cost of producing the coal.

The Illinois Coal Corporation entertained a party of visitors at the company's new big mine at Nason, Saturday, December 29. Albert J. Nason, president; J. D. Zook, vice-president, and Cecil J. Smith, chief engineer of the company, were the hosts. Several of the guests started from Danville Friday morning in the new gasoline propelled railway coach, seating 68 passengers, and rode across the state in it to Mt. Vernon, where it was put in service on the coal company's new railroad, the Jefferson & Southwestern, which runs from Mt. Vernon to Nason and eventually may be continued beyond Nason to make other railroad connections.

Dr. F. C. Honnold, manager of the Honnold Coal Bureau, of Chicago, starts January 15 for a trip to Cuba and the Panama Canal Zone, returning by a United Fruit steamer to Havana with a three-day stop in Costa Rica. Dr. Honnold expects to pause at Key West and also to make a visit at the estate of a friend on the east coast of Florida a short distance above Palm Beach. Mrs. Honnold will accompany him. They will return to Chicago in about six weeks.

The Middle Fork Coal Co. mine of the U. S. Steel Co. at Benton, Ill., has suspended work indefinitely and 800 miners are thrown out of work. Mine drivers struck rather than accept 75c. per day cut in wages. Officials say they can buy coal cheaper than they can produce it.

A total of 850 men were thrown out of work temporarily by a fire which did \$100,000 damage to the tippie at Mine No. 5 of the Centralia Coal Co., Centralia. The origin of the fire is not known but it is believed to have been caused by crossed wires.

INDIANA

The annual report of Cairy Littlejohn, chief mine inspector, shows that during the state fiscal year 25,328,218 tons of coal was mined in Indiana, as follows: Machine-mined block coal, 18,206 tons; pick-mined block coal, 17,164 tons; pick-mined bituminous coal, 14,813,987 tons; pick-mined bituminous coal, 10,514,237 tons. Miners of the major mines of the state received total wages amounting to \$45,920,877.54 during the fiscal year. The total number of employees at the mines was 31,189. Seventy-five fatal accidents in mines averaged one for every 338,181 tons of coal mined. The total number of mining accidents was 6,528. The number of persons killed for each 1,000 employed was 2.40. The miners lost a total of 9,350 days' work because of no sales of fuel, and 7,814 from lack of coal cars. Strikes were responsible for the loss of 459 days of work in the state.

The proposal to consolidate the United Mine Workers' organization of district No. 8, the block coal field, with that of district No. 11, the Indiana bituminous field, was not taken up by the district No. 8 convention at Brazil recently, and officers stated that it was the intention to maintain a separate district organization as long as conditions would justify it. The convention disposed only of routine matters. The district officers were constituted a scale committee and will attend the United Mine Workers' scale conference at Indianapolis in January.

The No. 7 Ayrshire mine, employing more than 100 men, eight miles south of Petersburg, was flooded recently by heavy rains but may be able to resume operations in two weeks.

The Big Four railroad has made Petersburg, a freight terminal. Recently it established its coal terminal there and has built four miles of track just south of Ashby. Coal from the mines in Pike and Gibson counties is taken there where the trains are made up for the north.

The capital stock of the Pike County Coal Corporation, Petersburg, has been increased from \$250,000 to \$550,000.

MARYLAND

The sentences of twenty striking miners, convicted as participants in disorders at Frostburg, involving unlawful assembly, riot and assault, were commuted just before Christmas by Judge Doub at Cumberland, and 15 were released from jail in time to spend Christmas day with their families.

MASSACHUSETTS

In a report filed with the State Legislature the joint special Coal Investigating Committee says that legislation cannot assure a continuous and adequate supply of anthracite, and only by the adoption of

lower-cost fuels which are available can the public solve this problem. The report says that there is no justification for the present retail price of \$16 a ton charged for anthracite by most Boston dealers, and that the price should not exceed \$15.50. The committee recommends federal legislation providing for complete publicity of the accounts of the anthracite industry, including operators and their affiliated sales organizations, and transportation companies and miners' unions; that the President be authorized, in the case of actual or threatened interruption of production, to appoint a special commission of conciliation and inquiry; that the form of contract between operators and miners be revised and penalties provided in case of a breach of either party; that the Interstate Commerce Commission or some other federal agency be given authority, in the event of a fuel emergency, to prevent speculation by wholesalers and jobbers of coal, while in transit from the mines to the consumers, and that the State of Pennsylvania repeal "the now notorious anthracite tonnage tax." The committee urges that Congress authorize some federal agency to standardize the sizes and regulate the quality of anthracite shipped in interstate commerce. It favors the continuance in this state of the special commission on the necessities of life and the emergency fuel act for a period of three years.

NEW JERSEY

Legislation regulating the quality of coal sold in New Jersey is one of the recommendations in the annual report of J. Harry Foley, superintendent of the Department of Weights and Measures. Mr. Foley finds that the laws to protect purchasers as to quantity are adequate, but absence of regulations affecting quality is costly to consumers.

NEW YORK

E. E. Loomis, president of the Lehigh Valley R.R., has sent a letter to stockholders formally announcing a stock offering made possible through the segregation of railroad property and the Lehigh Valley Coal Co., as approved by the U. S. District Court. Under the new plan every stockholder in the railroad company will be granted the right to purchase stock in the coal company at a fixed price of \$1 per share. This privilege, however, will expire next April. Reference also is made to the hearing before the Interstate Commerce Commission on Jan. 17 of the application of the railroad to continue its lease and stock ownership of the Delaware, Susquehanna & Schuylkill R.R.

The Pennsylvania Coal & Coke Co. for November reports surplus earnings of \$11,364 after all charges and ordinary taxes, but before provisions for federal taxes. Surplus for the eleven months ended with November totaled \$738,922 against \$541,629 in the same period last year.

The Walter Engineering Corporation, of 299 Broadway, New York City, announces the affiliation as an associate of Frederick Schwertner, income tax counsel, to handle income tax matters for its clients. Mr. Schwertner is well known as an expert in such matters and has for several years made a specialty of coal-company tax cases.

Stockholders of the United States Distributing Corporation, at a special meeting held in Richmond, Va., approved the recapitalization plan, it has been announced. The plan authorizes an increase in the old 100,000 shares of common stock of \$50 par value and 10,000 shares of managers' stock of \$5 par value to 220,000 shares of no par common and 27,500 shares of 7 per cent \$100 par cumulative preferred stock. The new stock is to be issued to present holders of common on the basis of one share of new common and one-quarter share of preferred for each share of common now owned. The new preferred is to be convertible into common at the rate of four shares of common for one share of preferred at the option of the holder. The preferred stock is entitled to four votes, while the common has one vote.

OHIO

Reductions in the price of hard coal, soft coal and coke ranging from 25c. to \$1.50 a ton in Toledo have been announced by at least one dealer. Other dealers declared prices for soft coal are off from 50c. to \$1 a ton and that a reduction in coke prices is anticipated, but no reduction in hard-coal prices is in prospect, they say.

The Central West Coal Co., of Columbus, recently closed a deal whereby it acquired a tract of 1,000 acres of coal lands with two operating mines at Jasonville, Ind., on the C. M. & St. P. RR. The property has both No. 3 and No. 4 seams of coal and both seams are being operated. The capacity of the two mines is 1,500 tons daily. The purchase was made from the New Calora Coal Co., which name will be used for some time in conducting the business.

PENNSYLVANIA

The officers of the Philadelphia & Reading Coal & Iron Corporation, chartered in Delaware to take over the coal and iron interests of the Reading companies as approved by U. S. District Court Judge Davis, at Philadelphia, are: President, William J. Richards, Pottsville, Pa., who was president of the old Philadelphia & Reading Coal & Iron Co.; Robert J. Montgomery, vice-president; William H. McEwain, vice-president and secretary; David Wilson, treasurer; Martin P. McDermott, assistant secretary, and Charles A. Hurff, assistant treasurer. Directors of the corporation are Joseph B. McCall Newton, H. Fairbanks, William J. Richards, Robert J. Montgomery, William H. McEwain and George C. Coughlin.

The last of the bodies of the five men entombed Dec. 8 in the Mount Jessup mine, at Jessup, were recovered Dec. 31 by rescue workers. The men had been buried under rock. Two of the bodies, one of which was that of Eban Jones, the mine foreman, were recovered about a week after the accident, the third was removed on Dec. 29 and the two remaining bodies on the last day of last year.

H. M. James, formerly electrical engineer for the Hudson Coal Co., is now engaged in consulting, electrical engineering work with offices in the Connell Building, Scranton.

The Lehigh Coal & Navigation Co. is electrifying its No. 9 colliery at Tamaqua, doing away with steam power.

Following the recent fire at the Beaver Valley Coal Co. breaker near Hazleton, the company's board of directors named the following officials to take charge of the plant after Jan. 1: George Reiff, Wilkes-Barre, general manager; George McCay, Wilkes-Barre, general superintendent; William Beltz, of Hazleton, paymaster and purchasing agent.

The Hazlebrook Coal Co., the Stonega Coke & Coal Co. and the Wentz Co. have bought all of the stock of the General Coal Co., a Delaware corporation, and as of Jan. 1, will operate it under their management. The General Coal Co. it was announced will conduct the business formerly transacted by the Wentz Co. and will be the exclusive sales agent for "Admiralty," "Roda" and "Stonega" coal and coke produced by the Stonega Coke & Coal Co., and for the "Dependable" anthracite coal, produced by the Hazlebrook Coal Co.

The Board of Directors, of the Lehigh & Wilkes-Barre Coal Co. has abolished the title of president and general manager effective Jan. 1, and the title of that office will thereafter be president. On the same date, by order of President C. F. Huber, Douglas Bunting, formerly general superintendent, became vice-president and general manager, and Edward Griffith, formerly assistant to the general superintendent, became assistant general manager.

One thousand and seventeen fatal accidents occurred in the mines of Pennsylvania in 1923, according to the annual report of the Bureau of Workmen's Compensation of the State Department of Labor and Industry. In 1922 there were 809 deaths due to mine accidents.

Warren N. McCann, of New York City, has filed a suit in the U. S. District Court at Philadelphia to recover \$771,437 from William M. Richardson, president of the Philadelphia Export Co. McCann, who was a major in the Ordnance Department during the war, alleges in his suit, which is for trespass, that he agreed to sell Tabb & Burtleson, of England, 180,000 tons of coal; that he agreed to buy a large tonnage of coal from the Export company, which in turn was sold to the English firm. It is alleged the defendant addressed a letter to Tabb & Burtleson reiterating representations that McCann had bought coal inferior in quality to that which he had agreed to furnish and that Richardson further solicited business from the English firm, resulting in a cancellation of McCann's contract with Tabb & Burtleson and the Export company obtaining the business that the plaintiff had with the foreign firm. McCann claims

\$571,437 due to the loss of the contract and \$200,000 as damages.

The U. S. District Court at Philadelphia has approved the merger of the Reading Co. and the Philadelphia & Reading Railway Co. sanctioned by the Interstate Commerce Commission, together with the authority to issue bonds and the application of the company to operate its subsidiary railway companies. The company was directed by Judge Davis to file a report thirty days after completion of final steps in the dissolution.

Day and night shifts are working at Port Carbon, on the Schuylkill River, cleaning the river of thousands of tons of culm which have accumulated and caused the stream to overflow its banks. A New York briquet manufacturing firm is negotiating for the establishment of a washery at this point.

RHODE ISLAND

George H. Webb, State Fuel Administrator, and Frederick C. Freeman, vice-president of the Providence Gas Co., declared at a joint meeting of the Providence Engineering Society and the American Society of Mechanical Engineers at Providence recently that Rhode Island will take matters into its own hands and supply its own fuel unless Pennsylvania stops placing restrictions upon the coal industry. Captain Webb said there is more hard coal under the surface of the ground in Rhode Island and Massachusetts than there is in the State of Pennsylvania.

UTAH

There are fifty-four coal-prospecting permits in Utah and the state has a guaranteed revenue in the near future from coal leases on public lands amounting to \$63,225 a year as a minimum. The leases in the state average around 1,000 acres each and the guaranteed production in the four years covering the agreement with the authorities is 1,686,000 tons of coal from thirty-two leases.

VIRGINIA

The Norfolk & Western piers at Lamberts Point broke all its previous dumping records for a day on Dec. 31, when 61,000 tons of coal was dumped.

WEST VIRGINIA

The coal properties of W. E. Deegans in Logan County were sold on Dec. 31 to George M. Jones and Herbert Jones, according to an announcement made by J. Frank Grimet, secretary-treasurer of the various Deegans consolidated companies. The consideration is said to approximate \$1,000,000. The properties transferred are the Cub Fork Coal Co., the Paragon Collieries Co., the Orville Coal Co., the Faulkner Coal Co. and the Paragon Collieries Co. These companies operate seven mines with a total monthly capacity of 75,000 tons. The Logan coal holdings of the Deegans' interests constitute about half of the total holdings of the consolidated Deegans companies. The Deegans interests still have coal operations in the Norfolk & Western territory, in Greenbrier County and in Kentucky.

Although only six resident and one non-resident coal corporations were organized in West Virginia in November, the aggregate capitalization of the companies organized amounted to \$8,120,000. The Sullivan-Pocahontas Coal Co., of Tralee, a consolidation of seven different companies, controlled by J. C. Sullivan, alone is capitalized at \$7,500,000. Other companies organized in November were: the Turner Fuel Co., of Charleston, capitalized at \$25,000; Shamur Coal Co., of Eventon, \$5,000; Laurel Run Coal Co. of Fairmont, \$20,000; Macwarash Coal Co., of South Charleston, \$25,000; Wilbur Fuel Co., of Clarksburg, \$500,000; Mary Martha Coal Mining Co., of Cincinnati, Ohio, \$45,000.

The Putnam Company of Charleston has been organized to develop coal, oil and gas lands at various points in the state, the company having 1,000 shares of capital stock of no par value. Among those principally interested in the new concern are H. H. Carrie, F. L. Thomas, T. Brooke Price, Duke W. Hill and John D. Preston, all of Charleston.

Robert J. Lauder, assistant to the director of the safety department of the Consolidation Coal Co., has resigned his position to accept a position with the Roxana Petroleum Co., of St. Louis, Mo.

J. B. Clifton, of the Raleigh Smokeless Fuel Co., and T. H. Wickham, of Beckley, sailed from New York on Jan. 4 to visit South America in the interest of their company.

Organization of the Clean Eagle Coal Co., with a capital stock of \$200,000 presages operations in the Logan field on a large scale. Among the well-known capitalists interested in the new company are J. Cary Alderson, Naaman Jackson, State Banking Commissioner; Bruce McDonald, L. E. Steele, all of Logan; C. McDonald England, of Lexington, Ky. The office of the company is to be at Logan.

CANADA

Lovell G. Nickles, president of the F. P. Weaver Coal Co., of Montreal, announced on Dec. 5 that he has made application for a charter for the Canadian Welsh Anthracite Co., the purpose of which will be to introduce Welsh anthracite into the Canadian market. Associated with Mr. Nickles will be Sir Alfred Mond and other interests in the Amalgamated Collieries of Wales, and it is the intention of the new company to install a complete breaking plant in Montreal, so as to be able to lay down the Welsh anthracite in Canada in all the sizes required by the Canadian trade. It is understood that the F. P. Weaver Coal Co. will act as agents in Canada for the new company. The Welsh coal interests with whom Mr. Nickles is associated are prepared to ship 100,000 tons of Welsh anthracite to Canada in the first year and to increase shipments as demand warrants.

The Telkwa Collieries, Grand Trunk Pacific Ry., is marketing coal in Prince Rupert. A new seam has been opened.

The coal production of British Columbia for November totaled 200,515 tons, a decrease as compared to the production for the month of October of 27,777 tons. Vancouver Island produced 132,395 tons, which was 10,625 tons less than in October. The Nicola Princeton mines produced 20,842 tons, a decrease of 1,390 tons, and the Crow's Nest Pass district 47,278 tons, a decrease of 15,765 tons.

General Manager Avard, of the Maritime Coal, Railway & Power Co. at Amherst, N. S., has been notified by the Minudie coal miners that the contract offer of his company will not be accepted at present, as the legal adviser of the miners, Mr. Curry, of Glace Bay, is negotiating for the sale of the mine and, pending negotiations, the men do not desire to make any definite agreement.

Alberta Coal Supply Co., Ltd., has been granted an Ontario charter of incorporation to mine and deal in coal and other fuel, with \$40,000 capital. Joseph Montgomery, Harold O. Robinson and Austin Kopas are provisional directors.

Colliery operators, coal dealers, and others were much interested recently by the arrival in British Columbia of a shipment of approximately 400 tons of Welsh coal. It was carried in ballast by a vessel chartered for the Pacific Coast lumber trade. The coal found a ready market at prices a little under quotations on the local product.

G. Howard Ferguson, Premier of Ontario, addressing business men of the City of Edmonton recommended that the Alberta Government open a coal office in the City of Toronto to further promote the sale of Alberta coal products. It was his opinion that for a time at least the business of marketing western Canadian coal in Ontario would have to be handled by the governments of the two provinces.

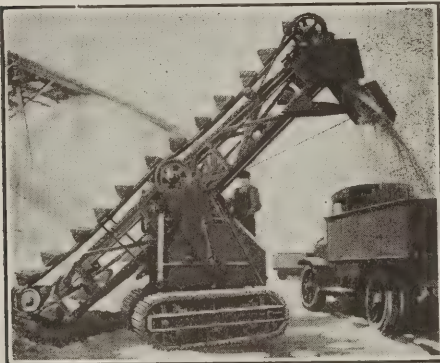
S. J. Cook chief of the Mining and Metallurgical branch of the Dominion Bureau of Statistics, states that the output of coal from Canadian mines during 1923, determined partly by estimate, amounted to 17,100,000 tons. Alberta had the largest production of any province, the total being 6,884,000 tons, and Nova Scotia was a close second, with 6,784,000 tons. British Columbia's mines contributed 2,825,000 tons, placing that province third among the coal-producing areas. Saskatchewan produced 368,000 tons and New Brunswick 292,000 tons. Approximately 10,000 men were employed in coal mines, three-quarters of them working underground, and one-quarter on the surface. The monthly production per man in October was 49 tons. During the first ten months of the calendar year the total importation of all coal was about 20,000,000 net tons, an increase of about 43 per cent over the preceding three-year average.

New Equipment

Crawler-Tread Loader

That it is capable of cutting a path 20 ft. in width through a pile of material by means of the swiveling feature is the claim made for the new crawler-tread power-swiveling industrial loader recently put on the market by the Link-Belt Co. of Philadelphia. This new industrial loader, shown in the accompanying illustration, is known as the "Grizzly." It is the large capacity, heavy duty loader of the Link-Belt group—a sort of parent to the "Cub" portable belt conveyor.

The new feature of the "Grizzly" loader is the crawler tread, the application of which to the industrial loader is of advantage because of the frequent necessity for moving such loaders over railroad tracks, rough and broken ground, piles of loose material and up inclines. The lower base is of solid, cast-steel construction, which eliminates the numerous rivet and bolt connections and makes for greater durability and rigidity. The lower



PORTABLE LOADER WITH CRAWLER TREAD

The tread of this loader is fitted with a cleaning device which makes clogging impossible under severe ground conditions.

base, which carries the loading mechanism, pivots on the tread in similar fashion to that employed by the larger and more expensive locomotive cranes.

Tread shoes of alloy heat-treated steel, cast in one piece, are attached by a patented design capable of self-cleaning. In the past, it is said, the one fault with mechanisms of this type was their liability to clog with dirt, sand, mud, etc. The Link-Belt self-cleaning tread adapted to the new "Grizzly" is said to make clogging impossible.

One of the principal features of this loader is its ability to swivel and swing independently of the wheel or tread base. It can back into a pile, dig, swivel and elevate at the same time, or it can do any of these operations independently—all at the will of the operator.

The steering mechanism of the crawler tread is controlled by a hand

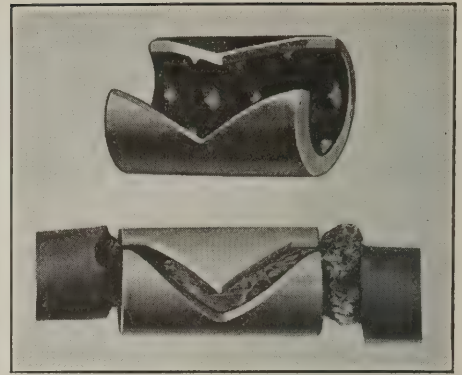
wheel, all other operations being controlled by levers conveniently located on the operator's platform on the upper swiveling frame.

The capacity of any loader will vary, of course, with the material handled. For the "Grizzly," however, a capacity of 45 cu.ft. per minute is claimed while handling bituminous coal. About the same rate of speed is given for sand and about 40 cu.ft. per minute with 1½ in. and under crushed stone. It is driven by a motor of ample power and of standard design.

Handy, Efficient Cable Splicer

Increased use of coal-cutters drills, cable-reel locomotives and many other portable tools has created a demand for a cable splicer which, aside from being efficient, will not too greatly increase the size of the wire at the splicer. There has long been a need for a splicer which could be applied without solder. Many times the cable breaks somewhere in the mine where solder is not quickly available; then again a soldered joint increases the diameter of the cable.

This small bronze casting clamps onto the ends of the cables to be spliced and firmly grips the strands when given a few blows with a hammer or similar handy tool. The teeth on the inner surface help to hold the cable tightly and form an efficient mechanical and electrical joint. On application, the splicer curls up and binds the cable ends firmly together. This device is a product of the Ohio Brass Co.



CABLE SPLICER

The upper illustration shows the teeth on the inside the splicer. These teeth grip and bind the cable ends as shown in the lower illustration.

Congo Car Mover

The Congo car mover is a device for moving cars at any location on the track. It is manufactured by the Cone-wango Car Co., of Warren, Pa., who assert that a loaded car may be moved a distance of eight inches with a single downward stroke of the handle. The three grips which hold onto the rail are arranged one on each side and one in the rear. These grips operate very efficiently while under load, and yet the operator can slide the device along the rail rapidly, thus moving a loaded car a considerable distance in a short time. A device of this kind is useful around coal tipples at the mines. Owing to the fact that it operates on the downward stroke it is quite possible for an ordinary strong boy to place a car wherever desired. All that is necessary is to set the device well under the wheel and throw the weight of the body on the long lever arm which is provided. All parts are made of steel, thus insuring long life.



MOVING A CAR BY HAND

It is claimed that this lever is arranged to make it readily possible to place a car with much ease and saving of time.

COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER, *Editor*

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Quiet Business Boom Responsible for Coal Output Last Year Exceeded but Once in Time of Peace

ABUNDANT transportation and consistent demand characterized the soft-coal industry in 1923. The freedom from car shortage after the first quarter was remarkable in view of the large tonnage produced. The output reached in 1923 has been exceeded but once in a peace year, the total for 1923 of 545,000,000 net tons falling but 23,000,000 tons, or 4 per cent, below booming 1920. It is interesting therefore to compare the 1923 and 1920 records in other respects. Preceding both were large-scale strikes affecting nearly all organized bituminous-coal mines. Consumers' stocks on Jan. 1, 1920, following the six weeks' strike of 1919 were at or just below 20,000,000 tons; on Sept. 1, 1922, following the big strike, stocks were about the same level.

Both strikes were followed by periods of restocking, but with this great difference—in 1920 the railroads were unable to move the coal as it was offered, whereas in 1923 car supply improved from beginning to end. Frenzied bidding and buying of 1920 was replaced by quiet purchasing in 1923. From the beginning to the end of 1920 consumers' stocks were increased by around 27,000,000 tons; in 1923 with no fuss at all, not less than 29,000,000 tons was added to consumers' reserves. With all the frenzy that attended the accumulation of stocks in 1920, there was but 45,000,000 tons on hand at the end of that year. On the other hand, 1923 closed with around 65,000,000 tons in consumers' storage, a new high record for the end of a calendar year. It is anticipated that this figure will be even higher by April 1, 1924.

The fact that at the first of the year stocks had been piled up sufficient to afford on the average a safe supply—that is to say, nearly four weeks' requirements—and that thenceforth throughout the year there was no pressing necessity for coal on the part of any class of consumers or of any locality, was a most important factor in depressing the price. Consumers were willing to take the coal throughout the summer and autumn of 1923, but they were not in dire need and bought as the coal, at constantly lowering price, was forced on them.

It must not be assumed that because soft-coal prices were easy and stocks piled up, general industry was not humming. The consumption of soft coal in this country

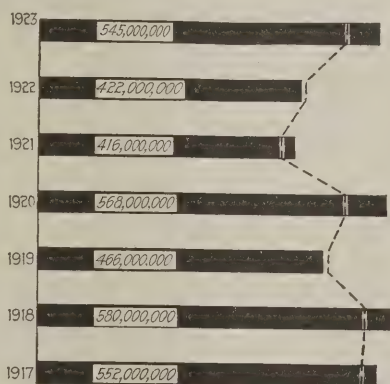
in 1923 was about 500,000,000 tons, almost identical in amount with the consumption of 1920. More coal was imported in 1923 than in 1920, but about 17,000,000 tons less was exported, which accounts for the seeming discrepancy. A measure of the industrial activity of 1923, as against 1920, is found in the figures of production of sixty-two commodities as reported by the Census in the Survey of Current Business. The production of these sixty-two commodities, which include coal and coke, was 9 per cent greater in 1923 than in 1920. The Federal Reserve Board reports a 10-per cent increase in manufacturing activity in 1923 over 1920. A few examples serve to indicate the widespread nature of this quiet boom in business and help account for the steady

demand for soft coal. Cotton consumption was 4 per cent greater in 1923 than in 1920, although textiles were considered dead last year. Pig-iron output in 1923 was 12 per cent greater than in 1920; likewise steel ingots, 12 per cent; copper, also 12 per cent; crude petroleum, 16 per cent.

It did not just happen that throughout 1923 the country consistently bought coal, irrespective of immediate requirements. There was definite national planning back of it. The Secretary of Commerce quietly but widely urged storage of coal by all industry. He appealed not once but repeatedly to business interests through their associations to be forehanded on coal purchases, to get supplies early and to forestall the usual autumnal rush and high market. Their response was equally unobtrusive, and were it not for the stock taking records of the government, it would be difficult to realize the extent to which this advice was followed. The railroads sponsored

the program—and have not ceased their efforts even at this date. With less than 7,000,000 tons on hand at the beginning of 1923, the railroads began in June an active campaign for coal storage. On Oct. 1 they had increased their reserves by 10,000,000 tons, or to 17,663,000 tons. They expect to have 20,000,000 tons on hand by April 1, 1924. If they but increase their reserve on wheels to what it was on April 1, 1922, they will have in excess of 22,000,000 tons.

Production of bituminous coal was regular throughout 1923. The best month, January, was 10 per cent



PRODUCTION AND CONSUMPTION

In this diagram the solid bars represent production of bituminous coal by calendar years. The dotted line is consumption. In but two years—1919 and 1922—of the seven from 1917 to 1923 was production less than consumption. In 1917, 1918 and 1923, all years of large production, there were substantial additions to stocks. In 1923, of a production of soft-coal in round numbers of 545,000,000 tons, 495,000,000 tons was consumed, 20,000,000 tons exported and 30,000,000 tons added to consumers' storage piles.

over the average; the worst month, December, was 10 per cent under, with a difference between them of but 9,000,000 tons.

Production of anthracite was at a high level in 1923. Inheriting a shortage from the long strike of 1922, the country was anthracite hungry. Demand was strong as the year opened and after a summer of exceptional output, the trade readily absorbed the output—following

the short strike in September—even at prices enhanced by reason of the wage increase given the miners by Governor Pinchot. Hard-coal production in 1923 was around 95,000,000 net tons, the highest in a peace year. Domestic sizes were the backbone of the trade, for steam sizes were off in price from April on, attendant on the lowering prices of soft coal, with which they were in direct competition in the steam trade.

Price Trend for Year Monotonously Downgrade

SATISFACTORY as was production of bituminous coal, prices were a disappointment. Spot prices ranged downward from an average of \$4.38 per net ton in January, dropping below \$3 in April to \$2.18 in December—that is to say, the market at the end of the year was half what it was at the beginning. There were no corresponding decreases in cost. The average spot price for the year was \$2.77, compared with \$3.67 in 1922 and \$2.55 in 1921.

Spot price, however, is not equivalent to average dollars realized by the operators. In the first place, the two figures are not strictly comparable, for the spot price is what the customer pays and is the operator's selling price enhanced by selling costs or middlemen's margin. In the long run, however, the discrepancy is not great. In boom years the spot price soars well above average realization because a majority of the coal is sold on a conservative basis, usually on contracts. Thus in 1920, when open-market prices for soft coal literally touched the sky, averaging \$5.64 over the year, the average actually received per ton was \$3.75.

But in periods of dull market the spot price descends below the contract price level, as in 1921, when the average spot price was \$2.55 and the average realized was \$2.89. In 1922, because of the shortage caused by the strike, spot prices mounted, averaging \$3.67, but realization was \$3.02 per net ton. The spot price in 1923 started high, as a holdover from 1922, but descended to a low point in December. The average spot price was \$2.77 and it is estimated that the average realized was about \$2.85, a few cents above the open-market quotations.

It cannot be argued therefore that 1923 was a prosperous year for the soft-coal industry. It is particularly significant that, after making allowance for increases in wages alone, the spot price of bituminous coal in 1921 and again in the latter part of 1923 fell below the pre-war record of 1913-1914. Labor cost alone considered, soft coal is now cheaper in the open market than before the war. It is small wonder then that the bituminous-coal industry is not facing 1924 in high spirits.

This unsatisfactory condition is solely due to the overdevelopment of the industry. The war inflation, huge in itself, has since been augmented by the forced development in the non-union fields attendant on the strikes in the union fields in 1919 and 1922. The boom of 1920 also was a contributing factor. The capacity,

both as regards mines and labor, is such that 10,000,000 tons or more per week may be produced and yet the air be filled with complaints of idle mines and idle labor. The year 1923 has given us an excellent measure of the overdevelopment of the soft-coal industry. With a high total production spread almost uniformly over the twelve months, the days of idle time represent surplus capacity.

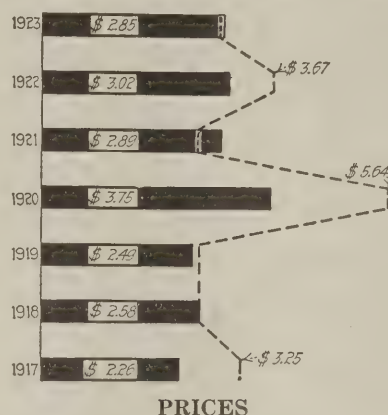
Distribution of coal was uniformly satisfactory in 1923. There were no hindrances to movement. Every section of the country has had soft coal forced on it.

New England and the Northwest are glutted with fuel. The movement into the Northeast was stimulated by competition between the water shippers from southern West Virginia and the all-rail shippers in central Pennsylvania. Never was so much soft coal—about 32,000,000 net tons—dumped at lower Lake Erie ports for the Northwest trade. Illinois, Indiana and western Kentucky enjoyed an active summer, but entered the autumn and winter with markets stocked and little business. They are now feeling more than any other producing areas the effect of deluged markets.

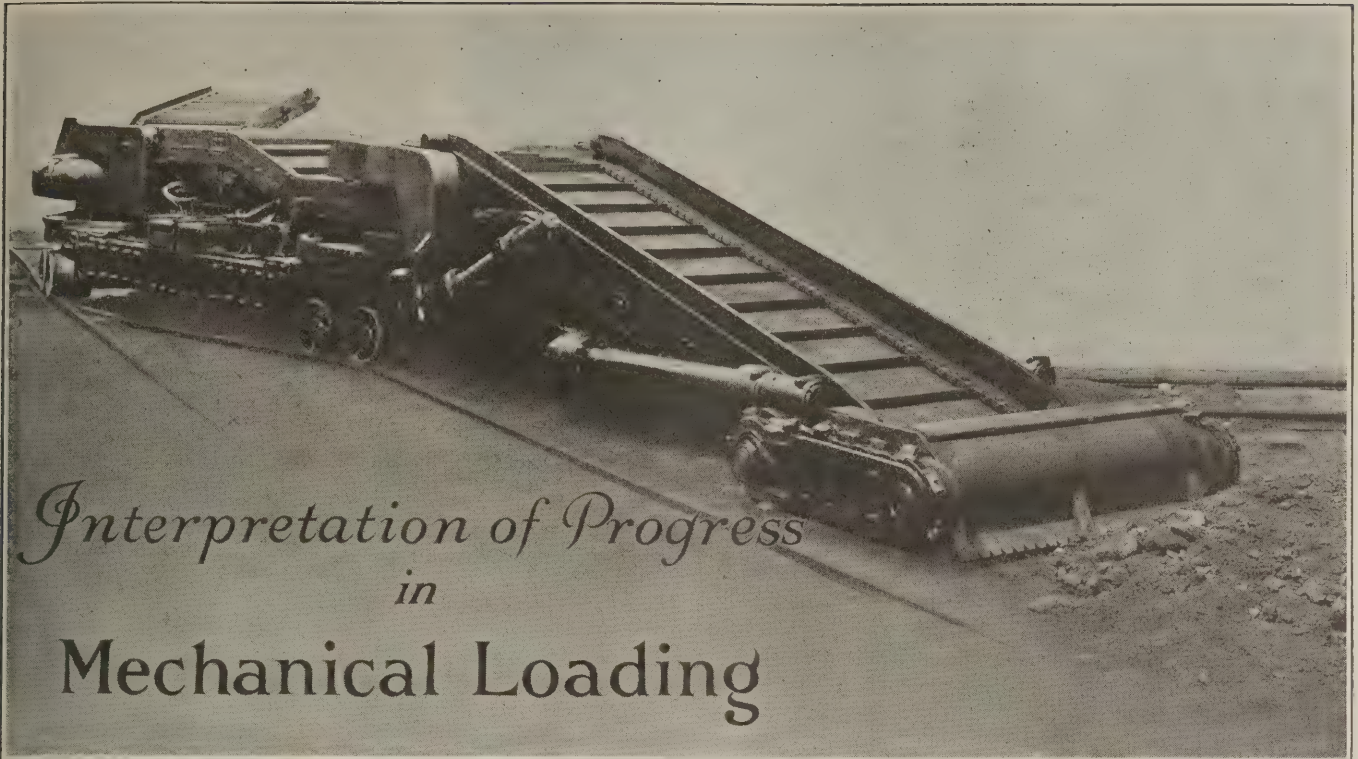
Except the flare-up in anthracite in September, there was no labor trouble in coal in 1923. The bituminous wage contract signed in August, 1922, expired April 1, 1923, but no real diffi-

culty was encountered in agreeing on a renewal. After some negotiations and considerable jockeying for position, the renewal was made for one year, instead of for two years, as some desired. This brings the expiration on March 31 next. At this writing there is much speculation as to whether a new contract can be agreed upon without a strike. It is useless to attempt a forecast. The miners obviously would in the aggregate profit by a two-year renewal of the present scale, as would the larger, more conservative operators. Another bitter contest such as that of 1922 would shackle the industry with still more development and put even further into the future that day of a more stable industry—if indeed it would not ruin the opportunity and postpone perhaps for a generation the possibility of the deflation so sorely needed.

Those who look only to the present and immediate future see the country overloaded with soft coal and all prospects gone of remunerative prices in 1924. To such there is no remedy save a forced suspension in the union fields—a shot in the arm to bring on the rosy dreams of low stocks, strong demand and high prices. Sentiment against a strike is gaining every day.



The solid bars and the figures in this diagram represent the average realization in dollars per net ton for bituminous coal, as reported by the U. S. Geological Survey, except that for 1923, which is an estimate. The dotted line shows the average spot price as reported by Coal Age.



Loading Machines Appearing in Great Numbers—Types and Principles of Machines and Appurtenances—Interest at Last at Fever Heat—Many Questions Must Be Settled and Problems Solved

BY ALPHONSE F. BROSKY

Assistant Editor, *Coal Age*, Pittsburgh, Pa.

"WHAT is being done on the problem of machine loading?" is the question mining men are asking all over the coal field. The problem is receiving much practical demonstration as well as thought. It is about as commonly discussed as the prohibition question—at the mine, in the office, at meetings and on pullman cars. And it is not something new, as many are led to believe, for loading machines have been an expensive hobby of a few men for many years; only this year has the interest been national. Heretofore, development was intermittent and, at best, pulsating. Someone would conceive ideas of a coal-loading mechanism and then commence to build one.

Too often work would cease before the machine had been completed or soon after it had been given a half-hearted trial. Many machines that had a semblance of practicability failed to make headway chiefly because of lack of funds and of co-

operation from mine owners. Woodsheds, machine shops and garages have been the birthplace of many loading machines. The number of them is legion. How many are there? That is a difficult question to answer, as a veil of secrecy hides the development of many of them.

UNION IMPEDES INTRODUCTION

Progress is slow, as it must be, until sufficient momentum is gathered to sweep the industry. In a way, the move is marking time and will continue to do so, all the while gathering force, till such time as the barrier of opposition thrown up by the United Mine Workers no longer obstructs the introduction of such machines. It is gratifying, however, that practically all the mine owners assert that the day of the loading machine is at hand.

Sooner or later, it is believed, the miners' union will have to yield to economic pressure and agree to a reasonable wage scale for loading machines. With these assurances mechanical - loading devices and methods are developing with increasing rapidity. If the U. S. Coal Commission's reports did nothing

else, its efforts at least caused wider interest in the problem.

Before going any further it might be well to give a definition of a mechanical loader, applying it to the type in most general use. Strictly speaking, a mechanical loader is a machine that performs the greater part of the work of the human loader, one which is devised to transfer coal at the face to mine cars or conveyors, after the face has been cut and shot down, and to do that work with little expenditure of labor other than that required for the manipulation of the machine.

A mechanical loader will never be small enough or flexible enough to match the co-ordination of man's brains and brawn, but it can be made to approximate that ideal. The more nearly it does so the more successful is the machine. Other machines are being built in which the functions of mining coal are added to those of loading. These are known as combination mining and loading machines. Earlier types of these last-mentioned machines were designed to advance entries, but the dual functions of mining and loading are now being incorporated in

The headpiece shows the Oldroyd loading machine, which, unlike other machines, has three conveyors. To the head end of the loading boom is attached a revolving dipper to which are fastened two replaceable strips of steel, which throw the coal onto the lowest of the three conveyors.



JOY LOADING AND DIGGING MACHINE ENTERING ROOM

This machine is employed extensively under all sorts of conditions. Being perhaps the smallest loader in use, it is suited for low as well as high seams. The digging and gathering fingers resemble somewhat the claws of a crab and draw the coal into the conveyor trough.

machines which have as their function the production of coal and not merely the extension of roadways.

The mechanical running of the machines and their performance at work are based upon many principles. Belt or metal conveyors in almost all cases carry the coal from the front end of a machine to a mine car or another conveyor. These generally consist of two units suspended from the body of the machine, which operate independently of each other. For convenience and uniformity of expression in describing various types, the front conveyor is called the loading and the rear conveyor the discharging boom.

On almost all types of loading machines it has been found advantageous to give the discharging boom independently controlled vertical and horizontal movements and to provide only for the elevation or lowering of the loading boom. A few types are provided with a moving device on the head end of the loading boom to facilitate the transference of coal onto the discharging conveyor.

Gears and worms, air and hy-

draulic cylinders, rope drums, shafts and direct connections are the means used to impart motion from motors to the various elements of the machine. The machines travel on tracks, tractors or on the ground in the fashion of a cutting machine. They are made large or small, depending upon the conditions to be met and the whims of the inventors.

COAL COMMISSION'S STUDY

In its report on machine loading the Coal Commission makes reference to two definite machines, evidently of different make, estimating their capacities in eight hours under satisfactory working conditions as 500 tons for the large and 150 tons for the small machine.

It is quite likely that the commission speaking of the big machine refers to the Jones loader, of the Pocahontas Fuel Co., of West Virginia, for the reason that the average output of three machines for a particular shift of eight hours is 352 tons each, despite an actual working time of only 56 per cent. No other machine is known to be in use that has loaded coal at that rate over long

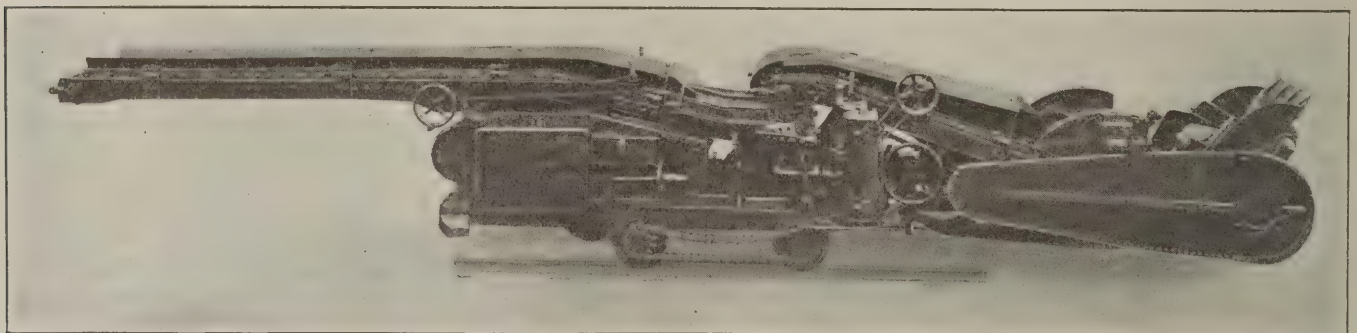
periods. When the commission refers to the little machine as being operated by one man, it must be alluding to the Joy loader. Throughout the report on machine loading, evidence is given that clearly fixes the identity of the two machines.

James Elwood Jones, of the Pocahontas Fuel Co., has for many years been working with a large loading machine in the Pocahontas No. 3 seam. This bed attains a thickness of 10 ft. of clean coal in the mines of this company. Working in thick coal he has demonstrated that loading could be successfully accomplished—even at this early stage of development—by room-and-pillar mining, where conditions are favorable. Because of the excellent results obtained in experiments, Jones loaders are being built at Columbus, Ohio, for use in the mines of this company. These mines are gradually being converted so that the entire coal may be loaded mechanically.

In the main the Jones loader resembles the types of machine in most general use, in that it moves from room to room on track and is arranged with loading and discharging booms suspended from the body of the machine. The loading boom is designed somewhat like the cutter arm of a cutting machine, under which is placed a wide slide pan.

In the chain which operates the loading boom are attached, in place of cutter bits, long arms which slide the coal to the discharging boom. It is a large machine, at present designed to load coal only in wide rooms and high coal. Its crew of twenty-two men attend to all duties relative to the mining, loading and hauling to a sidetrack of 500 tons of coal or more in eight hours. It has a record of loading a 4-ton car in one minute.

In its infancy the Joy loader weighed about 9 tons. The body of the early type was built about a large storage hopper, to which the



MYERS-WHALEY SHOVEL—A HEAVIER MECHANISM OF LARGE CAPACITY

A swinging shovel deposits the coal on the loading boom. The type shown here can be operated in a 4½ ft. seam of coal. It will also load rock, ore, clay or other loose matter with equal facility.

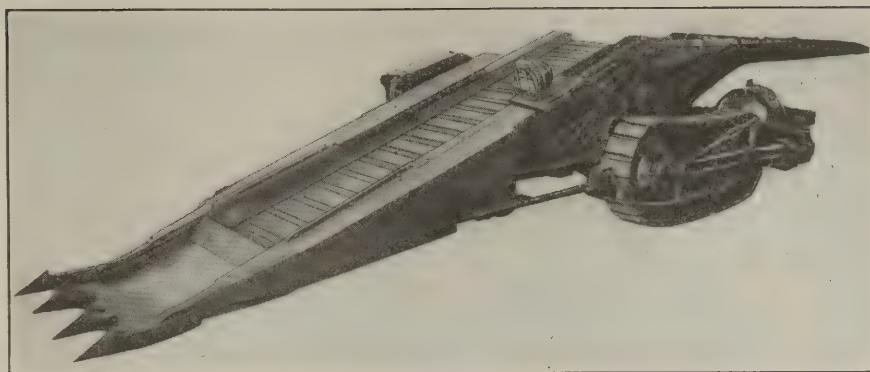
coal was fed by one conveyor and from which coal was discharged into mine cars by another. Believing a loading machine should be small enough to make it extremely flexible and so that one man can operate it, the designer eliminated the impracticable hopper, and reduced its size to that of the present Joy loading and digging machine, which weighs about $3\frac{1}{2}$ tons.

It has but one flight-conveyor pan, which flares out at the head end of the machine and is suspended on a tractor truck so that it may be raised or lowered. The flared-out section of the pan is provided with a pair of digging and gathering fingers which are geared and pinned to describe fixed orbital paths drawing the coal into the conveyor trough. Two hundred of these machines are distributed over Virginia, West Virginia, Indiana, Illinois, Kentucky, Colorado and Pennsylvania.

No better implement than a shovel is known for the hand loading of coal or other loose material. On the Myers-Whaley loading machine, developed fifteen years ago, the principle of a shovel is incorporated. Essentially it consists of a swinging shovel and two conveyors and travels and loads over a 20-ft. front from a mine track.

Both conveyors have lateral movement. The capacity of the shovel with a sufficient car supply is 150 tons per shift, operating in seams $4\frac{1}{2}$ ft. thick or thicker. A number of these machines are in use in coal mines of Pennsylvania, West Virginia, Indiana, Illinois and Colorado, and in rock and ore mines in this country and abroad.

Adoption of the caterpillar tractor



HOLMSTED COAL-LOADING MACHINE, USED AT HARDY COAL CO.'S MINE

In this machine the essential feature is a wedge held in an eccentric path by guides and made to move into the coal and back to the conveyor by a semi-flexible connecting rod from a drive crank.

to impart flexibility of movement in loading at the face and portability in traveling from place to place independently of mine track is a step forward in the development of loading machines. It enables the small loading machine, which does not have sufficient reach for loading from a mine track, to reach all parts of the face, and when thus applied it gives excellent service. George Dillig, of Pittsburgh, Pa., claims priority over all other designers in the use of this device, for in 1920 he mounted an experimental loading machine on caterpillar tractors. That machine loaded out 57 tons of coal in two hours from two rooms in the Hammill mine, near Pittsburgh, Pa.

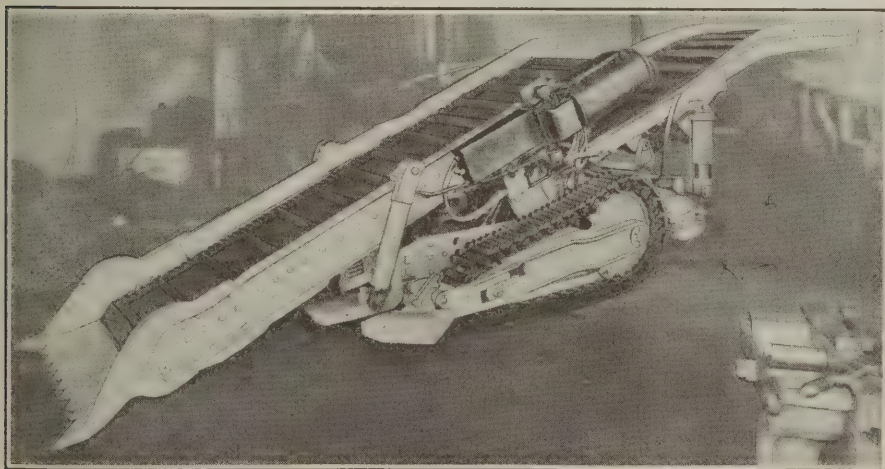
The Dillig tractor loader as developed today depends upon the powerful action of tractors to ram its nose under the coal to be loaded. This lifts the coal onto a loading boom which deposits it onto a discharging conveyor. The booms are lifted or swung by air jacks. At the present time several of these machines are being built less than 36

in. high for a large company in Pennsylvania. The Valley Camp Coal Co. is preparing to use a Dillig loader in its Kinloch mine, Parnassus, Pa., where plans are made for longwall mining in an isolated panel. The machine will work in the thick Freeport seam, which is topped with a hard roof.

At the Hardy mine of the Hardy Coal Co., of West Virginia, three Holmsted loading machines are in use in room-and-pillar mining. Additional machines for the same place are in process of construction. The outstanding feature of this machine is a reciprocating wedge on the head end of the loading boom, which is thrust under the coal on its forward stroke and drags the coal onto the conveyor on its backward stroke. Reciprocation of the wedge in eccentric guides is accomplished by attaching to a crank a semi-flexible connecting rod. Its general features are similar to those of other loading machines. It will load at the rate of $1\frac{1}{2}$ tons per minute. All the machines already mentioned have been extensively used.

In the Oldroyd coal-loading machine are embodied several of the movements of an arcwall machine in cutting horizontally, as it travels on a track and may be fed straight in toward the center of a face in loading and may be swung also to either rib. The loader breaks the coal down and loads it at the face, and, for this reason, it is heavily constructed. It is equipped with three conveyors supported by two sets of swivel trucks for greater ease in rounding curves.

Coal is fed onto the front conveyor by means of a revolving dipper provided with two steel cutter plates spaced at an angular distance of 180 deg. to each other. The Oldroyd will load at a maximum rate of



DILLIG TRACTOR LOADER—ALSO SUITED TO ROOM-AND-PILLAR MINING

The ram nose of this loader is forced under the coal, which moves onto the conveyor, urged forward by the powerful thrust of caterpillar treads.

2 tons per minute. In one shift it has actually loaded 250 tons of coal in 2.4-ton cars at the Sumner No. 2 mine of the Pittsburgh & Erie Coal Co., Braznell, Pa., where the Pittsburgh seam is 7 ft. or more in thickness. Using a 4-ton wagon, 350 tons of coal could have been loaded out in eight hours.

Other loading machines than those mentioned are in all stages of development. The Wheeling Steel Corporation is developing an air punching heading machine. J. A. Forsythe, master mechanic of the Buckeye Coal Co., is getting ready to build a loading machine at Nema-colin, Pa. Another loading machine is being built at New Florence, Pa. The Jeffrey Manufacturing Co. has started work on a new type of loading machine; one about which little is known is still in the embryo stages of development.

Patrick J. McDonald, of New Cumberland, Pa., has taken out patents on a loading machine that employs the unusual arrangement of multiple-bladed collecting scoops which revolve and thus discharge coal onto a conveyor.

The Vesta Coal Co. and the Bethlehem Mines Corporation are each developing a loading machine. F. N. Wilson, of St. Louis, is constructing a mechanical loading device for the Southern Coal, Coke & Mining Co. It will be known as the "Wilson Chainloader." It has two sickle-shaped arms which, after gathering coal onto a flight conveyor, develop a half twist in two planes and are thus lifted above the loading conveyor. It will load from a mine track and will be built as low as 30 in. The smallest size will weigh

about 4,000 lb. No doubt many other loading machines are being designed or built, but regarding these information is not obtainable.

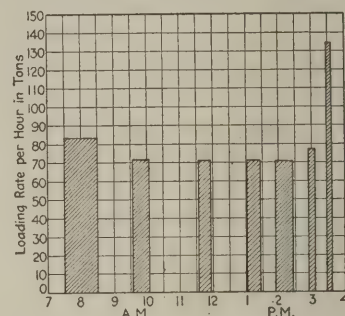
A few types of shovel loaders, such as the Shoveloder and the Hoar Baby shovel, are giving excellent service in handling rock where roof is brushed in coal mines, but these require more headroom than most seams afford and consequently at most mines cannot be used for loading coal. Their development, nevertheless, has benefited the industry.

There is a fight between two factions, one holding that present plans of mine layout, embodying the principle of rooms and pillars, cannot be changed; and the other, a bit dubious of the stand taken by its conservative opponent, maintains that modifications of longwall mining should be developed to prove or disprove the possibility of adopting the European system in the various seams of this country.

It is surprising the number of sound mining men who are now accepting the advice given many years ago by the longwall advocates, and who are either already experimenting or contemplating the making of experiments into the possibilities of longwall systems of mining. Men in the service of coal companies ranging from the largest to the smallest are members of the latter or minority party. Experiments in modified longwall are being conducted in seams varying in thickness from 3 ft. to that of the Pittsburgh seam. Longwall, by the way, is being tried in this seam.

Without doubt arrangements for loading coal mechanically must be developed, but opportunities for ap-

plying longwall methods, with their inherent cost-saving due to concentrated mining, should certainly not be overlooked. The geology of sedimentary deposits is pretty much the same all over the world, so that what



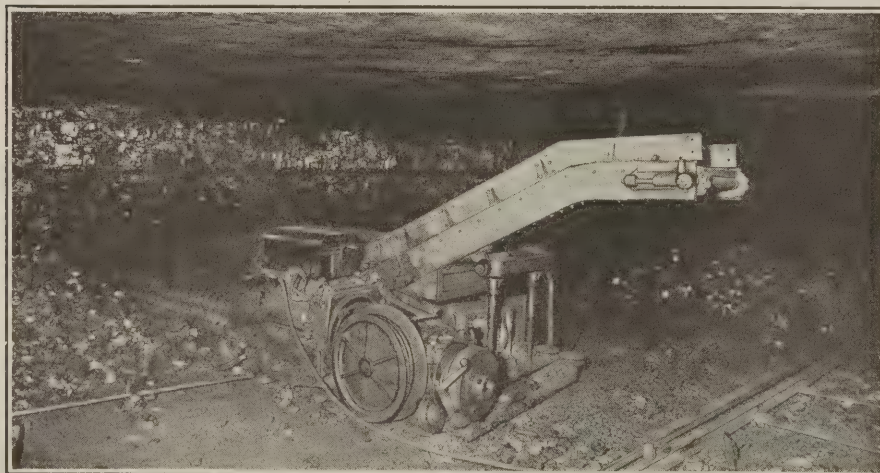
LOADING RATE, BUFFALO-EAGLE MINE

Shaded areas in diagram show loading rate in tons per hour for a single machine in test made Dec. 13, 1922. Machine with three men to operate it loaded 267 tons in 8 hours. The total operating time was 3½ hours and the rate of loading when in operation was 76.3 tons per hour.

is good for Europeans should, in a measure, be good for us also. However, it must not be forgotten that in Europe longwall is accompanied by backfilling, whereas we propose not to go to that expense. The burning question of machine loading is responsible for the beginning of this revolution. How it will end, only time will tell.

A loading machine has been manufactured expressly for loading from longwall faces. On this machine is a horizontal bar with cutting bits set around its periphery, which revolves so as to throw material in its path up to and on a conveyor that parallels the loading bar. It has several characteristics of the old shortwall cutting machine. It is not portable of itself and consequently in transit must be carried on a truck.

Like the shortwall undercutter also, the machine while loading is moved slowly along the face by ropes and jack pipes. It is said that it can be built to operate in seams as low as 2 ft. thick. This machine will easily load a ton a minute. In a test in a mine of the Buffalo-Eagle Colliery Co., Logan County, West Virginia, this machine loaded 267 tons of coal in 3½ hours of actual working time. The test was conducted by the Allotment Commission of the Chesapeake & Ohio R.R., which, in order to determine what would be a fair proportion of cars to allot a mine having such a machine, had a run made to ascertain its capacity under working conditions. A graphic chart of this performance appears above.



MINE CAR LOADER, DESIGNED SOLELY FOR LONGWALL MINING

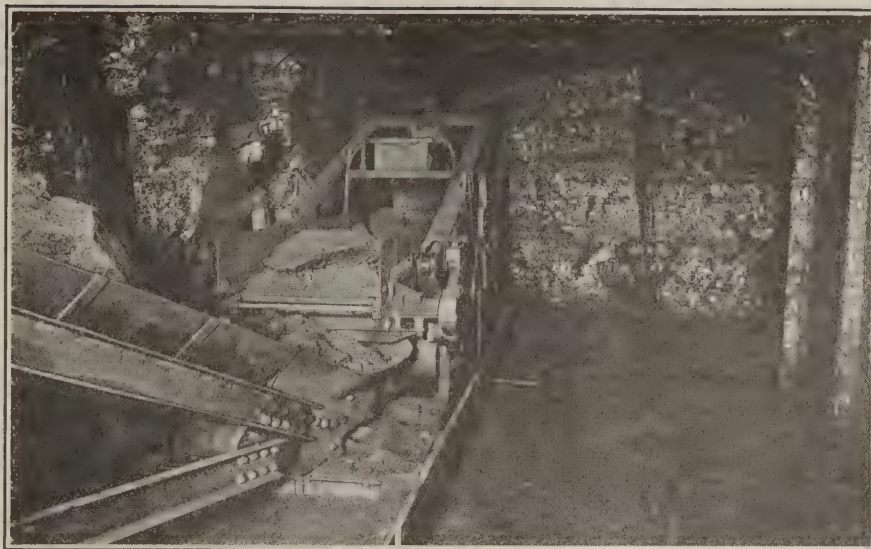
This loader consists, in the main, of a horizontal bar covered with bits, which on revolving throws material in the path of a parallel conveyor. It embodies several features of the old-type shortwall cutting machine, moving while loading as the latter moves in cutting.

Major recovery in mining cannot proceed any faster than entry development. For this reason progress in entry-driving machines must parallel that of loading machines. Because most entries are driven narrow, machines for consummating this work have almost invariably been conceived as combination mining-and-loading devices. The Jeffrey heading machine is designed and used for this purpose and makes a remarkable yardage.

It undercuts and shears simultaneously, and as the cutting progresses inward a reciprocating picking frame, the height of which may be adjusted while the machine is in motion, breaks down the coal. The coal falls on a conveyor pan on the bottom of the machine and is conveyed to a mine car in the rear. Entries can be driven to any width by taking successive cuts across the face. It has loaded as much as 30 tons in one hour.

One of these heading machines recently was installed at the Keystone Coal & Coke Co.'s mine, at Keystone, W. Va., on the Norfolk & Western Ry. For the last four months, I am told, it has driven entry at the rate of about 30 ft. in each eight-hour shift, and it has been shown that if it is given cars for continuous loading it will drive over 50 ft. in that period of time. One day when locomotives and cars were available for handling the coal, the machine advanced 53 ft. in seven hours and on several other occasions similar performances were obtained.

The machine will work well under any conditions where the coal is not much below 5 ft. in thickness and where the seam has not an excessive quantity of sulphur or other hard impurities that bits cannot cut. Four of these machines are being used in the Raleigh-Wyoming Coal Co.'s mine, the explosion that recently occurred in those workings



JEFFREY HEADING MACHINE FOR DEVELOPMENT WORK

This machine cuts two vertical kerfs and one horizontal kerf in the coal and then punches out the coal by five strong picks set in a solid frame. It makes three cuts in a wide heading. The rib line with its small offsets can be seen on the right.

being confined to an entirely different section of the mine.

Another combination mining-and-loading machine now being manufactured is known as the McKinlay mining and loading machine. It inherits the principles of the old Stanley header. Briefly, two shafts project from the body of the machine, and to these are secured two arms which revolve somewhat after the fashion of a propeller. These arms are provided with bits that may be located at intervals from 6 to 12 in., depending upon the nature of the coal cut. The relative motion of the two shafts and arms is such as to permit the twin tunnels to overlap each other, cutting a double tunnel 10½ ft. wide.

The sectors between the two circular tunnels are cut by means of a horizontal saw arrangement. The annular rings circumscribed by the cutter bits generally break of their own accord; otherwise revolving wedge wheels tear them out. Barrier plates on the sides of the ma-

chine and buckets on the revolving cutter arms divert the coal into the path of a belt conveyor. This machine will advance at the rate of 3 ft. an hour and is operated by one man.

The difficulty of getting a sufficient and a continuous stream of mine cars to mechanical loaders in rooms is now the biggest drawback to more general use of these machines. This obstacle is being studied seriously by many men. Portable and inexpensive conveyors are thought logical in rooms that may be driven wide in high coal so as to yield a large output per cut. As many as three, and possibly four, cuts might be loaded out of a single room in eight hours. Then a trip of as many mine cars as are required to carry the tonnage from one cut can be spotted and moved at the room neck with little delay. Another remedy suggested is the use of two or more tractor hoppers which ply back and forth, receiving their cargo at the loading machine and dumping it into a trip of waiting mine cars at the neck of the room. This scheme has possibilities.

In November of 1922, before the Kentucky Mining Institute, I suggested the possibility of using a telescopic ladder conveyor of two or more units that might be extended or closed at will by means of racks or some similar arrangement. Interlocking gears could transmit power from one conveyor to another, the conveyors being played out from and supported by crossbars. Such a conveyor could be extended to a sufficient length to permit as many



McKINLAY AUTOMATIC COAL MINING AND LOADING MACHINE

Considering the work it must do, this machine is extremely simple. Revolving cutter arms and horizontal reciprocating saws mine the coal, which is scooped up and deposited in the path of a single belt conveyor by two buckets on each of the revolving cutter arms.

mine cars to run under it as are needed to load out a cut.

J. A. Forsythe, of the Buckeye Coal Co., recently developed a scheme similar in general principle to my proposal. When a loading machine moves into a room it pulls behind it as many as six mine cars, on the top of which are slung conveyor units, one on each car. Each unit is driven by an individual motor and all are tied together electrically by power cables controlled by push-buttons from the loading machine.

Each conveyor rides on a stilt frame, to the legs of which are attached small wheels. An elevated conveyor-frame track lies on the outside of the mine track. In passing over this outer track the conveyors are lifted from the mine cars. In loading, the mine cars are moved from and spotted under the end of the outby conveyor unit.

CONVEYORS CARRIED ON EMPTIES

For transportation purposes a trip of empties is backed under the conveyor units by a gathering locomotive, which is then uncoupled. In backing out of the room the loading machine pushes the conveyor frames from the elevated conveyor track and lowers them to a sling position on top of the mine cars, which move with them. The train is then ready to move to another room, having a supply of mine cars available for immediate use.

What are the possibilities of loading machines in the immediate future? Of first importance in this

connection is an agreement between miner and operator as to a wage scale for mechanical loading. In Illinois the operator is paying the cutting-machine rate to loading-machine operatives. In Indiana the pay of loader operatives runs as high as \$12.50 a day. In neither state has a piece-work rate been made for mechanical loading. However, in Indiana a joint committee of operators and miners was appointed in the spring of 1923 to formulate a scale, but thus far it has not concurred in any recommendation. It is certain that this question will be much to the fore during the coming wage-negotiation meetings scheduled for next month.

It is interesting to note the type of companies that are most absorbed in the development of mechanical loading. Who will derive the most immediate benefit from it? From present indications owners of captive mines are most active in this work. Large commercial coal companies generally are more or less indifferent as to what is transpiring in this new field of endeavor.

CAPTIVE MINES WELL EQUIPPED

Co-ordination of engineering talent in companies that both produce and consume coal is responsible to a large degree for the progressive management of captive mines. As E. W. Davidson points out elsewhere in these pages, captive mines usually are better equipped than those which sell their coal on the open market.

Preparation and sizing of coal re-

quired for various uses is a factor in the progress of machine loading. Steam coal, fired by stokers or pulverized and blown into boiler furnaces, can be loaded by machines which would degrade sized coal too much for domestic and other uses. Slack coal is actually desirable for byproduct coking. If loading machines are developed that are successful, save that they cause regradation of the coal, steel and other industrial companies will not hesitate to adopt them.

Loading machines will help to stabilize the industry by eliminating snowbird and high-cost mines.

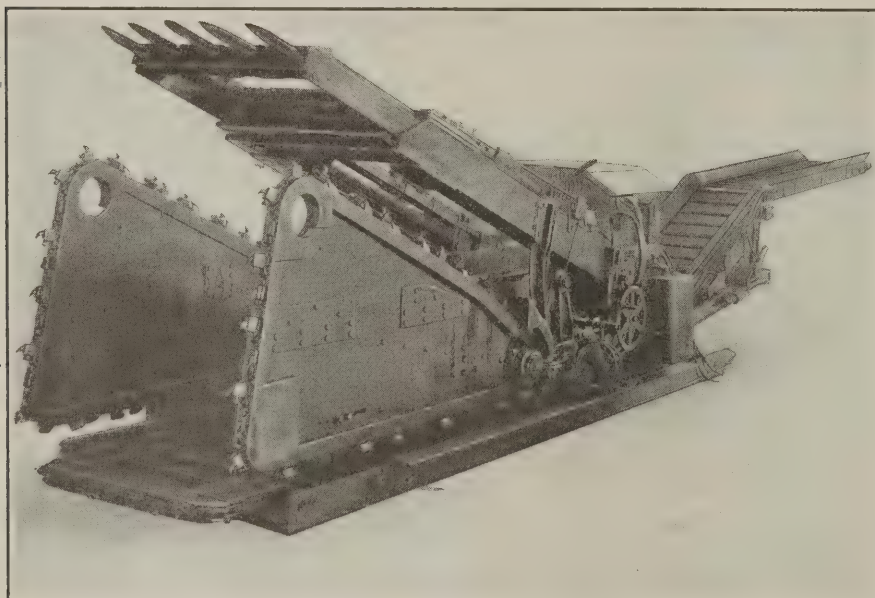
Consumption of Natural Gas Up 15 per Cent in 1922

In 1922 there was consumed in the United States 762,546,000,000 cu. ft. of natural gas, having an estimated value of \$84,873,000 at the wells and of \$221,535,000 at points of consumption, according to data compiled by H. Backus and issued through the U. S. Geological Survey. This is 15 per cent more than the quantity consumed in 1921 and 4 per cent less than that consumed in the record year, 1920.

Increased production is recorded for most of the states and in the leading five—West Virginia, Oklahoma, Pennsylvania, Louisiana and California—gains were made ranging between eight and twenty billion cubic feet. There were few changes in rank of the states in production, with the exceptions that Wyoming, with an increased output of more than 50 per cent, attained eighth place, passing Kansas; and that Arkansas, with an increase of more than 100 per cent, went from twelfth to tenth place, passing Kentucky and New York. But in consumption several of the leading states changed relative positions as compared with 1921. Pennsylvania regained first place, having dropped to third in 1921, Ohio changed from first to second, Oklahoma from second to third, California from fifth to fourth, and West Virginia from fourth to fifth.

The interstate movement of natural gas increased from 150,000,000,000 cu. ft. in 1921 to 179,000,000,000 cu. ft. in 1922. West Virginia, which contributed 25 per cent of the total production and consumed only 10 per cent, contributed 66 per cent of the gas that was transported to other states.

During the past few years there has been a considerable increase in the unit value of natural gas, the average value at the points of consumption increasing from 21.6c. per thousand cubic feet in 1919 to 29.1c. in 1922. The average value per thousand cubic feet of the gas used in domestic consumption increased more than 15c. in the past four years and in 1922 was 49.9c.



FRONT VIEW OF JEFFREY HEADING MACHINE, SHOWING PICKS

At the Keystone mine this machine has driven a heading 53 ft. ahead in 7 hours. With a conveyor to carry the coal to a roadway at right angles, or curving away from the machine-driven road, full trips could be loaded with elimination of waits and it is easy to surmise that the tonnage thereby could be greatly increased.

Are "Captive" Mines on the Increase?

Bulk of Opinion Is That "Low-Price Era" Is On and Fewer Steam-Coal Consumers Will Get Mines, but Other Consumer-Owned Tonnage May Grow—
Fourth of National Demand Already Lost to the Market

By E. W. DAVIDSON

WHAT of captive coal?

For a generation bituminous fuel produced by consumer-owned mines has cut a swath in the coal industry of this country—much wider than many men in the coal industry have realized. In 1920 at least one-quarter of the entire bituminous production of the nation was captive. Since then it has undoubtedly increased a little. Probably the percentage fell back during the peculiar year 1923 because of the engulfing flood of cheap coal that finally closed down a number of captive mines; but what will be the trend of this captive coal in the future?

"Downward," promptly replies the great producer of commercial coal. "Yes, probably downward," agrees the railroader. But the industrialist comments thus: "I have an idea it will be somewhat upward because that has been the trend for quite a while. Enough big industries have profited in the long run by owning their own mines so that they will not quit mining after a single doubtful season." And there you are.

The commercial producer—his opinion is a cross-section of several commercial producers' opinions—whose sole business is the mining and selling of coal wherever it will sell, thinks captive coal will recede for several reasons. Metallurgical captive coal no doubt will continue strongly in the hands of its consumers—it is three-quarters in those hands now—but the army of steam-coal consumers will find in the future that the market and not the mine is the most satisfactory place to get fuel.

This will be true, says the commercial operator, because coal is going to be uniformly lower in the future and there will be fewer "emergency" peaks in the market. This will be brought about, he thinks, partly by more reliable and capable transportation and because he dares to think there may be less labor trouble. The seizure of union markets by lower-cost non-union fields, thus reducing union working time, is bound to have an effect, he believes.

With coal entering upon a cheaper

era, he holds, there will seldom recur a time when the steam consumer can afford to run mines. The lessons of the past few months illustrate the point perfectly. Captive mines had to quit because of the low price level of the market. Scores of them ran well into the autumn, loath to shut down and thus break up their organization, even though outside coal at far less than their cost of production pounded at their gates. Finally they could stand the pressure no longer, as in the case of the Standard Oil and Corporation mines in Illinois.

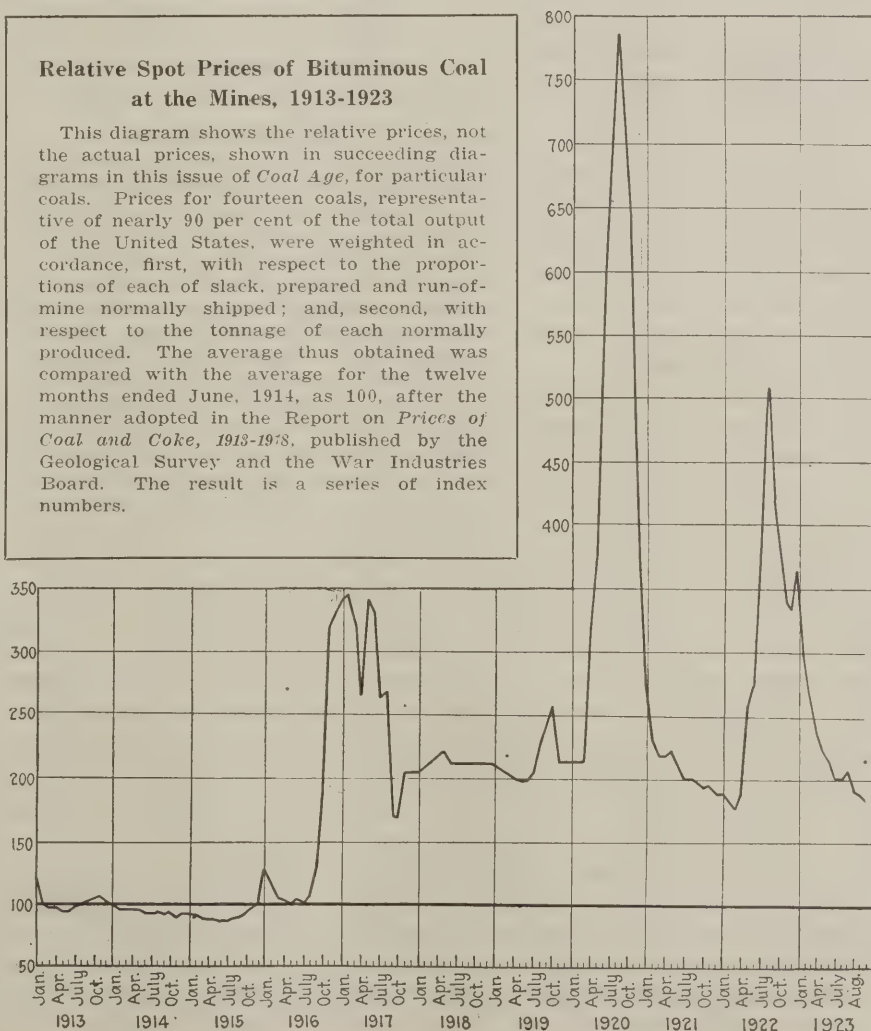
The oil company, with production costs at the mines near Carlinville, Ill., ranging up toward \$2, stood the strain until late November. Then it contracted throughout the Springfield district and Montgomery

County, Illinois, for enough screenings to supply the company's needs to April 1, at prices varying between \$1.05 and \$1.25. There was nothing else to do when other producers were glad to make such contracts. The central Illinois screenings market at the time was from 25c. to 40c. below those prices.

The Steel Corporation's great Middle Fork mine, in southern Illinois, went through about the same experience. It was operated at a loss for months and the corporation wished to keep on operating it, but lack of co-operation on the part of the miners finally exhausted an already sorely tried patience and the mine closed. The sale, soon after, of a wide acreage of Franklin County (Illinois) virgin coal lands,

Relative Spot Prices of Bituminous Coal at the Mines, 1913-1923

This diagram shows the relative prices, not the actual prices, shown in succeeding diagrams in this issue of *Coal Age*, for particular coals. Prices for fourteen coals, representative of nearly 90 per cent of the total output of the United States, were weighted in accordance, first, with respect to the proportions of each of slack, prepared and run-of-mine normally shipped; and, second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the Report on *Prices of Coal and Coke, 1913-1918*, published by the Geological Survey and the War Industries Board. The result is a series of index numbers.



which the steel interests had been holding in reserve, further indicates the attitude of the corporation toward digging its own coal in Illinois.

Then, too, the commercial operator holds the stock argument that the average industrial mine is less efficiently and less economically operated than the mine which depends for its life upon success in the fierce competition of the market. While this is not true in the East, there are many instances where it is true. A string of Midwest captive mines whose extraction is barely 39 per cent—lower by 4 or 5 per cent than that of neighboring commercial mines—is a case in point. The extravagant cost of shaft sinking and development work in another Midwest industrial mine, raising the cost of operation far above that of its neighbors, is another. These things are charged against a carelessness and lack of engineering knowledge that might not be found in a commercial mine.

CAPTIVE MINES MOST PROGRESSIVE

The outstanding fact cannot be overlooked, however, that, as a rule, the captive mine in this country is the leader in progressive mining. The industry behind it ordinarily is better able and often more willing to make heavy investments in good housing, as at Nemaquin, Pa., than the average commercial mine owner. Progressiveness in engineering is well exemplified at the now famous Lynch mines, in eastern Kentucky, in the Frick properties of Pennsylvania and elsewhere. Even the immense commercial mines of southern Illinois cannot outstrip them.

It must be said, however, that progressiveness in engineering often is handicapped by labor in such solidly unionized districts as the states of Illinois and Indiana. The strong effort to introduce underground mechanical loaders is one case in point. Although the unionized Middle West is keen to use them, only twenty-five have ever penetrated Indiana and a bare fourteen in Illinois, whereas there are nearly 100 in West Virginia—52 of them of one make—and only a little less than fifty in Pennsylvania, most of these in the non-union mines of that state. Maneuvers by the operators to get wage scales fixed for loader operators have failed. Down in the unionized Kansas fields the point is equally well illustrated by the fact that,

even after all these years, the union has not yielded to the demand for a cutting machine rate that is satisfactory.

The railroader quoted earlier in this narrative—being a composite railroader and not an individual—believes the wave of captive coal will recede largely because of the future ability of the railroads of the country to perform, and because he feels that sufficient control over coal is certain to be exercised, beginning in the immediate future, so that the days of weird coal prices are about over.

The railroader, like everyone else, can see sound reason why consumers that require a specific kind of coal should continue to own and operate

Complete reports for the year show the largest number of cars on record were loaded during 1923 with revenue freight. The total for the year was 49,814,970 cars. This exceeds by 4,696,498 cars, or 10.4 per cent, the previous record freight traffic, established in 1920. The number of cars loaded in 1923 in excess of 1920 would make a solid train more than 35,500 miles in length.

mines in even larger degree than they do now. But all consumers of steam coal, especially industrial plants, should not feel the mining urge that they had good reason to feel in the past six or seven years. The day of more substantial contracting, he thinks, is coming. When wild fluctuations occur in the market, contracts amount to something less than the well-known scrap of white paper, but he feels that that day will seldom reappear.

Railroads, he thinks, will add few if any mines to those already owned. They will need only enough of their own coal to maintain a balance—say 15 per cent. If anything, the proportion of railroad-owned coal production will drop. In 1920 it was one-third of the whole railroad consumption. Legal restrictions upon railroads dissuade them from further extending properties they may be operating on their own lines.

The average railroader points to the physical recovery of the nation's carriers to support his contention that transportation is sure to be

stronger than it ever was. He points to the fact that during the first eleven months of 1923 a total of 3,704 new locomotives were put in service on American lines as against 2,910 ordered on the best previous year, which was 1916. In 1922 no less than 180,154 freight cars were ordered, about a third of them being coal equipment, and up to Dec. 1, 1923, another 177,845 had gone into service. The American roads put one and a half billion dollars into capital expenditures during 1923, much of which counts heavily toward better movement of freight of all classes.

EQUIPMENT IN GOOD SHAPE

During the active and steadily busy year of 1923 the roads not only increased their motive power and number of cars but got equipment into as good shape for service as it has been in years. Locomotives awaiting heavy repairs Dec. 1 totaled less than 13 per cent, though 15 per cent is normal, and bad-order cars had been reduced to 5 per cent, which is nearly negligible. In spite of car surpluses in some parts of the country during the later months of 1923, which held cars idle, the average per-day car mileage was approximately 30, a year ago is as low as 20.

Such coal roads as the Louisville & Nashville and the C. & O., both chronically handicapped by lack of facilities when coal runs heavily, and the Illinois Central have notably strengthened their positions by adding trackage and terminal space that will count directly for the benefit of coal movement, not to speak of their additional power and cars. Most other roads serving coal fields have made special efforts to increase their coal-moving facilities, which, with the general improvement of receiving lines, practically guarantees excellent transportation of coal, for the immediate future at least.

Turning back to the ideas of the industrialist—another composite character—who thinks captive coal mining will increase somewhat, we are invited to contemplate Henry Ford. That genius of gasoline has built a vertical trust which requires the inclusion of coal as one of the raw materials. There are other vertical trusts, the industrialist says, that will go into coal just as Ford has. That will be one big source of expansion for captive coal.

Of course Ford faces market problems which he has not yet solved and

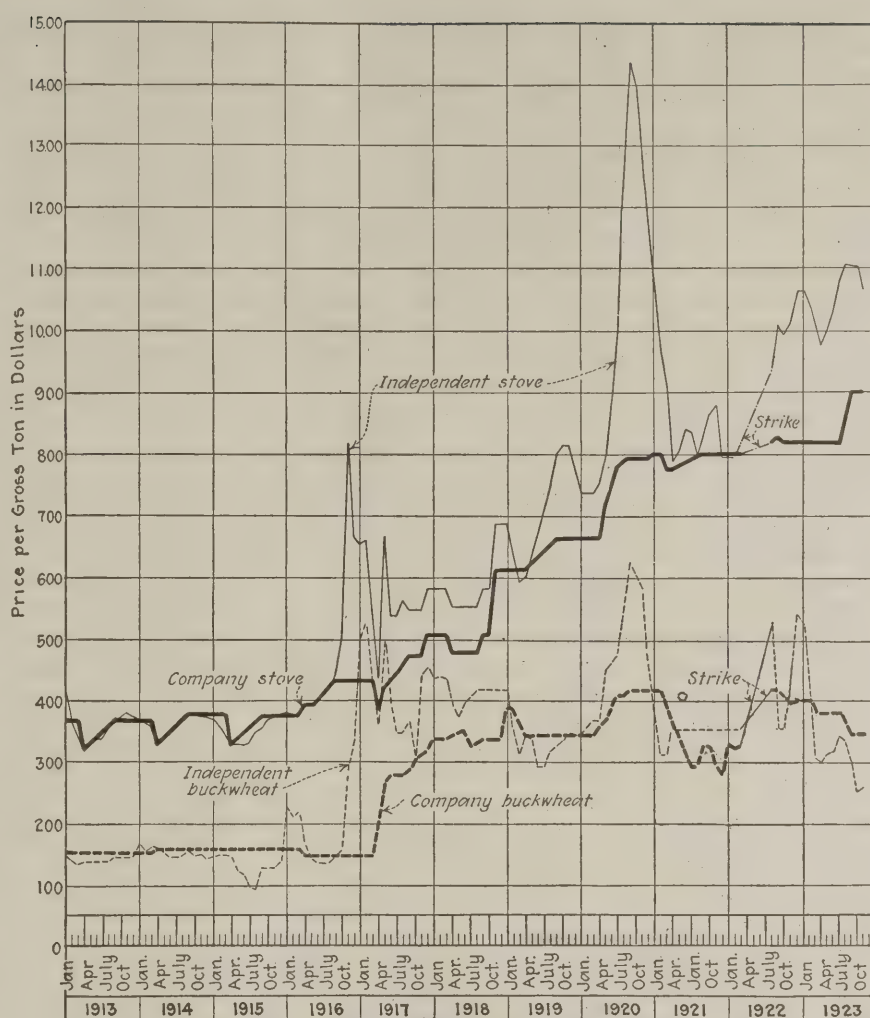
which possibly every other such enterprise will have to face. He has a surplus of production over his own needs. Per ton costs mount steeply when mines do not operate regularly. So Mr. Ford, on occasion, has forced coal at prices above the market onto unwilling buyers who sell him automobile parts. That helps to keep up his running time and to keep down his costs. But it is radical marketing and there is no assurance that he or anybody else operating captive mines will always find themselves able to unload by the same expedient.

This sort of thing will count heavily against captive mines in times of low market, but the industrialist's answer is that many vertical trusts of the future may be able to hold their coal productive capacity down to about the level of their own consumption and thereby escape the difficulty of disposing of surpluses.

He does not realize, however, as does the veteran coal producer, that lump coal must bring lump prices at any mine, lest the property's revenue fail to meet the costs of operation. The mine that crushes all of its lump deprives itself of a good earner.

The industrialist points also to the public utility as a probable wider owner of coal mines. The great public utilities, consumers of both steam and gas coals, have long been in the coal fields. Notable among them is the West Penn Power Co., with its Springdale coal operations close to Pittsburgh, Pa., all controlled by the American Water Works & Electric Co., Inc. Another example is the Insull interests, owning the Commonwealth Edison Co., of Chicago, and controlling the Northern Illinois Public Service Co., the Central Illinois Public Service Co. and other big power groups throughout the Middle West. The coal consumption of such utilities as these runs into millions of tons annually, supplied by such mining companies as the new Industrial Coal Co., with two Franklin County (Illinois) mines: the Utilities Coal Corporation, operating mines in Central Illinois, Harlan County, Kentucky, and Logan County, West Virginia, and other mining properties operated principally by the Peabody Coal Co., of Chicago.

One other source of additional operators of captive mines which the industrialist thinks about are the owners of commercial coke plants. He is not thinking of coal coked directly by the steel interests but of byproduct corporations. The By-



Anthracite Prices for Eleven Years

This diagram shows in dollars per gross ton the average company circular prices and average spot quotations on "independent" stove and buckwheat sizes of Pennsylvania anthracite at the mines. Prices shown are averages of the range as quoted on the New York market.

Products Coke Corporation, of Chicago, capable of carbonizing 1,500,000 tons of coal in one plant at Chicago, now draws coal from the Solvay Collieries Co.'s mines in West Virginia and the Black Mountain Corporation mine in Eastern Kentucky. Other standard coking companies attached to the Solvay or Koppers interests also are increasing their consumption of coal and low-temperature distillation could very well add a long line of coking plants all over the country which the industrialist pictures as divided into ownership groups that will want to operate coal mines. He is counting on an adjustment of railway freight tariffs to permit the coking of coal on through rates.

So much for what is visioned for the future. What exact information is there on captive coal of the past? Unfortunately, the body of information is not exact but approximate data compiled by and for the U. S. Coal Commission is illuminating.

One of the outstanding facts about the captive mine is that it averages far better running time than the ordinary commercial mine and somewhat better time than even the best of commercial operations. The accompanying table showing operating time of consumer-owned mines compared with commercial mines for both 1920 and 1921 is enlightening.

Quoting from the U. S. Coal Commission report on "Relief from Irregular Operation and Overdevelopment": "Consumption of bituminous coal was abnormally low in 1921. The soft-coal mines of the country worked an average of 149 days, or about half time. Consumer-owned mines quite generally averaged well above commercial mines. The regular connection and the interest of the consumers in maintaining regular output at their mines thus gave these mines better operating time in a year when lack of market was the controlling factor in the operation of all soft-coal properties."

"The production of iron and steel was at low ebb in 1921 and the mines connected with that industry made a correspondingly poor record. But the railroad-owned mines and those controlled by public utilities and industrials operated well above the average. Second only to the captive mines in regularity of operation were those owned by large, well-established commercial operators. Thus in Pennsylvania a group of 159 captive mines average 185 days, compared with 176 for the large commercial coal operations, 135 for all others and 151, the average for the state. Captive mines in Kentucky average 85 days more work than large commercial operations and 91 days more than the small mines.

"The record of the large commercial operators in Ohio is better than any other group because they are shippers of Lake coal. The large commercial operators in Virginia and Ohio worked more days than the captive mines in either Pennsylvania, West Virginia, Illinois and Indiana. The best records in 1921 were made by public-utility-owned mines in Pennsylvania and West Virginia."

How much advantage in cost of production has the captive mine? From the table of comparative working time of captive and commercial mines in the seven states for 1921 it can be computed that the average number of days worked that year by captives was 179.5 or an average of 14.95 days per month, compared to only 147.7 or 12.3 days per month, by the commercials.

A Coal Commission curve based on 1921 data from 119 mines scattered over the country shows exactly how the percentage of cost per ton rises in proportion to the loss of working time. It assumes 25 days a month to be full working time and takes that as its 100-per cent base. According to it, production costs at a mine working 15 days a month are 13 per cent above the base, and at a mine working between 12 and 13 days a month costs would mount 20 per cent above the base. By such cal-

culations the captive mine has an average of 7 per cent advantage over the commercial mine.

This 7 per cent looms large when applied to the output of, say, a million-ton captive mine and a million-ton commercial mine. The average spot price of soft coal for 1921 was \$2.55. If an average mine cost were assumed to be \$2 for the captive mine, its entire output for the year would total \$2,000,000, as compared to \$2,140,000 for the commercial mine, or a margin of \$140,000 in favor of the captive.

INTERESTING CAPTIVE-MINE DATA

In 1920, according to a study made by C. G. Duncan from data partly estimated and otherwise open to revision, captive mines in this country produced 139,148,000 tons of soft coal, or 24.6 per cent of the country's total. They contributed 22.2 per cent of the total shipments of raw coal and 61.9 per cent of the total that was made into beehive coke at the mines.

Steel companies are shown to be by all odds the largest holders of captive mines. The output of mines affiliated with the steel industry totaled 75,232,000 tons for that year. This is about three-quarters of the entire coal consumption of the industry.

Railroad-owned mines that year produced 46,705,000 tons, which was about 8 per cent of the national total and approximately 30 per cent of the total coal consumed by railroads. Industrial consumers of various other classes owned mines that year which produced about 8,500,000 tons, or 12 per cent of the amount of coal used by industrial plants other than those of the steel industry.

Geographical distribution of captive-mine tonnage shows that the heaviest captive production is by the Connellsville region of Pennsylvania—the great coking field serving the steel industry—Alabama, Illinois and the Far West. Consumer holdings in the Connellsville region are so extensive that they produced in

1920 about 31 per cent of the entire Pennsylvania output. In Alabama the captive-mine output was 46 per cent of that from the whole state, and in Illinois, 27 per cent. More than half the Far Western coal is mined by railroads and metallurgical companies. In Washington, Montana and New Mexico the proportion is about two-thirds, in Utah more than 50 per cent, in Wyoming 40 per cent and in Colorado about 38 per cent.

Production by the steel-company mines for years has kept pace almost exactly with the increase in total production of soft coal in the nation. Captive coal has increased also under the ownership of manufacturers of brick and other refractories, glass, paper, oil, cement and chemicals. Almost every industry with a coal consumption of 200,000 tons a year either owns mines now or has owned them in the past; but it is a notable fact that a number have taken fliers in coal only to let go at the first opportunity. This was true recently of a Pennsylvania cement concern which bought a West Virginia mine only to quit it for the open market.

Many a wise coal observer foresees that a good many of the smaller industries that now dig captive coal will soon quit the game. The prophecy for low priced steam coal during the next few years certainly is a discouraging one for any steam-coal consumer who thinks of getting into coal operation. The indications are that the prophecy will, in general, be borne out. Then it remains to be seen whether a shrinking proportion of captive steam coal will be counterbalanced by an expanding proportion of gas and special coal before the industry can determine which way captive coal is bending its course.

Commercial producers, who already see more than 25 per cent of the whole coal demand of the country taken out of the market by captive mines, today are counting on good rail service, less labor trouble and fewer future market peaks to preserve for them the remaining 70 to 75 per cent of the trade of the nation.

Captive Mines Work When Commercials Cannot*

Captive Mines	Days Worked								Days Worked						
	Pa.	W. Va.	Ky.	Va.	Ohio	Ill.	Ind.		Pa.	W. Va.	Ky.	Va.	Ohio	Ill.	Ind.
	1921								1920						
Iron and steel.....	177	151	260	134	140	170	225	Iron and steel.....	284	212	232	305	276	254	281
Railroads.....	195	179	224	...	157	174	189	Railroads.....	246	205	217	...	181	236	188
Public utilities.....	236	258	175	...	...	180	165	Public utilities.....	239	237	217	...	...	223	184
Industrials.....	205	167	203	...	212	196	...	Industrials.....	241	257	218	...	211	226	...
Average.....	185	180	228	134	161	175	193	Average.....	272	223	226	305	191	238	211
Selected large well established commercial operations.....	176	158	143	189	182	144	159	Large commercial operations.....	240	203	204	282	183	195	185
Other commercial operations....	135	144	137	143	118	147	116	Other commercial operations....	236	194	174	234	189	210	193
Total.....	151	149	152	166	136	152	128	Total.....	244	199	183	264	188	213	193

* This table, compiled by the U. S. Coal Commission, shows the average days worked in 1920 and 1921 by groups of consumer-owned mines in seven states, compared with days worked by mines depending on the market. The advantage to captive coal rolls up a considerable margin against commercial coal. The average for 1921 is 7 per cent lower cost at captive mines.

Engineering Achievements Outstanding Features Of Mining Progress in 1923

Organization of Engineering Forces—Greater Use of Mechanical and Electrical Horsepower—Increased Application of Automatic Equipment—Higher Efficiencies in Material Handling

BY EDGAR J. GEALY

Associate Editor, *Coal Age*

EVERY year impresses more forcibly on the coal industry the paramount importance of mechanical and electrical engineering and equipment as factors in production. More and more the mine approaches the ideal of a large machine operated by power generated at the mine mouth or at some distant station and controlled by push buttons and switches from the surface. We are a long way from such an ideal, and doubtless will never wholly attain it, especially in some mines and at the mine face, but time, patience and effort will bring it appreciably nearer.

In earlier years the engineer was largely a man who obtained by machinery a certain given result—at what cost of energy was regarded as a minor consideration; the wonder was that the result could be accomplished with any expenditure of power. Nowadays engineers are going over the equipment and finding where power is being wasted. Many engineers are engaged not so much because of their ability to construct plants and indeed to run them but because they are able to save money in their operation.

Operators are beginning to realize that having the machinery that will do the work as and whenever they want it done is not enough. Devices or systems are needed that will enable the work to be accomplished not merely effectually but economically. This kind of service differentiates the mere engine runner and electrician from the mechanical and electrical engineer.

As the engineer has come into his own he has made many changes and much progress in the handling of his work. Engineering staffs have materially increased, more technical men skilled in engineering theory are found in the organizations. The work of the staffs has been systematized. Records, data, charts and tabulations tell the story of each machine.

Following the example of the

power-plant industry, more efficient and reliable meters and recording equipment have been developed and applied, so that the engineer is able to ascertain definitely what any new arrangement, equipment or device will save him and can base his action not so much on his judgment or his preference as upon definite findings which will enable him to state just what can be saved by any given change in methods or equipment.

The modern engineer keeps data on the machinery he has replaced. He obtains photographs of the old and new installations. His operating records tell him what he can do under new conditions, duplicating those he has formerly controlled, and also prove the success of his plans after he has put them into effect. These methodical ways of planning and conducting his work have not only contributed to the efficient performance of his labors but have been the means of promoting confidence in his ability to economize and in consequence have enabled him to obtain the necessary funds for more elaborate systems of operation and control.

AUTOMATICITY SPREADS

During the year just past the use of automatic equipment and devices was greatly extended. Control apparatus were perfected and applied for the purpose of eliminating the difficulties that accompany manual operation. It is true, few radical changes were made in either design or construction, but the number of applications of electricity to mining was greatly increased.

By changes in design higher efficiencies were attained in many types of machinery, and corresponding advances made in the control apparatus to be used with it. These changes in detail in each instance may not have been great, but owing to the number of machines in use in the mining field the aggregate advance is of great potential economic value.

This year's developments in haul-

age equipment have consisted of greater refinement in mechanical and electrical detail. The outstanding features have been better tracking qualities, improved spring suspensions, greater battery efficiencies and such improvements in control as have resulted in lowered power losses.

Dynamic braking has been more generally applied. Locomotives of 25- to 30-ton capacity have been equipped with contactor control, ventilating fans and air brakes. By the use of ball and roller bearings mine cars when made up into larger trains than usual have been handled with ease. In many cases by these changes the need for large and for more locomotives thereby has been obviated. In fact, heavier loads than heretofore have been handled with smaller locomotives and hoist motors, thus effecting savings in power-generating equipment and power costs.

Almost everywhere the comparative figures available show that the friction load of anti-friction bearing cars is about one-fourth that of cars with ordinary sleeve bearings. Many records show even better results and point to great possibilities of further advance in the new year.

Last year equipment was designed for the largest coal hoist in the world, the drive consisting of two 2,000-hp. motors. Aside from the more extended use of hoisting equipment of small and extremely large size the most important progress in hoists has been in the application of accurate control and of dynamic braking.

Under several conditions heretofore considered practically impossible for efficient electrical control, hoisting systems have been developed that are capable of handling various loads at extremely low and high speeds with a minimum expenditure of power and without special complicated control. At the present time one coal company is seriously considering the develop-

ment of a complete automatic hoisting and dumping installation controlled by the footman at the level from which the cars are being hoisted.

The H. C. Frick Coke Co. is installing a belt conveyor over four miles long for transporting coal from the mine workings to the shipping station. It consists of twenty sections, each driven by induction motors varying in size from 50 to 75 hp. All are of the wound-rotor type. Solenoid brakes are provided for stopping and holding the conveyor belts when the power is cut off from the motors.

The control is so arranged that the motors start in sequence, beginning always at the delivery end, so that no coal can be delivered by a moving belt onto one that is standing. As each motor reaches full speed it trips a switch which energizes the starting circuit of the next succeeding motor. If any motor stops, it automatically stops all the motors preceding it in the conveyor system but allows those following it to run and clear the belts of any coal in transit.

In the pumping field this year we have seen the perfected development of the primed, started and controlled centrifugal pumping station. This complete equipment obviates the necessity for an attendant. So complete is the automatic control that it will work not only when the pump is in normal operation but under circumstances which would be likely to cause a breakdown. The pump begins to operate as soon as the water in the sump has risen to a predetermined height and automatically stops when the water has fallen to a level similarly predetermined.

For small gathering pumps a valve has been developed which automatically opens when the water in the sump reaches a height sufficient for pumping and closes when the water recedes to a point where pumping should stop. With this device a single pump may be arranged to unwater several areas by means of an octopus suction system.

An important development of the year which will greatly affect fan drives was the building of an alternating-current brush-shifting motor with shunt motor characteristics. This machine gives adjustable speed without auxiliary apparatus and permits large savings of power during the night and in idle periods when the fan may be slowed down. This motor is designed to run normally

at a low speed. It fills a long-felt need for an adjustable-speed alternating-current motor that will be simple and the speed of which will be virtually independent of its load.

Such rapid strides have been made in power-plant generation that today it is a relatively simple matter to obtain a kilowatt-hour of electrical energy from the consumption of two or two and a half pounds of coal. With the further development of the mercury boiler and turbine it is highly probable that some of the best power plants under favorable load conditions will be able to generate a kilowatt-hour of energy per pound of coal.

Where water conditions are favorable many large coal-mine power plants are operating at very low costs. These plants have an advan-

The engineer is no longer regarded as a spender but as a saver of money, and many notable improvements in power costs have been made, with increases in efficiency, during the last year.

tage over those in other industries, for the fuel they use is sometimes that which is cleaned from the roads and as it must be gathered to keep the tracks clear its cost to the mine power plant often is only the charge for conveying it to the power house. In many plants the small sizes are used which are inevitably made in the production of marketable coal. In this instance also the power-plant charge for the fuel is only the cost of preparing and conveying it to the furnaces.

The automatic substation has continued in popular favor, as is evidenced by a growing tendency to make the converting station automatic and thus obtain a reliable power supply for direct-current equipment. New features added to this equipment have broadened its field of application and made for greater reliability.

More converting stations have been placed inside the mines where they can be closer to the load and deliver better voltage with less power loss. Where the seams are thin and the mining progresses rapidly there is a growing need for portable power-converting substations, large companies having many

important mines finding it more and more necessary to have such equipment for emergency service. As the application of electrical machinery increases the demand becomes greater for a flexible power system. Ease of operation, control and repair has definitely favored the installation of the motor generator over the rotary converter.

Large power-consuming apparatus in the mine is now being fed through heavy high-voltage cables. Alternating current has been more extensively carried into the mines, voltages as high as 2,300 and 4,000 volts now being common. Feeder cables have been removed from the usual wet and dangerous hoisting shafts, and where the water is highly acidulous are now being installed in separate boreholes lined with iron or even terra-cotta pipe.

Marked improvement has been effected in the operation of portable machinery such as coal cutters, loaders, room hoists and cable-reel locomotives, thanks to the use of all-rubber insulated portable cables. In many operations where the ordinary portable cable would be dangerous and economically impossible all-rubber cables have proved their worth and established their practicability.

The mining field has been given special consideration by the electrical manufacturers, who have more fully recognized the hard service mining equipment must withstand. Special insulation and winding impregnation is now given to such motors and control equipment as are to be used in the mine. By this process it is easier to prevent moisture from causing delays.

Anti-friction ball and roller bearings have been adopted for many types of motors, thus effecting higher efficiencies and eliminating serious delays and damage that result when acid water, dust, dirt, sand, etc., enter the bearings.

The Fynn-Weichsel induction motor, capable of correcting lagging power-factor and operating at high power-factor on loads which must be motored higher than the average load condition would require, opens up big opportunities for correcting the low power-factor loads usually found around coal mines.

With these achievements in the past year and with indications of further expansion and application markedly discernible we are entering the new year confident that it will show even greater progress than those which have preceded it.

Marked Increase in Tidewater Coal Business Does Not Reflect Natural Growth

Gain of 9,000,000 Tons in Dumpings at Atlantic Ports Represents Emergency Requirements Both at Home and Abroad—Ruhr Controversy Brings Short-Lived Boom in Export Trade

BY J. S. BURROWS

Of Castner, Curran & Bullitt, Inc., New York

THIRTY-SEVEN million net tons of bituminous coal was dumped at the five Atlantic Ports in 1923. This total shows a substantial increase of nine million tons over 1922 but does not reflect any natural growth when compared with the preceding years since the war. In other words, there is no new business that has come to tidewater shippers in recent years other than emergency requirements at home as well as abroad.

On coastwise business the ports are in keen competition with each other for the existing business, while all new markets abroad are closed to American coal by high freight rates and unfavorable money exchange.

RAIL RATES HAMPER EXPORT TRADE

Fuel oil has been such a tremendous factor in restricting the use of tidewater coal all along the Atlantic seaboard that the only room left for expansion is in the export trade. Those engaged in trying to sell export coal are convinced that the strongest barrier in the way today is the high rail rates to tidewater ports and they believe that if rail rates on coal for export could be reduced by 40 to 50 per cent, sufficient export business would result to compensate the railroads through the greater volume of tonnage handled.

In the year just closed, export business showed an improvement over 1922, which year, however, showed the lowest tonnage in many years. This business came—mainly to Baltimore and Hampton Roads—in the "emergency" occasioned by the early developments in the Ruhr controversy. The new business remained throughout the summer months and departed as suddenly as it had come, when the "emergency" was past and the purchasers were able to re-establish their regular connections abroad.

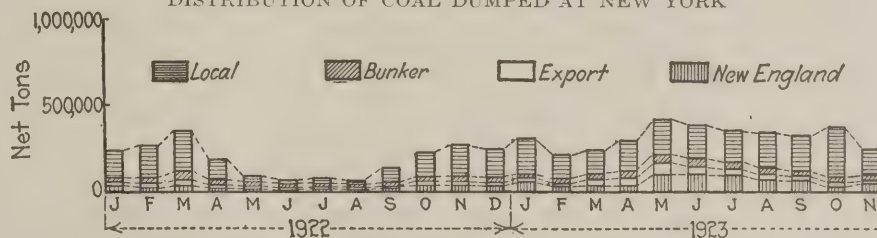
About 5,000,000 tons was exported overseas in 1923 as compared with 1,600,000 in 1922, and nearly 22,000,-

000 in the banner year of 1920, when it was thought that a strong foundation had been laid beneath our export prospects and that a considerable part of the tonnage obtained

that year would continue. The bunker business, at the ports under consideration, accounted for a dumping of nearly 5,500,000 tons last year. This was nearly 25 per cent more



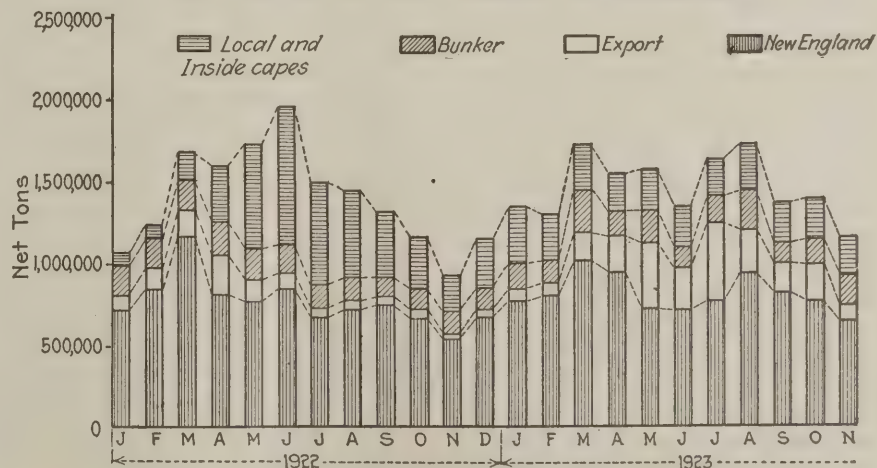
DISTRIBUTION OF COAL DUMPED AT NEW YORK



DISTRIBUTION OF COAL DUMPED AT PHILADELPHIA



DISTRIBUTION OF COAL DUMPED AT BALTIMORE



DISTRIBUTION OF COAL DUMPED AT HAMPTON ROADS

than in the previous year and may be regarded as a normal tonnage in this direction.

The coal trade felt the competition of oil first in the bunker business and over a period of years has seen one great liner after another convert to oil, with the result that the mainstay of the bunker business today is the tramp ship and older boats engaged mainly in freighting. Consequently the tonnage varies from year to year in accordance with the trend of the general export and import business of the country and to a very large extent depends upon the relative price of coal and oil, as many ship owners do not hesitate to change from one fuel to the other under favorable conditions.

Tidewater business usually is thought of in terms of the New England market and it is true, of course, especially with a light export demand, that New England is the objective of the tidewater shipper. Many of the largest consumers in New England now burn oil exclusively and in the late months of 1922 and the early part of 1923 other plants stocked up heavily with British coal, which they found satisfactory. New England in general, however, was much in need of adequate stocks of coal following the bituminous strike and throughout all of 1923 took in sufficient coal to build up reserves and provide a goodly margin of safety for the future.

13,000,000 TONS TO NEW ENGLAND

Thirteen million tons, or 35 per cent of the total tidewater tonnage, was loaded into vessels for New England destinations. Hampton Roads enjoyed the bulk of this business, 55 per cent of the dumpings of the three Hampton Roads piers being for New England account. As compared with former years New England tonnage in 1923 exceeded both 1921 and 1922. The other divisions of tidewater statistics, namely "Inside Capes" and "other tonnage" vary but slightly from year to year and may be compared in the accompanying tables.

With respect to the position of the five ports, they show about the same percentages of the total business in 1923 as in 1921. Owing to the strike in 1922, New York, Philadelphia and Baltimore, being most affected, slipped back as coal-loading ports while Hampton Roads dumped 58 per cent of the total business, but with the restoration of normal conditions in the mines the affected ports returned to their customary positions,

although it will be seen that Baltimore made a considerable gain in the past year over 1921.

Prices at loading ports throughout the year have been governed entirely

by supply and demand. At the beginning of the year there was a general shortage of railway equipment and a strong demand for coal, so that the highest prices were obtained

Destination of Bituminous Coal Shipped to Tidewater In 1923, by Months

(In Net Tons)

	NEW YORK					Total
	New England	Exports	Bunkers	Inside Capes	Other Tonnage	
January.....	135,000	.....	284,000	.....	712,000	1,131,000
February.....	134,000	1,000	226,000	.....	536,000	897,000
March.....	138,000	.....	249,000	.....	537,000	924,000
April.....	171,000	.....	230,000	.....	549,000	950,000
May.....	182,000	1,000	250,000	.....	565,000	998,000
June.....	138,000	.....	217,000	.....	503,000	858,000
July.....	120,000	1,000	247,000	.....	514,000	882,000
August.....	135,000	.....	204,000	.....	546,000	885,000
September.....	132,000	.....	236,000	.....	480,000	848,000
October.....	113,000	.....	196,000	.....	542,000	851,000
November.....	95,000	.....	186,000	.....	500,000	781,000
December.....	113,000	.....	180,000	.....	500,000	793,000
Total.....	1,606,000	3,000	2,705,000	.....	6,484,000	10,793,000

	PHILADELPHIA					Total
	New England	Exports	Bunkers	Inside Capes	Other Tonnage	
January.....	68,000	12,000	31,000	215,000	.....	326,000
February.....	41,000	9,000	30,000	143,000	.....	223,000
March.....	48,000	29,000	38,000	149,000	1,000	265,000
April.....	41,000	53,000	45,000	176,000	.....	315,000
May.....	115,000	74,000	45,000	198,000	.....	432,000
June.....	120,000	50,000	42,000	191,000	1,000	404,000
July.....	114,000	34,000	42,000	186,000	.....	376,000
August.....	85,000	26,000	53,000	198,000	.....	362,000
September.....	75,000	28,000	40,000	204,000	2,000	349,000
October.....	54,000	14,000	29,000	191,000	.....	288,000
November.....	69,000	5,000	28,000	174,000	.....	276,000
December.....	64,000	23,000	33,000	156,000	1,000	277,000
Total.....	894,000	357,000	456,000	2,181,000	5,000	3,893,000

	BALTIMORE					Total
	New England	Exports	Bunkers	Inside Capes	Other Tonnage	
January.....	146,000	5,000	30,000	174,000	14,000	369,000
February.....	99,000	10,000	21,000	129,000	8,000	267,000
March.....	105,000	111,000	28,000	145,000	1,000	390,000
April.....	82,000	248,000	42,000	163,000	3,000	538,000
May.....	114,000	329,000	65,000	180,000	9,000	697,000
June.....	178,000	339,000	55,000	180,000	1,000	753,000
July.....	98,000	275,000	48,000	131,000	3,000	555,000
August.....	75,000	106,000	32,000	140,000	5,000	358,000
September.....	80,000	65,000	31,000	132,000	4,000	312,000
October.....	85,000	48,000	19,000	144,000	3,000	299,000
November.....	70,000	63,000	21,000	120,000	4,000	278,000
December.....	70,000	31,000	28,000	121,000	2,000	252,000
Total.....	1,202,000	1,630,000	420,000	1,759,000	57,000	5,068,000

	HAMPTON ROADS					Total
	New England	Exports	Bunkers	Inside Capes	Other Tonnage	
January.....	768,000	70,000	161,000	68,000	264,000	1,331,000
February.....	795,000	78,000	129,000	68,000	218,000	1,288,000
March.....	1,039,000	232,000	168,000	71,000	203,000	1,713,000
April.....	928,000	225,000	150,000	70,000	202,000	1,543,000
May.....	718,000	405,000	182,000	32,000	219,000	1,556,000
June.....	708,000	252,000	137,000	53,000	182,000	1,332,000
July.....	756,000	481,000	163,000	40,000	176,000	1,616,000
August.....	927,000	356,000	151,000	64,000	219,000	1,717,000
September.....	813,000	176,000	123,000	21,000	227,000	1,360,000
October.....	758,000	225,000	146,000	28,000	222,000	1,379,000
November.....	632,000	151,000	140,000	25,000	197,000	1,145,000
December.....	787,000	212,000	169,000	13,000	225,000	1,406,000
Total.....	9,629,000	2,863,000	1,819,000	521,000	2,554,000	17,386,000

	CHARLESTON					Total
	New England	Exports	Bunkers	Inside Capes	Other Tonnage	
January.....	9,000	8,000	7,000	.....	8,000	32,000
February.....	16,000	8,000	6,000	.....	3,000	33,000
March.....	5,000	12,000	6,000	.....	.....	23,000
April.....	10,000	9,000	1,000	.....	.....	20,000
May.....	.....	38,000	5,000	.....	5,000	48,000
June.....	.....	31,000	2,000	.....	.....	33,000
July.....	.....	18,000	1,000	.....	.....	19,000
August.....	.....	27,000	2,000	.....	4,000	33,000
September.....	.....	35,000	2,000	.....	.....	37,000
October.....	.....	21,000	1,000	.....	1,000	23,000
November.....	3,000	37,000	3,000	.....	1,000	44,000
December.....	.....	25,000	3,000	.....	1,000	29,000
Total.....	43,000	269,000	39,000	.....	23,000	374,000

	ALL PORTS					Total
	New England	Exports	Bunkers	Inside Capes	Other Tonnage	
January.....	1,126,000	95,000	513,000	457,000	998,000	3,189,000
February.....	1,085,000	106,000	412,000	340,000	765,000	2,708,000
March.....	1,335,000	384,000	489,000	365,000	742,000	3,315,000
April.....	1,232,000	535,000	468,000	377,000	754,000	3,366,000
May.....	1,129,000	847,000	547,000	410,000	798,000	3,731,000
June.....	1,143,000	672,000	453,000	424,000	688,000	3,380,000
July.....	1,088,000	809,000	501,000	357,000	693,000	3,448,000
August.....	1,222,000	515,000	442,000	402,000	774,000	3,355,000
September.....	1,100,000	304,000	432,000	357,000	713,000	2,906,000
October.....	1,010,000	308,000	391,000	363,000	768,000	2,840,000
November.....	869,000	256,000	378,000	319,000	702,000	2,524,000
December.....	1,034,000	291,000	413,000	290,000	729,000	2,757,000
Total.....	13,374,000	5,122,000	5,442,000	4,460,000	9,123,000	37,521,000
Per Cent.....	35	14	14	12	24	

in the early months. As railway service improved and coal became more plentiful at the piers, prices steadily declined from month to month until coal could be bought in the late autumn and early winter at a price below the cost of production. As a result, many mines which ship to tidewater have closed down.

At the beginning of the new year the tidewater shipper is confronted with heavy stocks of coal in New

England and along the coast, and with continued inroads of oil fuel everywhere in his accustomed markets at home he realizes that he must turn to new territory. This means export markets, and if he cannot enter these markets at even present below-cost prices, some help will have to come from the other end of the coal business—the railroad people—in the form of lowered transportation charges on export coal.

No Adjustment of Northwest Freight Rates Despite Hullabaloo

Flood of Complaints Anent Alleged Inequalities Brings About Only Trifling Changes—Examiner's Report Favors Docks Over Rail Shippers—Protest Delays Effective Order

A GREAT hullabaloo about freight rates offered some serious diversion from the business of competing for markets in the Northwest in 1923. No adjustments were made during the year however. The docks made a struggle to get either a reduction of their own rates inland or an increase in competing rail rates. Following the filing of a complaint with the Interstate Commerce Commission for such relief, all the other factions interested in Northwest trade hurried to file counter complaints so that the Commission consolidated five of them and heard them together in six busy days beginning May 2.

The first complaint was I.C.C. Docket 14,476, by the Northwest Dock Operators' Association, attacking past adjustments of rates from Illinois (more particularly from southern Illinois, whose competition was most keenly felt) to points in Iowa, Minnesota and the Dakotas as being unreasonable. The rate on lump is \$3.47 and on fine coal \$3.29. The second complaint was I.C.C. Docket 14,622, by the South Dakota Board of Railroad Commissioners, seeking lower rates on South Dakota fine coal into various regions. The third was I.C.C. Docket 14,533, by the Sioux City (Ia.) Chamber of Commerce, asking lower rates to that city both from Duluth and from Illinois. The fourth was I.C.C. Docket 14,477, by the C. Reiss Coal Co., asking, for the benefit of the Lake Michigan docks, that the Holmes and Hallowell scale be applied to Illinois coal meeting Michigan dock coal within the State of Michigan. The fifth was I.C.C. Docket 14,142, in which Illinois, through the

Illinois Traffic Bureau, asked for the adjustment of inequalities in rates to local stations from Lake Michigan docks and from northern Illinois.

The dock operators, in their attack on Illinois rates to the Northwest, pointed out that since 1917 the commission had increased rail-lake-rail coal rates \$1.74 while increasing Illinois and Indiana rates only \$1.17 to the same territory. It was their principal argument. Wayne Ellis, the new secretary of the dock association, surprised the rail men with the brevity of his argument, which consisted mainly of placing in the commission's hands a mass of records supporting a case based upon the theory of rate making adopted by the commission in its own decision on cement rates. The main Illinois contention was that the rates in existence are so high now as not to give Illinois producers an equal chance at Northwestern markets.

Dock interests said they hoped for a change in rates to be made before the end of the 1923 season, record breaking though such speed would be. As a matter of fact an examiner's report was filed in the autumn recommending in effect that very little change should be made in the rate fabric as between Northwestern docks and Illinois and as between Lake Michigan docks and inland points, but it was greeted only by protests from all hands, which were formally filed. Up to the end of 1923 no further definite action had been taken by the commission. All sorts of pressure was exerted by North Dakota to obtain a more favorable rate for its lignite, but that, too, remains in abeyance.

In general, the docks interests

were favored over rail shippers in Examiner C. I. Kephart's report, filed Aug. 3, but which has been protested and has not been ordered into effect. The recommendations begin with one that would reduce rates on coal going off the Lake Superior docks 10c. a ton on short distances up to 35 miles, and ranging down to 1c. on distances up to 350 miles. Rates from Lake Superior docks to certain points in northern Iowa would be reduced 17 and 18c. Rates from both docks and Illinois to Sioux City would be reduced in varying amounts from 22 to 36c.

Rates from Lake Michigan docks to points in South Dakota would be reduced amounts ranging from 38c. at Chamberlain to \$2 at Rapid City. The relation between rates from the various Lake Michigan docks into Wisconsin would not be disturbed. The Commissioner found, however, that the rates from southern Illinois and Lake Michigan docks to Wisconsin points are unduly prejudicial to dock shippers and preferential to shippers in southern Illinois in small accounts.

Another diversion was the assault which the Federal Trade Commission made upon the Northwest Dock Operators' Association. Late in April this commission formally cited the association for conspiracy to suppress competition and create a monopoly in the sale of anthracite and bituminous coal at wholesale and retail in the Northwestern territory. The complaint alleged both violation of the Federal Trade Commission Act by reason of unfair competition and the Clayton Act by price discrimination.

The charges included these: Comparing price lists and agreeing upon them before making them public; blacklisting retailers; selling coal in the Twin Cities, which is keenly competitive territory, at prices less than those charged for the same coal in Duluth; undercutting competitors to force them to join the association; compelling purchasers to use their coal only for purposes outlined in the contract; declining to take certain municipal business so that local retailers might have it; refusing to sell coal to dealers not possessing the usual yard equipment.

The dock association, of course, denied undue price fixing, efforts to restrain trade and create a monopoly and everything else illegal. The case dragged along through the late summer and autumn with no decision by the end of the year.

Spot Coal Prices for 18 Years: What They Reveal

Violent Fluctuations of Post-War Days in Striking Contrast with Preceding Decade—Business Prosperity and Depression Reflected—Car Shortages, Strikes and Threats of Suspension in Evidence

BY F. G. TRYON AND W. F. MCKENNEY*

READERS of *Coal Age* have learned to use and to value the index of spot prices of bituminous coal developed by the present editor of the paper. The principal landmarks of the curve of spot price appearing weekly in the market review—the sudden rise in 1916, the peak of early 1917, the plateau that marks the Fuel Administration's maximum price, the extraordinary peak of 1920, the depression of 1921, and the secondary peak of the strike year 1922—all these are familiar to students of the coal trade.

In fact, to a great many people—perhaps to the average citizen—these violent fluctuations in price, particularly the peaks of 1917, 1920 and 1922, typify the whole coal industry. Consumers are inclined to judge the industry by what has happened since 1916, ignoring the decade of uneventful history before. To do so, however, may give quite a misleading impression both as to the stability of the industry and the profits of the owners, and also as to the outlook for changes in price.

It is, therefore, of more than merely curious interest to trace the course of spot prices into the pre-war days, which we still think of as "normal," whatever that may mean. A recent study made by the Geological Survey, in co-operation with the President's Conference on Unemployment, has pieced together the best available information and carried the record of monthly spot prices back to 1906. The results are shown in diagram 1.

The diagram reveals at once an extraordinary difference in the course of prices before and after 1916. It is not merely that the war has raised prices to an entirely new level—a new tableland, as it were, the low points of which are practically twice as high as the old level—the notable thing is rather that the shape of the curve has changed. The extraordinary peaks and valleys of the post-war curve are conspicuously absent in the years preceding 1916.

That the coal market was subjected to the play of disturbing factors in those days is indicated by the notations in the upper part of the diagram, which explain the ups and downs of the curve. The alternating prosperity and depression of the business cycle affected spot prices then as now, but not, perhaps, in the same degree. Thus the financial panic of late 1907 was shortly reflected in a decline in the price of coal, and the price remained relatively depressed during the dull year

increase, as will be seen from the curve, but the increase, which reached a maximum in the early autumn of 1907, did not exceed 20c. a ton, an amount that would hardly be noticed in such a car shortage as occurred in 1917 or 1920.

Strikes occurred in the pre-war period, and they left their mark on the spot price. Suspension, or the threat of a suspension, caused a peak in the price in the early part of the "even" years 1906, 1910 and 1912. Here again the increase in price looks negligible alongside the increase, let us say, of 1922. Yet some of these pre-war suspensions were formidable demonstrations of the strength of the union. Thus in 1906, 44 per cent of the bituminous miners were out on strike. The total number of man days lost was 13,000,000, and in some districts the men were out for three months.

Again in 1910, the mines in Illinois and the Southwest Interstate region were closed practically five months, yet the increase in average spot price was only 19c. a ton over the year preceding. The sharpest little peak of the pre-war period occurred in early 1912, when the usual threat of a suspension of bituminous mining was reinforced by a stoppage in the anthracite region and by a sudden demand at tidewater, associated with a strike of the British miners. Even this combination of causes produced an increase in the average price for the country of but 60c. a ton over the year preceding, an increase which disappeared within two months.

Why was it, it may be asked, that the same kinds of causes which have produced the violent explosions in prices since the war—failures of labor supply, of transportation, or of both—produced such comparatively slight effects before the war? The answer is: (1) That strikes closed a smaller percentage of the total capacity of the country then than now; and (2) that the reserve power of the railroads to make up for a shortage of coal when it arose was greater then than now. Whereas a general strike order in 1919 could

Monthly Average Spot Price of Bituminous Coal, F.o.b. Mines, 1906 to 1912

(In dollars per net ton)

	1906	1907	1908	1909	1910	1911	1912
January.....	1.10	1.28	1.09	1.06	1.24	1.16	1.14
February.....	1.09	1.21	1.07	1.05	1.23	1.11	1.22
March.....	1.27	1.14	1.05	1.04	1.25	1.08	1.64
April.....	1.46	1.12	1.05	1.05	1.26	1.06	1.30
May.....	1.21	1.11	1.03	1.03	1.19	1.05	1.11
June.....	1.14	1.10	1.03	1.02	1.18	1.05	1.09
July.....	1.06	1.10	1.02	1.00	1.18	1.03	1.04
August.....	1.11	1.13	1.04	1.00	1.20	1.02	1.05
September.....	1.15	1.20	1.06	1.01	1.32	1.03	1.09
October.....	1.29	1.30	1.05	1.04	1.27	1.04	1.21
November.....	1.30	1.29	1.05	1.09	1.23	1.09	1.30
December.....	1.32	1.15	1.04	1.09	1.22	1.09	1.29

These figures have been compiled as nearly as the records permit in the same way as C. E. Leshner's average spot price of bituminous coal, first published in the U. S. Geological Survey's "Prices of Coal and Coke, 1913-1918," and since carried forward in *Coal Age*. They represent average of trade journal quotations for twelve coals representing the great bulk of the production, weighted first with respect to the proportions each of slack, prepared, and run-of-mine normally shipped, and second with respect to the tonnage of each normally produced. Data subject to revision.

1908 and the opening months of 1909, to recover in the autumn of that year with the revival of business. Much the same change in spot price accompanied the financial depression which began in the closing months of 1913 and continued through 1914 and the first half of 1915. But the changes accompanying these depressions amounted to only a few cents a ton between high and low changes that seem insignificant alongside of the contrast between the boom of 1920 and the slump of 1921.

Nor were car shortages wanting in those days, though it is clear that they were less frequent and less acute than now. In the business boom of late 1906 and 1907 occurred a rather notable congestion of the railroads, which caused much comment at the time. The spot price did

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and did close 72 per cent of the capacity of the bituminous mines, a general strike in 1913 would have closed but 59 per cent of the capacity. Moreover, in the pre-war suspensions, it seldom happened that the entire membership of the union was called out. Usually some of the organized districts outside the Central Competitive Field stayed at work. With the supplies of non-union coal relatively greater than now, and with the railroads able to make up more speedily a deficit in coal supply when the strike was over, the increase in price attending these general suspensions was singularly small.

The data used in plotting diagram 1 for the period 1913 to 1923, are C. E. Leshner's "Average Spot Price on Fourteen Coals," weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each coal normally produced. The figures for 1906 to 1912 here shown have been assembled as near as possible in the same way. Quotations from the *Black Diamond*, the *Coal Trade Journal* and other sources have been pieced together and averaged with the same weights used by Mr. Leshner for the later years.

For twelve of the fourteen coals in the *Coal Age* Index it was possible to obtain quotations back to

1906 from one source or another. For two of the coals used by Mr. Leshner, the present writers could find no quotations; these two are eastern and western Kentucky. An attempt was made to procure records of spot prices actually received by large producing companies that were in business throughout this period, but no company was found that could make accurate separation of its spot and contract sales realizations for the period in question. The quotations become less and less satisfactory as the reader goes back into the earlier trade journals, and no journal seems to have made it a regular practice to report prices until about 1905. Naturally the accuracy of quotations for a given market varied with the care and skill of the correspondent in that market, and not all the quotations appeared trustworthy.

The coals selected for the group of twelve were the ones which appeared to be most accurately quoted, yet even here there apparently are discrepancies revealed by comparison of the quotations for one coal with others, and a considerable number of omissions. Where necessary interpolation was made in order to complete the string of quotations. Because of these possibilities of error, the figures are subject to revision, but it is not likely that they will be seriously changed.

The curve for the country as a whole, is, of course, a composite of local conditions that may vary widely. To throw light on these local differences we have charted typical coals from the Middle West, the district shipping to the Lakes, and the districts serving tidewater. These diagrams (2, 3 and 4) are drawn to a larger scale in order to bring out more clearly the fluctuations in price, and they show what was happening to spot prices from 1906 up to the latter half of 1916, when the war boom sent prices soaring upward beyond the limits of the scale here used. The diagrams are arranged one above the other, so that changes for one group of coals can be compared with those for another during the same period.

The curves represent weighted averages of the quotations for run-of-mine, prepared sizes and screenings, the weight used being the relative proportions of these sizes shipped in 1917.

The two Midwestern coals—Carterville and Franklin and Clinton—both quoted in the Chicago market, are dominated by the biennial suspension. They reached their highest point in 1910, when Clinton was quoted in one month at something over \$2 a ton. The suspension of 1910 centered in the Mississippi valley, and the Eastern fields—Ohio and Pennsylvania—resumed opera-

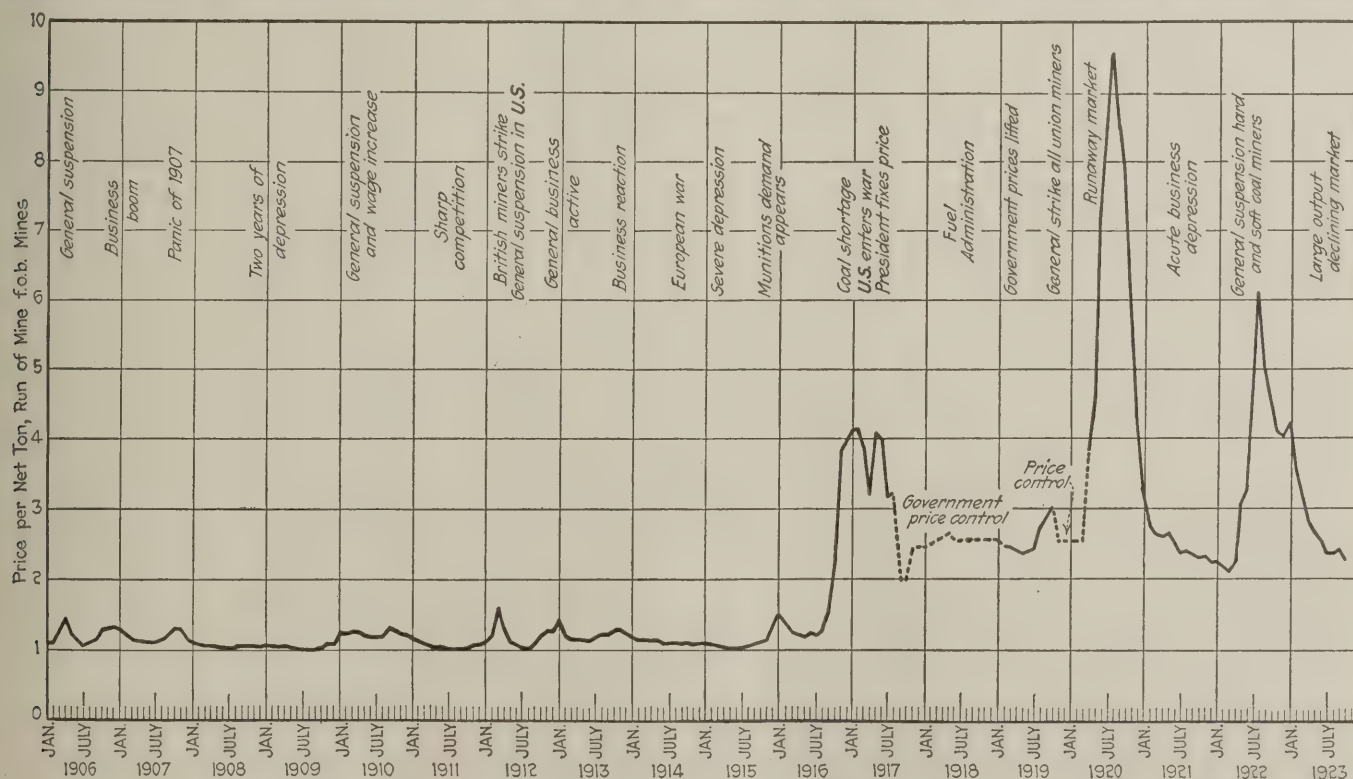


Diagram 1—Monthly Average Spot Prices of Bituminous Coal, F.o.b. Mines

The course of coal prices shown in this diagram is an epitome of coal for 18 years.

tions fairly early. Therefore, while these high prices were recorded for Indiana and Illinois coals, shippers from the Hocking and Kanawha fields reported a relatively small advance in price. Even quotations for

smokeless-coal on the Chicago market did not rise any higher than \$1.31 f.o.b. mine for run-of-mine. In fact the Hocking and Kanawha prices are the steadiest of those showing great disturbance only in

1906 and 1907—the first year because of the suspension which closed union mines in the East, the second year, apparently because of the traffic jam connected with the boom times of that period.

Diagram 4 represents two smokeless coals. The quotations for Pocahontas and New River up to 1912 inclusive represent prices in the Chicago market. Thereafter they represent the price in the Boston market. The quotations for Somerset are partly for the New York market and partly for Boston. The fact that the Pocahontas quotations represent prices for inland delivery and the Somerset quotations prices for tidewater delivery, explains in part the discordances between the two curves in the years 1906 to 1912.

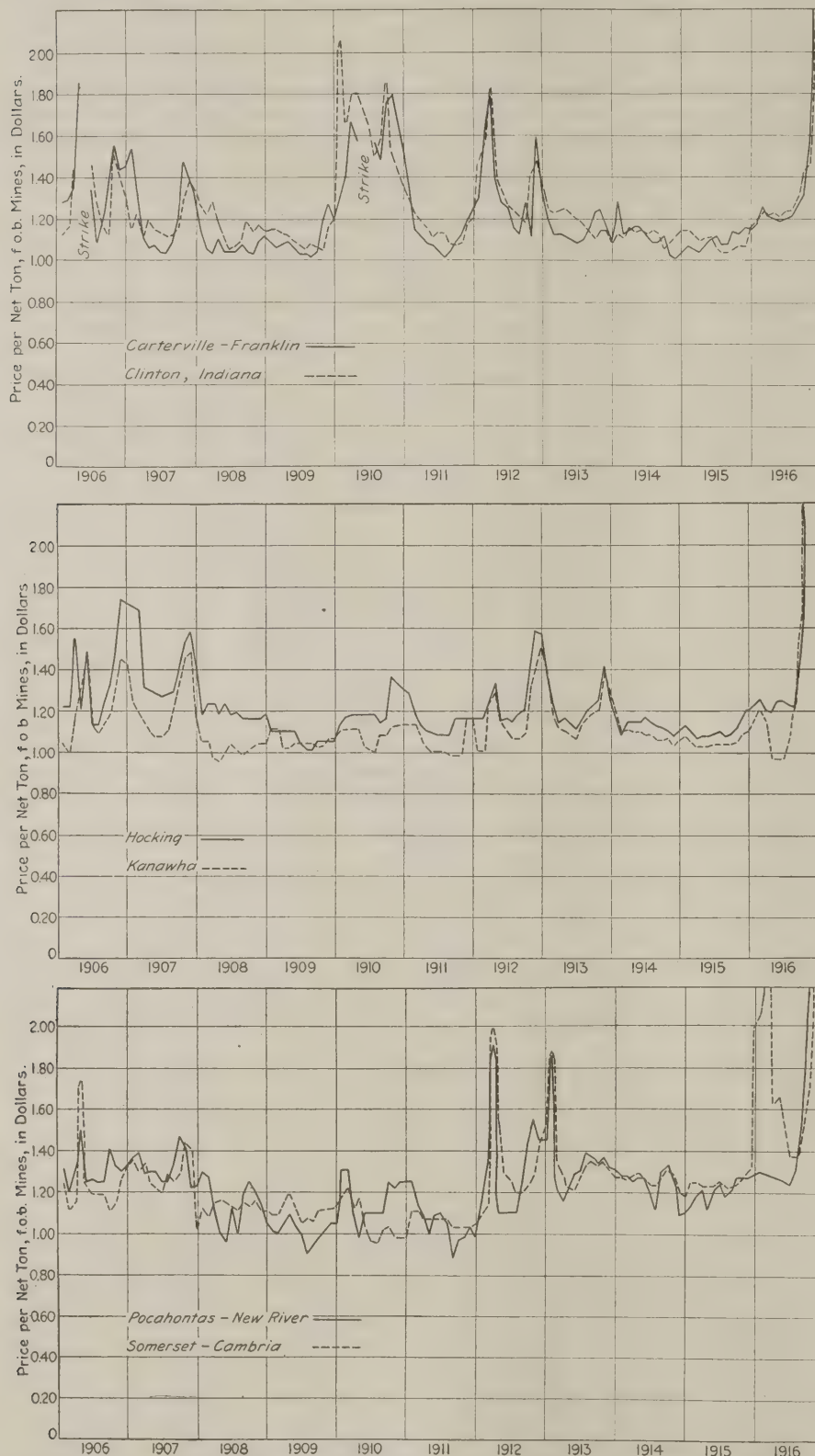
The price of Pocahontas should be the most sensitive of all the coals, because the demand for it is so diversified, and because it participates in both the tidewater and the interior trade. Careful study of the Pocahontas curve does show that it responds more quickly than any of the others to changes in the general tone of business and that it registers both the periodic strikes of the interior and the changes of the tidewater market. The sharpest peak in the smokeless prices, it will be noticed, occurs in March, 1912. It is a composite of three disturbing factors, (1) the regular biennial suspension anticipated for the bituminous fields; (2) the stoppage of anthracite mining at the expiration of the anthracite wage agreement; and (3) and perhaps most important, a strike of the British miners, which created a sudden vacuum in supplies of bunker coal at our North Atlantic ports.

These prices are of course spot, or open market, quotations and they do not reflect the amount of profit received by the operator. They are weighted down by the volume of contract business which continues to move as usual at customary prices. That the ups and downs of the spot market had relatively little effect on the average receipts of the substantial companies is shown by the figures of average sales realization on both spot and contract business which follow:

Average Sales Realization on all Bituminous Coal Produced, 1906-1922

(As reported to the U. S. Geological Survey)

1906.....	\$1.11	1912.....	\$1.15	1918.....	\$2.58
1907.....	1.14	1913.....	1.18	1919.....	2.49
1908.....	1.12	1914.....	1.17	1920.....	3.75
1909.....	1.07	1915.....	1.13	1921.....	2.89
1910.....	1.12	1916.....	1.32	1922.....	3.02
1911.....	1.11	1917.....	2.26		



Diagrams 2, 3, 4—Pre-War Variations in the Spot Prices of Bituminous Coal

The six coals for which price fluctuations for eleven pre-war years are shown in these diagrams are representative of the three largest soft-coal areas—the Middle West, the Eastern high-volatile and Eastern low-volatile fields. By comparing one with another, it will be noticed how little the Illinois strike of 1910 affected the Eastern coals, but how the boom in smokeless coal prices in 1912, following the British strike of that year, was reflected in the West. At the end of 1916 the prices of all these coals hit the sky and went beyond the scales on these diagrams.

Coal Freight-Rate Decisions Made and Pending Point Path to Normality

In Disposing of Complaints This Year Interstate Commerce Commission Probably Will Pass on Rate Structure of Most of the Country—Relationships Between Origin Districts Most at Issue

BY WAYNE P. ELLIS

IF THE history of soft-coal production in 1923 spells "nothing else but," it has forcefully confirmed the oft-repeated statement of the operator that, given transportation service of 100 per cent at the mines, the normal competitive forces of supply and demand will set at rest most of the ills of the coal industry. But, without straying further into conjecture, many facts indicate that that elusive bird called "normal" has had the adaged sprinkling of salt on its tail and should soon be in captivity. One of the indications is the large number of decisions rendered and complaints pending before the Interstate Commerce Commission involving freight rates on coal. When these complaints are finally disposed of, as may be expected by the end of 1924, that body will have passed upon the present coal-rate structure of the country, with the possible exception of the Far West and the Southeast.

The complaints now pending have to do for the most part with relationships between origin districts. They are an indicator of normality because they show that the coal-shipping and consuming public, which took without much open discussion all that was put on its head in the way of increased freight rates during and since the war, is now relieving itself of pentup grievances.

Freight rates on coal are now about 75 per cent above the levels on Jan. 1, 1917. Prior to that date there had been little change for fifteen years. In the pre-war period the soft-coal business of the country developed under a general freight-rate structure of established fixed differentials between grouped points of origin to grouped points of destination. By reason of the method by which the general advances in rates were applied to coal, the rates from these coal fields in closer proximity to the consuming markets were advanced a larger percentage than the more distant fields. The question before the Interstate Commerce Commission is broadly

whether or not the larger percentage advances from the short-haul fields should be reduced or the smaller percentage advances from the long-haul fields should be increased.

Many arguments have been advanced by the contending parties on both sides. These contentions have been set forth so well in the decision of the Interstate Commerce Commission in what is known as the Ohio-Michigan Coal Cases (reported in 80 I. C. C. Reports, page 663) and the decision is so important as bearing upon the thought of the commission in disposing of similar complaints now before it, that the following brief résumé of that portion of the decision bearing upon the issue of relationship is offered.

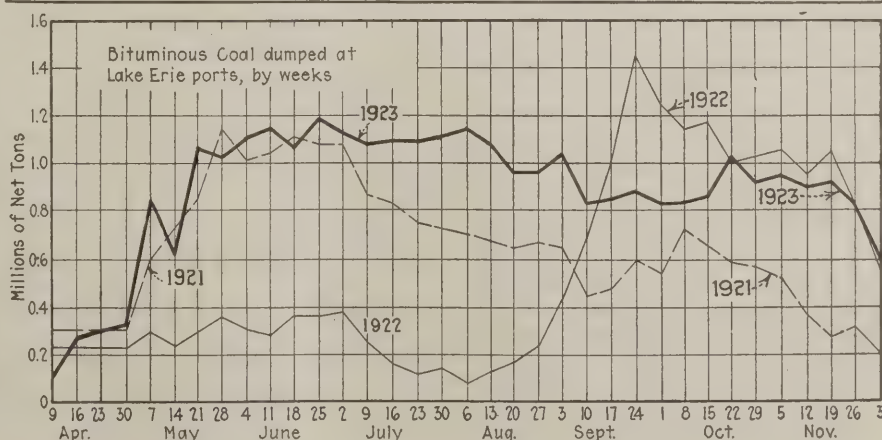
On that phase the commission was not called upon to decide the reasonableness of the rates, as there was no such allegation in the complaint. It was necessary, however, for it to determine, under the express terms of the Transportation Act of 1920, the effect of any change in the situation upon carrier revenues, and decide upon a basis that would not impair railroad earnings. As the decision states, "Stripped of surplusage, the naked issue presented by the pleadings and evidence is this: Have the increases made since the original decision disturbed the relationship under the differential there prescribed so as to bring about undue prejudice to complainant and

undue preference of the Crescent Coal fields?"

The original decision referred to was in the case known as Bituminous Coal to C. F. A. Territory (I. & S. Docket 774, reported in 46 I. C. C. Reports, page 66), in which the differential from the Pittsburgh, Connellsville Fairmont, southern West Virginia and eastern Kentucky high-volatile coal fields—that is, the Inner Crescent group—over Ohio districts to affected territory was ordered to be increased from 25c. per ton to 40c. per ton. Affected territory may be generally described as comprising northwestern Ohio, northern Indiana (excluding the Chicago district) and the Lower Peninsula of Michigan. The same territory is covered in the order of the commission in the Ohio-Michigan cases.

The commission's decision summed up the evidence of the complainant (the Southern Ohio Coal Exchange) in two propositions, as follows: "(a) That the differentials here in issue were fixed when the rates were substantially lower than at present, that the relationship has been destroyed by the various increases since made, and that under existing rates greater differentials in favor of southern Ohio should be established to restore the proper relationship; and (b) that southern Ohio is entitled to greater differential because of its proximity to consuming points in central territory."

Before taking up these proposi-



AVERAGE OF COAL RATES TO THIRTEEN POINTS IN THE CENTRAL MARKETS, IN CENTS PER TON								
Origin Groups	1917 Rates Prior to (1)	I.&S. 774 (2)	Rates after Decision in I.&S. 774 (a) (3)	June, 1922 Rates Prior to 10 Per Cent Reduction (4)	Rates Proposed by Complainant in Ohio-Mich. Case (5)	July 1, 1922 Rates Resulting from 10 Per Cent Reduction (6)	Rates Pro- posed by Complainant in Ohio-Mich. Case Less 10 Per Cent Reduction (7)	Sept. 27, 1923 Rates Resulting from Order Ohio-Mich. Case (8)
Ohio		143	143	292	263	259	237	249
Inner Crescent		168	183	332	337	299	303	299
Outer Crescent		187	202	351	372	318	335	323

(a) These rates did not actually become effective as the 15c. per ton advance authorized in all coal rates by the Interstate Commerce Commission was added at the same time, making the actual rates 158, 198 and 217 respectively.

tions, and in order to portray the situation more effectively, the accompanying table is given containing the average rates in effect to thirteen representative points in affected territory from the three general origin groups.

Under proposition (a), the complainant requested the Interstate Commerce Commission to establish the rates shown in column 5 in the table. These proposed rates were arrived at by using the rates approved in docket I. & S. 774 from Ohio (the average is shown in column 3) as a basis; adding to such base 15c. under Ex Parte 57 (The 15 Per Cent Case), 30c. under General Order 28, and 40 per cent under Ex-Parte 74 (Increased Rates, 1920). The method produces the average rate of 263 from Ohio, as shown in column 5 in the table, which is approximately 184 per cent of the base. The proposed rates from the Inner and Outer Crescent were then arrived at by increasing the rates shown in column 3 by 84 per cent, the same as the Ohio rate. Column 7 shows what these proposed average rates would have been after the 10 per cent general reduction in rates on July 1, 1922.

The principal reason given by the complainant for approval of these proposed rates was the fact that increased operating costs had brought about the general increases in rates since 1917, and contended that the manner in which the increases were applied "cast a greater portion of the burden of the increased costs on the coal traffic from Ohio than on that from the Crescents."

The commission rejected this contention; first, because it had, in a number of cases previously decided, refused to change coal-rate differentials on that ground; and second, because fixed differentials on coal are the rule and "stabilize rate relationships between competing producing points or markets," which is important in a "highly competitive commodity like coal."

From a careful reading of the

decision, it must be concluded that the commission arrived at the opinion that the differentials should be widened because of proposition (b). The decision states that "upon this record we are of the opinion that the southern Ohio districts are not now enjoying the full advantage of their location with respect to the markets in affected territory." Distance (plus perhaps other handicaps of lesser importance) appears to have been the principal factor considered by the commission in arriving at the conclusion to increase the differential.

No finding was made as to rates to non-affected territory. The opinion states that the carriers would "be expected to make such readjustment of their rates to that territory as may be necessary to bring them into harmony with the readjustment of rates" required to affected territory. As a result the carriers have made readjustments to part of the non-affected territory.

Two significant factors should be noted in connection with this decision: (1) that the commission reiterates its belief in the justice of the group principle of making coal rates; (2) that while all eleven commissioners agreed that the differential should be increased, five of them believed it should have been made larger.

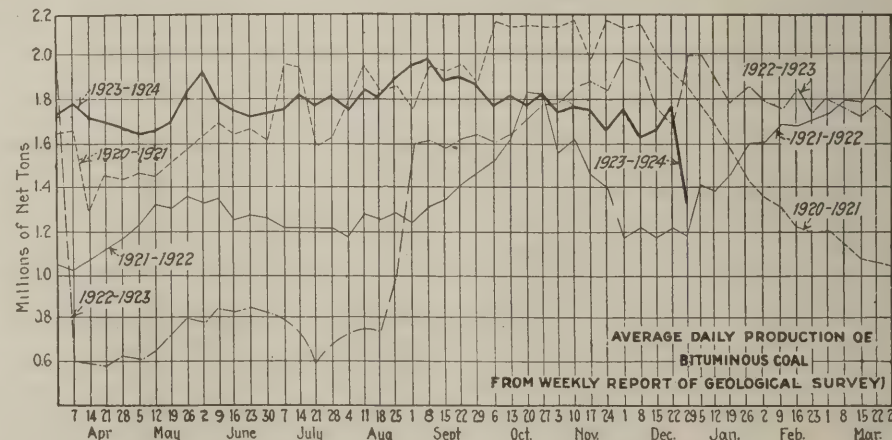
Whatever significance may be attached to the decision in the Ohio-

Michigan cases affecting the differentials between the Ohio and Crescent fields as indicating what action the commission may take in similar cases now pending before it, it must be borne in mind that each case will be decided on its merit on the record that is made in each case and in accordance with the particular circumstances and conditions which surround the movement of coal from the districts involved. The long-haul districts took heart after the decision of the commission in the Illinois coal cases, 1920, wherein they ordered the restoration of the 70c. differential between northern and southern Illinois. In the Ohio-Michigan cases it has made a different decision, but in each case it must be concluded that the commission arrived at its opinion from the facts as made of record.

It cannot, therefore, be prophesied what action will be taken by the commission in particular cases involving the same factors as was presented to it in the Ohio-Michigan case on the question of relationship or differentials between the fields.

Empties Thirty-five Cars At One Time

A rotary car dump just installed at the Colonial No. 3 Mine, of the H. C. Frick Coke Co., is 400 ft. long and dumps a trip of thirty-five cars at one time. It is more than twice as large as any other equipment of this type heretofore built. It is similar in construction to the 26-car dump built for the Snowden Coke Co., at Brownsville, Pa., but that is only 120 ft. long. The net load of coal discharged every time the car dumper turns over will be from 130 to 150 tons. The weight of the empty cars will be approximately 50 per cent of this load, or 60 tons. The car dump itself weighs about 150 tons, making a total weight of 360 tons. The constructors are the Car-Dumper & Equipment Co.



MARKET REVIEWS

Markets and Production in 1923 and Forecasts by Our Correspondents in Leading Coal Fields—Diagrams and Tables of Spot Prices of Coal and Operating Records of Producing Districts

"Battle of the Century" Is Fought in Northwest With Big Flow of Coal

Lake Traffic Gets About 32,000,000 Tons During 1923, Which Exceeds Boom Year, 1918, by Nearly 3,000,000 Tons—Throat-Cutting Competition Runs Through Season

THE battle of the century" was fought all over the Northwest during 1923. Dock armies and rail armies marched and countermarched back and forth and up and down Minnesota, Wisconsin, Iowa and the Dakotas, fighting for the complacent coal trade of those states. In the dock forces there were armies within armies. In the rail forces there were all sorts of separate and detached maneuvers. And outside of the regular forces of both there were guerilla actions galore.

As a result of the whole campaign the Northwest got cheaper coal than it has had for years. It got all it wanted and a good deal more. The fighting for the privilege of supplying this coal was so bitter that coal traders' margins narrowed down to little or nothing. At the end of the year the various armies were almost in a state of collapse from forced fighting on empty stomachs while the consumers of the Northwest were literally stuffed with good coal and the docks were loaded to the rims.

Never before had there been a Lake movement of 32,000,000 tons. The biggest previous season of Lake coal shipping was 1918, with 29,388,000 tons. The month of November alone was the greatest November bar one. In November, 1922, the wild rush to get post-strike coal to a famishing Northwest took a total of 4,008,000 tons off the Lake Erie dumping points and sent it up-Lake. In 1921, which was not the worst year in history, the month's total was barely 1,500,000 tons. But in November, 1923, the total reached 3,735,000 tons!

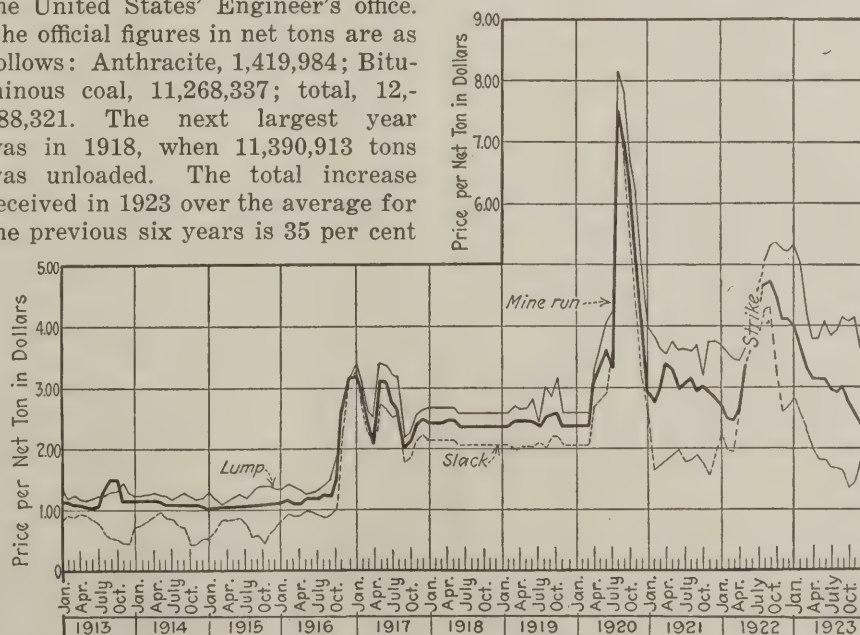
A few more statistics as of Dec. 1, 1923, show that the season up to that date was about 72 per cent ahead of 1922 and approximately 44 per cent ahead of the season of 1921. Navigation, which had opened May 1, closed officially on Dec. 12, when insurance rates went off, but a good deal of coal reached the north docks in those twelve days, and in the mild weather which followed in the next few days a few more dribbles of fuel tied up alongside, waiting for a chance to unload.

The heaviest receipts of coal yet recorded at the Head of the Lakes in any one year were unloaded at Duluth in 1923, according to the final official figures of receipts given out by the United States' Engineer's office. The official figures in net tons are as follows: Anthracite, 1,419,984; Bituminous coal, 11,268,337; total, 12,688,321. The next largest year was in 1918, when 11,390,913 tons was unloaded. The total increase received in 1923 over the average for the previous six years is 35 per cent

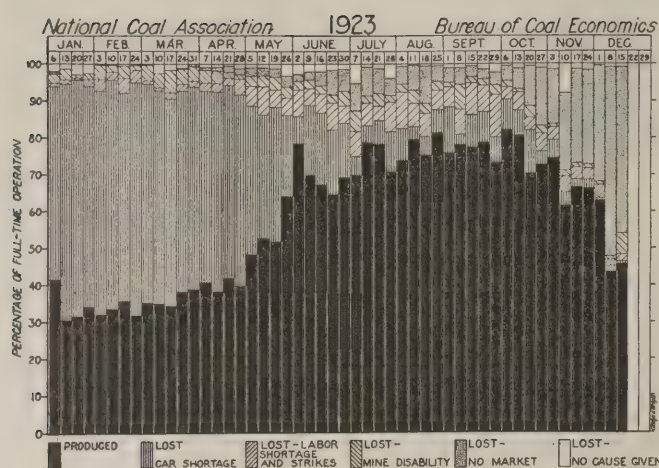
or 3,316,749 tons. The season extended from May 5 to Dec. 10. The total number of cargoes was 1,441. Largest day's receipts was on May 5 when 28 cargoes aggregating 266,686 tons, were received.

Receipts by vessel at Milwaukee did not exceed those of 1918, as did the receipts of most lake ports. However, plenty of coal reached the docks of that city. Vessels brought 3,233,122 tons, the largest volume since 1918, when 3,446,000 tons arrived. Most other upper Lake docks had received more than in any other year, by the time vessel movement came to an end.

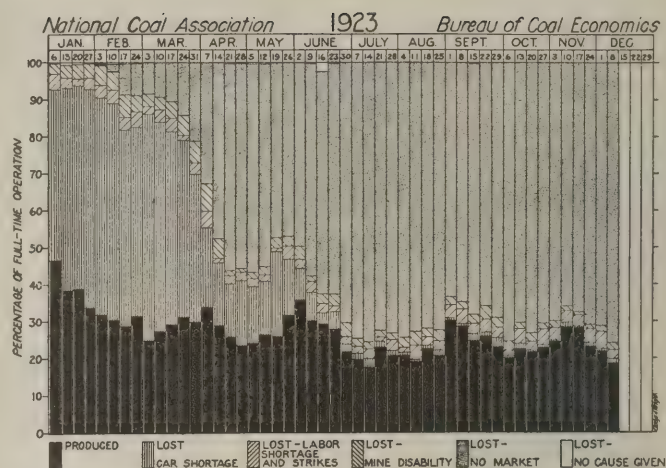
But the battle for markets did not end then. There could be no ar-



SPOT PRICES F.O.B. MINES ON THE CHICAGO MARKET OF COAL FROM SOUTHERN ILLINOIS



Northern and Central Ohio Districts



Southern Ohio District

PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

mistice in such a war. Blood had been shed, so to speak, in great volume all season, rules of fighting had early been scrapped and there was no insurance to go off Dec. 12 for salesmen, or any other hindrance to the tooth-and-nail struggle to sell. Movement off the docks was considerably reduced during December, as was movement into the Northwest by rail, indicating that the country was sated for the time being, but coal in abundance was easily at hand ready for delivery.

The facts are, the dock operators, figuring on a countrywide strike in the union fields next April, are stocked with cheap coal and ready to profit by it. It is estimated there will be 6,000,000 tons of Eastern bituminous on the docks April 1. This carry-over, the biggest ever, much of it sewed up at the ridiculously low prices of the late summer and autumn, may enable the docks to recoup all the losses so many of them suffered in the price-cutting campaign they ran all through the autumn against themselves and against Illinois, Indiana and Kentucky rail shippers. At Duluth-Superior alone on Dec. 1 there were free stocks totaling 5,875,000 tons of bituminous coal. Other docks were equally well stocked.

Just how the docks and rails

divided the Northwestern market during the year is difficult to say. The battle line wavered back and forth often and widely between the rail coal assaulting from the south and the Lake coal counter-attacking from the north and east, with a flank turning movement executed every now and then by Dakota lignite from the west. That particular lignite doubled in production over average previous years, so the total of it in the market was approximately 3,000,000 tons.

Illinois and Indiana shippers vary in their estimates of the volume of coal from those states that went into the Northwestern trade, but the consensus is that the total is about the same as in recent years. The realization, however, is much less. It has been so much less, in fact, that a few of the Midwestern producers most fortunately situated as to outlet into sections other than the Northwest largely withdrew from the territory, centering their attention upon regions where competition was less ruinous.

The price of Illinois and Indiana coal going north ranged far downward from even so low a level as that of 1921, when industrial stagnation kept the country's total coal

Spot Prices, F.o.b. Mines, of Bituminous Coal, Central Illinois, 1923

CHICAGO (ILL.) MARKET

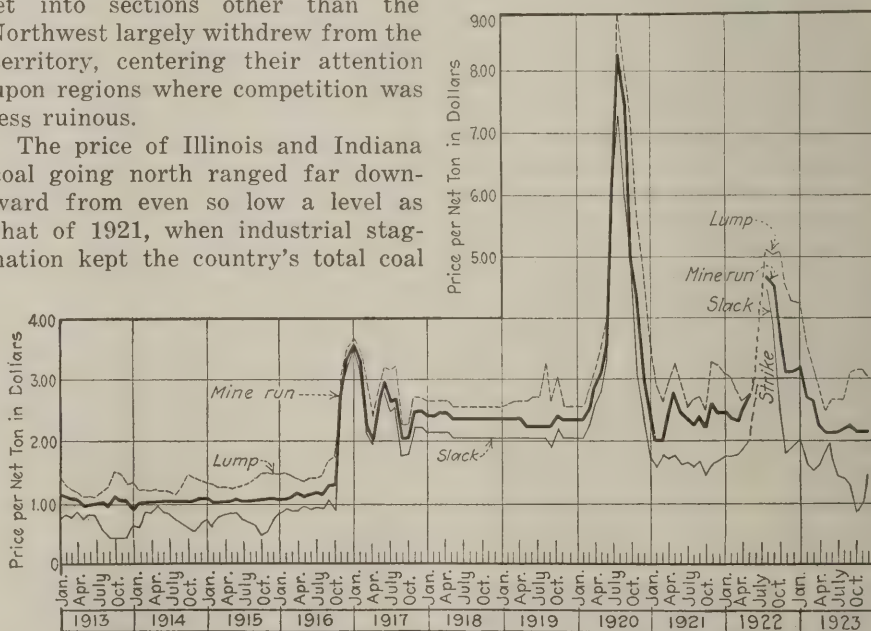
	Lump	Mine-Run	Screenings
January.....	\$4.23	\$3.18	\$2.01
February.....	3.54	2.69	1.63
March.....	3.19	2.63	1.50
April.....	2.82	2.23	1.60
May.....	2.47	2.13	1.81
June.....	2.63	2.13	1.69
July.....	2.63	2.13	1.43
August.....	2.63	2.16	1.39
September.....	3.10	2.23	1.24
October.....	3.13	2.13	.89
November.....	3.13	2.13	1.00
December.....	3.02	2.13	1.45

production low and when the dock interests, in order to keep their Pennsylvania, West Virginia and Ohio mines running during the summer, sent a normal amount of fuel up the Lakes. A comparison of actual prices on coal shipped to the Northwest for the two years from a typical southern Illinois mine shows 1923 decreases varying from 27c. to 60c. and averaging 43c. The 1921 prices

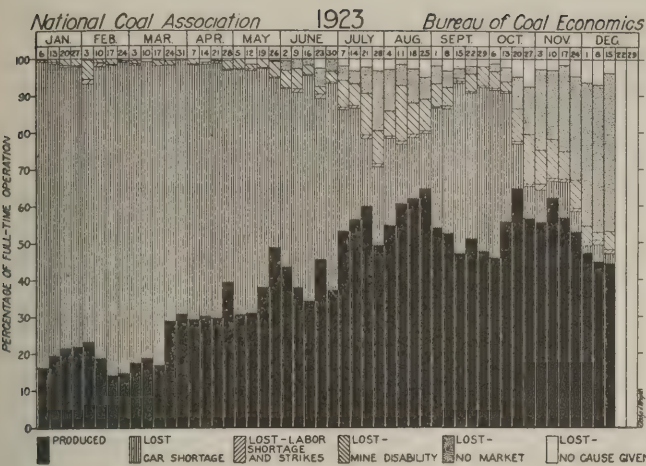
Spot Prices, F.o.b. Mines, of Bituminous Coal, Southern Illinois, 1923

CHICAGO (ILL.) MARKET

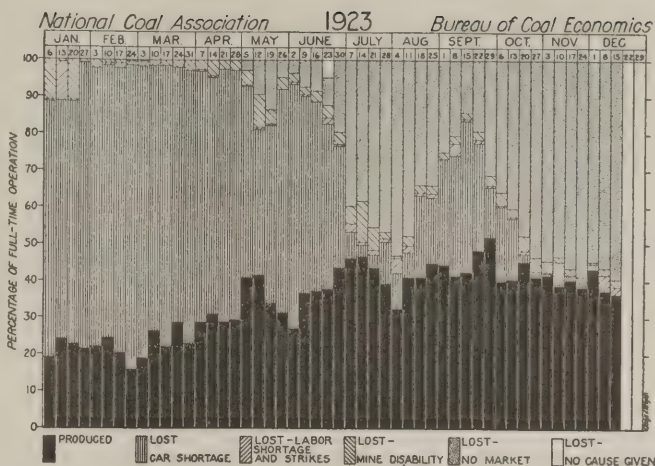
	Lump	Mine-Run	Screenings
January.....	\$5.38	\$3.98	\$2.81
February.....	5.01	3.64	2.54
March.....	4.24	3.32	2.31
April.....	3.78	3.13	1.99
May.....	3.80	3.13	1.82
June.....	4.08	3.13	1.81
July.....	3.83	2.98	1.68
August.....	3.93	2.91	1.67
September.....	4.15	3.00	1.63
October.....	4.08	2.73	1.36
November.....	4.13	2.54	1.45
December.....	3.65	2.38	1.78



SPOT PRICES F.O.B. MINES ON THE CHICAGO MARKET OF BITUMINOUS COAL FROM CENTRAL ILLINOIS



Hazard Field, Kentucky
PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES



Harlan Field, Kentucky
PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

on this coal—including, from spring to winter, all sizes from screenings to 6-in. lump—ran from \$2.32 to \$2.75 and in 1921 from \$2.70 to \$3.05. Of course, there were wide variations from this, in many special instances, but the record of that one mine is typical of the average experience of the whole southern Illinois field.

Early in the summer, as the navigation season opened, strong efforts were made to maintain prices of Eastern coal going into the Lake trade, but the net result was failure. A good deal of coal shipped on open price contracts was the first development. Then general undercutting started, resulting in splits among dock interests before the trade generally resigned itself to price levels at which coal-at-cost from Illinois, taking a \$3.47 rate into the Northwest, could be met.

Docks at no time were moving coal into the interior as speedily as they had hoped, but a good indication of how the season wound up is shown by the figures for shipment off the Head-of-the-Lakes docks for November. In that month 23,699 cars were loaded off as compared with 23,436 the month before and with 20,638 in November of 1922, when the grand post-strike rush was on.

As the year finished, the Northwest was showing no great coal hunger. Soft coal moved on a price basis only and even anthracite was a trifle sluggish, for retailers had taken as much of it as was customary, and December was not severe. Everyone in the region looked forward to winter months in which they could obtain all the coal they wanted, whenever they wanted it, and worried not at all about April 1 and a strike.

For once the Northwest had little cause to worry about its anthracite supply. While it did not get as much

hard coal as in some previous years it received a sufficient supply from first to last in spite of the brief tie-up due to the miners' strike which Mr. Pinchot so obligingly settled by increasing the price of coal. This increase is the only thing about anthracite which seriously harassed the Northwest. Hard-coal shipments arrived with fair regularity during the bulk of the season except September, causing no flurry whatever except a small and largely artificial one near the end of the year, when it became noised abroad through the towns of Duluth and Superior that the hinterland had sewed up all the hard coal there was while the lake-edge communities snoozed.

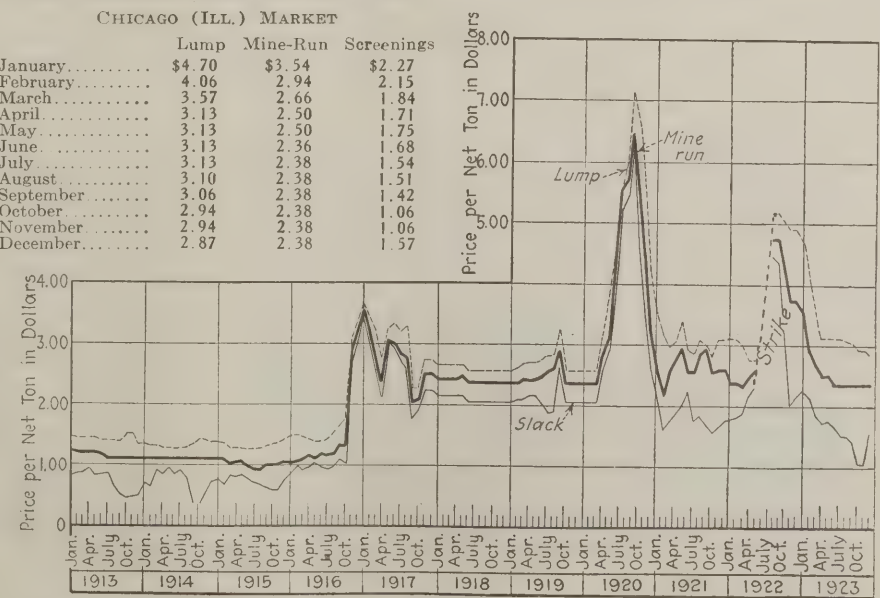
The demand for stove and egg sizes got too heavy for the docks to handle during November, and there was some parcelling out of coal in

small lots, and insistence upon the buyer taking a certain proportion of chestnut and pea sizes, all of which had a tendency to fret the trade a little, but at no time was anybody frantically fighting for fuel. The increased price did some good for the briquet manufacturers and aided the Pocahontas business materially, however.

Duluth's total receipts of hard coal for the year were approximately 1,500,000 tons while another 300,000 tons went to other Lake Superior ports. Milwaukee received 971,824 tons of hard coal at about its regular rate all season by vessel, except in the low month of September, when only 32,000 tons arrived, and, in addition, got approximately 150,000 tons by car ferry. Thus gently did a year of little labor trouble and practically no transportation disability treat the Northwest in its regular business of getting anthracite.

Spot Prices, F.o.b. Mines, of Bituminous Coal, Indiana 4th and 5th Vein, 1923

CHICAGO (ILL.) MARKET			
	Lump	Mine-Run	Screenings
January.....	\$4.70	\$3.54	\$2.27
February.....	4.06	2.94	2.15
March.....	3.57	2.66	1.84
April.....	3.13	2.50	1.71
May.....	3.13	2.50	1.75
June.....	3.13	2.36	1.68
July.....	3.13	2.38	1.54
August.....	3.10	2.38	1.51
September.....	3.06	2.38	1.42
October.....	2.94	2.38	1.06
November.....	2.94	2.38	1.06
December.....	2.87	2.38	1.57



SPOT PRICES F.O.B. MINES ON CHICAGO MARKET OF BITUMINOUS COAL FROM FOURTH AND FIFTH VEINS, INDIANA

New England Bituminous Trade in 1923

Hampton Roads Shippers Dominate Market Greater Part of Year—Too Much Coal and Collapse of Prices—Forecast for 1924 Complicated by Wage Negotiation

By G. G. WOLKINS

BUYING power collapsed so early in 1923 that for the bituminous-coal industry it proved a highly unsatisfactory year. Renewal of the wage agreement prior to April checked any tendency toward lower production cost in the union districts, and except for a few weeks in the spring the outlet in New England for central Pennsylvania grades was pretty much restricted to the narrow strip west of the Connecticut River which alone can be regarded as undisputed all-rail territory.

The railroad-rate problem remains unsolved and it has again been demonstrated that in the absence of swollen demand off-shore or impaired railroad service the Pocahontas and New River districts are adequate sources of supply for the greater part of this northeastern area—in fact insistent upon the lion's share. Through non-union policy they enjoy enough lower cost than sections accessible all-rail that in anything short of a buoyant market they dominate the seaboard trade. With rail rates as they are the smokeless shippers curry practically the whole of New England and there are few steam-using communities that elude their fine-tooth comb. Oil and hydro-electric power have made such inroads that the Hampton Roads agencies are in position to flood this finicky market, although partly for the same reason the total requirements are far less than during the war.

For the year recently ended, reduced consumption was perhaps the leading feature. Cotton manufacturing was particularly hard hit, and in many industries the inclination in January to store coal against possible emergency soon gave way to an entire lack of buying interest. Reserves were ample, receipts of coal for the first six months were well up to the high marks of other

years, but from July to December industrial purchases of more than meagre tonnage were the exception.

The goods trade, shoes, metal working and paper were all under blight of varying proportions, and deliveries on bituminous-coal contracts were as a rule far behind the quotas engaged. A few keen buyers profited by the dalliance between factors who loaded their wharves to the danger point and those who warehoused their coal in demurrage-laden bottoms, for in the end the seller went under the knife. It was the inexorable law of supply and demand.

A year ago it was figured that imports of fuel oil during the preceeding twelve months at the Port of Boston had been the equivalent of 4,250,000 net tons of bituminous coal, or an increase over 1921 equal to 500,000 net tons. Because California oil has been rapidly supplanting Mexican output the customs data for 1923 are not so significant, but according to oil statisticians the enhanced displacement for the year now ended was easily another 500,000 net tons, or a possible total of 4,750,000.

It is conceded that where local oil reserves last year were large they are now relatively less, a circumstance that would make actual consumption of oil for 1923 swell the estimated gain. That oil has made havoc with the steam trade is beyond question, but in spite of the marvellous flow of this attractive fuel there are certain indications of abatement. Besides broad assertions that the use of oil as fuel is wasteful, that the current surplus will be held in check, that relative costs are certain in the long run to favor coal, we know of steam users who find themselves obliged to consider resuming the use of coal.

At today's prices the consumer who can feed his boilers one-third anthracite

screenings and two-thirds bituminous coal discovers that only the cost of his oil installation stands in the way of oil. California oil will cost more than oil from Mexico; there are delivery charges on oil that are on all fours with coal, and barring a protracted strike that would be general in the bituminous regions it may be that 1924 will witness more of a reaction toward coal than the trade now anticipates.

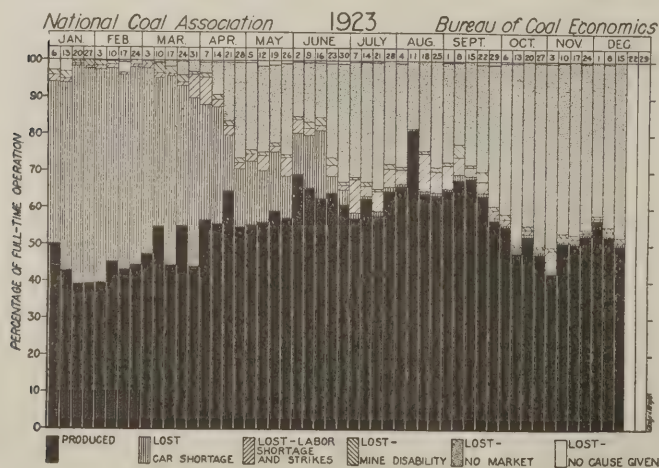
FOREIGN COAL IN EVIDENCE

British steam grades were in evidence early in the twelve-month period, but January and February receipts could not be sustained. Ocean freight rates continued on a low basis—\$1.25@ \$1.50, Cardiff to Atlantic ports—but the prostration of prices at Hampton Roads the second half-year effectually put an end to movement in this direction. In December, however, there were colliers chartered for French ports for Hampton Roads loading, certain of them having brought Welsh anthracite to Boston with generous proportions of slack to enrich the available supply of low-price bituminous!

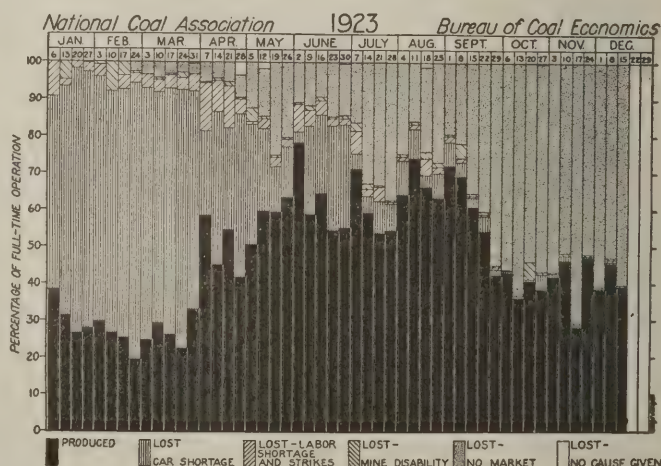
The unforeseen breakdown in prices of non-union bituminous coal early in the year discouraged further purchases of engine fuel from abroad, and even at the low range of ocean freights the West Virginia product at \$1.75 per net ton and less was too sharp competition for our English cousins. And it was from West Virginia that the New England roads took the greater portion of their supply during the period under review.

A committee of the Massachusetts Legislature named in the spring to examine into the coal industry made a rather more restrained pronouncement than is usual in political composition. It urged a review of railroad rates on bituminous coal as well as on anthracite, argued for the more extended use of bituminous in dwellings, and, refreshing for coal men to read, it lambasted coke producers for their "selfish policy."

Quality coals from the central Pennsylvania districts were on a \$6 per net ton mine level in January, but as the weather caught up with the short sup-



Central Pennsylvania
PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES



Somerset County, Pennsylvania

Spot Prices, F.o.b. Mines, of Bituminous Mine-Run Coal, Cambria, Clearfield and Somerset, Pa., 1923

	BOSTON (MASS.) MARKET		
	Cambria	Clearfield	Somerset
January.....	\$5.21	\$4.85	\$5.21
February.....	4.39	3.85	4.04
March.....	3.91	3.13	3.47
April.....	3.61	2.86	3.29
May.....	3.27	2.56	2.87
June.....	3.01	2.44	2.79
July.....	2.88	2.35	2.60
August.....	2.91	2.34	2.60
September.....	2.88	2.18	2.44
October.....	2.68	2.07	2.33
November.....	2.60	2.10	2.36
December.....	2.45	1.88	2.14

ply of anthracite there was a gradual lowering of prices until in April they were around \$4. Beginning in June quotations on all grades drooped for the rest of the year, and in New England the product of Pennsylvania almost ceased to figure.

All-rail deliveries were reasonably well maintained to the time when Southern coals eased off, but thereafter the proportion of commercial bituminous coal entering the Hudson River gateways was relatively light when compared with the volume of railroad fuel rolling on early commitments. When No. 1 Navy Standard Pocahontas and New River sold at \$5.18 on cars Boston with slack at 50c. less, and favored with a \$1.32 rate to large mill centres the high tariff all-rail would leave but \$1.39 per gross ton f.o.b. mines in Pennsylvania. He who runs may sense the reason for the much restricted buying of even the highest grade Cambrias during 1923.

SEASON LACKED BALANCE

There was a period in May, when the smokeless interests sought to establish \$7 as a take-or-leave basis at Norfolk, that the South Fork producers had vistas for a few days of comprehensive business, but it was for a few days only. Most of them were so flustered by what seemed an inviting prospect that they declined tonnage they sorely needed later on. A large movement probably would not have been the outcome in any case, for the buyer has ways of reaping the advantage of hindsight, but it was considerable while it lasted and was a godsend to the rail roads serving Philadelphia.

Aside from that short spasm, dumpings at the Delaware River terminals after April were confined chiefly to high volatiles both for locomotive supply and for illuminating purposes, and even of these the volume steadily diminished until low totals were reached toward the end of the year. The bulk line was from Hampton Roads and it is with Pocahontas and New River that the record of 1923 is mainly concerned.

At no time during the year was there anything approaching the contract-making activity that used to be so characteristic of the spring months. The Navy purchases of 400,000 tons or so in April ranged \$6.50@\$6.72 per gross ton f.o.b. vessel at Norfolk, but in New England there were but few comprehensive orders placed at a fixed price. The Navy bids disclosed a firm

purpose to maintain higher levels than during 1922, but faced with uncertainties in their own lines, buyers here could not see their way clear to respond.

By late March, therefore, contract business was at rather loose ends, and few of the agencies could do better than continue the previous season's understandings and make prices on a mine basis only for April, leaving later figures to be determined as the market developed. The price range on these arrangements at the outset was \$3.50@\$4 per net ton at the tippie (\$6.44@\$7 per gross ton f.o.b. Norfolk), the price varying according to the class of the buyer, but by June the mine basis had to be modified materially. As in 1922, a large proportion of the Hampton Roads coals received here was through regular channels that had become customary since the war.

In January the smokeless coals were in short supply. Car service was erratic, prepared sizes were in strong demand in the West, and in New England there was an improving market for inland delivery. At the Virginia terminals prices ranged \$7.50@\$8.80 for standard grades, a level that was raised to \$9 by the end of that month, with \$11 a typical quotation on cars, Boston, and bituminous retailing at as high a figure as \$15 per net ton. But by February our buyers began making their exit. It was estimated that something approaching 25 per cent of the steam coal received early in the year was shipped in anticipation of household needs, and it was quite clear that production was far beyond normal industrial requirements.

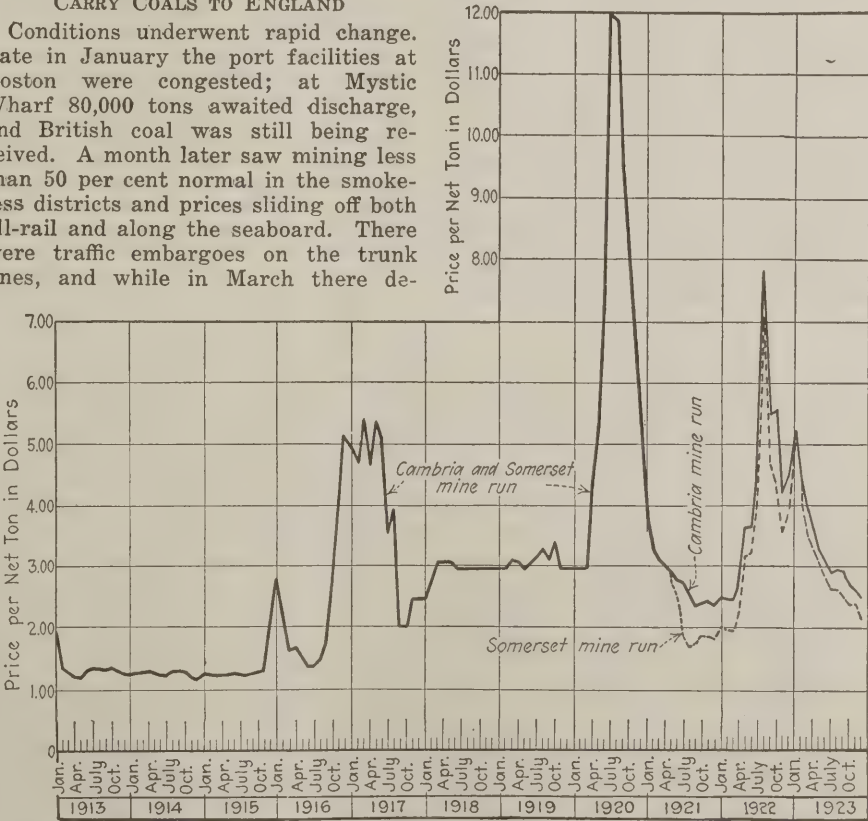
CARRY COALS TO ENGLAND

Conditions underwent rapid change. Late in January the port facilities at Boston were congested; at Mystic Wharf 80,000 tons awaited discharge, and British coal was still being received. A month later saw mining less than 50 per cent normal in the smokeless districts and prices sliding off both all-rail and along the seaboard. There were traffic embargoes on the trunk lines, and while in March there de-

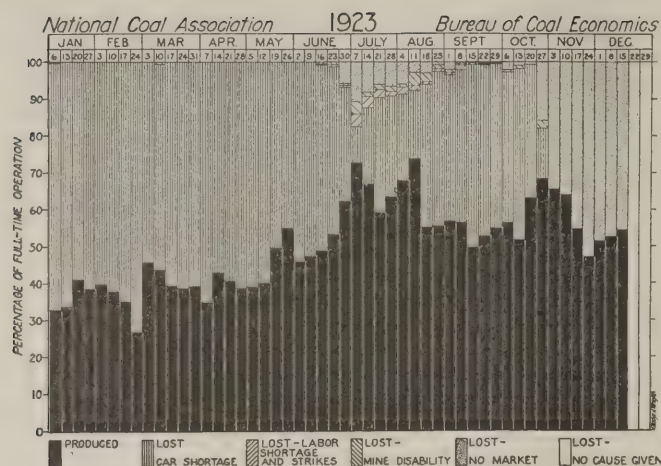
veloped a disposition to hedge on the course of the spring market, it was soon realized that there was little support for prices that were being sought.

It was in March that certain Italian and English orders materialized, and the trade was treated to another paradox. Situations had developed so fast that ships were passing on the high seas, some bound here with English coal on commitments of thirty days earlier, and others outward bound with American coal for Europe. A surplus of shipping both here and abroad depressed marine freights and for series of trips on short days for loading and discharging there were fixtures of coastwise steam tonnage at rates down to 55c., Hampton Roads to Boston, a level that had not been touched since 1914.

Transportation disabilities had been so persistent and were so recent it was but natural that there should be alarm in the spring over what were regarded as reserves entirely too small for New England's probable consumption, but by mid-June the market's extremely sluggish tone convinced the prophets that there was other ground for anxiety. The cotton mills were curtailing from a third to a half, about every hardening tendency was one after another eliminated, and the market settled down into old-fashioned summer dullness. From May 15 to Nov. 15, a full six months, the f.o.b. market declined steadily from \$7 to \$4.35 per gross ton at Hampton Roads, the on-cars price here suffered a similar drop from \$8 to \$5.18, and further declines were saved only by the most drastic and general cessation of mining. The retail price in Boston

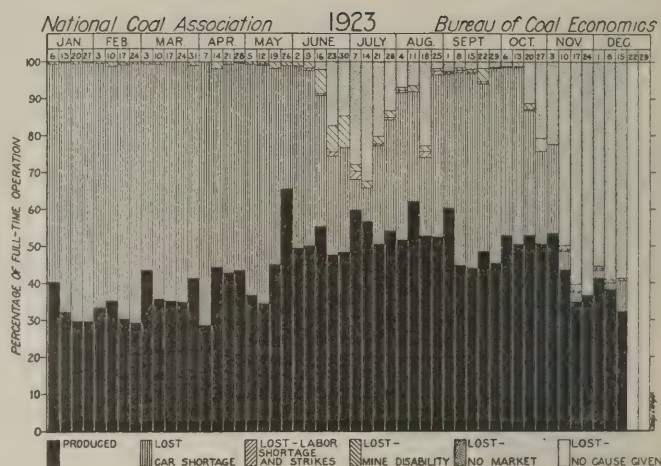


SPOT PRICES F.O.B. MINES ON THE BOSTON MARKET OF MINE-RUN COAL FROM CAMBRIA AND SOMERSET COUNTIES, PENNSYLVANIA



Pocahontas District

PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES



Tug River District, W. Va.

sagged to \$8 at a time when anthracite was selling at \$16.

Until November every purchase was a poor one; and even at the low point it was extremely difficult to entice buying. "Market cargoes" flourished for a brief season, but the toll was too severe, and burned fingers shunned the fire. Toward the end of December it was said there was less coal on wheels at the Virginia piers than at any time in several years, and yet the average price had reacted only to a point barely above \$4.60 f.o.b. vessel. Consuming territory was saturated, and probably not for a considerable period will the market recover from the protracted inertia of the second half-year of 1923.

Thanksgiving time witnessed a slight indication of firmer prices, due partly to a further restricted output and partly to the final absorption of scattered lots of distress coal. Ostensibly the on-car figure at this end was hitched up to \$5.75, but at the time and later there was quiet selling at 50c. less as bargain-seeking buyers put in an appearance.

It was a disheartening season. Only rock-ribbed houses could stand the strain, and it would not be surprising if several of the smaller brokers follow

some of their colleagues into more stable trades where they are not so likely to be caught between the upper and the nether stone.

The year ended with stocks nearly as great as in 1918—probably greater when we consider their proportion to current consumption. The faint spurts of the last two months had worn off; there was virtual stagnation and none but a drab prospect for 1924.

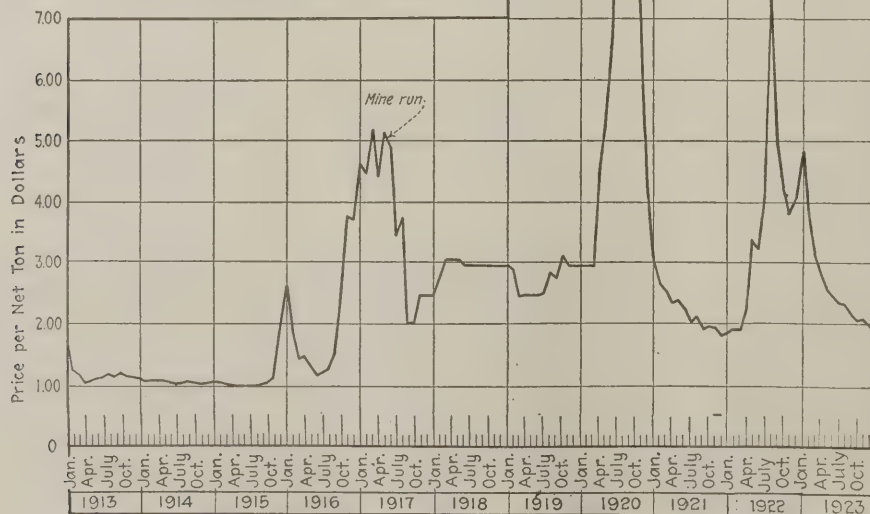
NEW YEAR PROSPECTS

On the threshold of another season the forecast is complicated by a probable renewal of the wage controversy. Buyers who took on coal in December to meet all probable requirements as far ahead as May and June were per-

sued that in all likelihood prices would not be as low again for a long interval. Moreover, there is a reasonable prospect of suspension in the union fields and a determined effort to unionize operations that are not now organized. What will come of it is on the knees of the gods, unless it is in the mind of politicians to force a conclusion satisfactory to the union leaders. That would be in line with precedent in a presidential year!

Bituminous-Coal Production, Spot Price and Index, By Weeks, 1923

Week Ended	Production (Net Tons)	Week Ending	Average Spot Price	Coal Age Index
Jan. 6...	10,993,000	Jan. 1...	\$4.47	369
Jan. 13...	11,217,000	Jan. 8...	4.54	375
Jan. 20...	10,925,000	Jan. 15...	4.42	365
Jan. 27...	10,985,000	Jan. 22...	4.33	358
Feb. 3...	10,686,000	Jan. 29...	4.14	342
Feb. 10...	10,725,000	Feb. 5...	3.78	312
Feb. 17...	10,431,000	Feb. 12...	3.58	296
Feb. 24...	10,324,000	Feb. 19...	3.49	288
Mar. 3...	10,946,000	Feb. 26...	3.38	279
Mar. 10...	10,627,000	Mar. 5...	3.38	279
Mar. 17...	10,428,000	Mar. 12...	3.24	268
Mar. 24...	10,424,000	Mar. 19...	3.19	263
Mar. 31...	10,430,000	Mar. 26...	2.98	246
Apr. 7...	9,629,000	Apr. 2...	3.05	252
Apr. 14...	10,401,000	Apr. 9...	2.82	233
Apr. 21...	10,221,000	Apr. 16...	2.84	235
Apr. 28...	10,103,000	Apr. 23...	2.79	231
May 5...	10,061,000	Apr. 30...	2.71	224
May 12...	10,175,000	May 7...	2.66	220
May 19...	10,270,000	May 14...	2.73	226
May 26...	11,049,000	May 21...	2.68	221
June 2...	10,091,000	May 28...	2.63	217
June 9...	10,676,000	June 4...	2.60	215
June 16...	10,573,000	June 11...	2.60	215
June 23...	10,452,000	June 18...	2.54	210
June 30...	10,458,000	June 25...	2.48	205
July 7...	8,742,000	July 2...	2.46	203
July 14...	10,925,000	July 9...	2.38	197
July 21...	10,676,000	July 16...	2.40	197
July 28...	10,817,000	July 23...	2.38	196
Aug. 4...	10,565,000	July 30...	2.37	196
Aug. 11...	9,851,000	Aug. 6...	2.36	195
Aug. 18...	10,843,000	Aug. 13...	2.37	196
Aug. 25...	11,383,000	Aug. 20...	2.38	197
Sept. 1...	11,737,000	Aug. 27...	2.44	202
Sept. 8...	10,485,000	Sept. 3...	2.47	204
Sept. 15...	11,378,000	Sept. 10...	2.49	205
Sept. 22...	11,454,000	Sept. 17...	2.44	202
Sept. 29...	11,347,000	Sept. 24...	2.42	200
Oct. 6...	10,699,000	Oct. 1...	2.37	196
Oct. 13...	10,953,000	Oct. 8...	2.30	190
Oct. 20...	10,694,000	Oct. 15...	2.24	185
Oct. 27...	10,919,000	Oct. 22...	2.25	186
Nov. 3...	10,517,000	Oct. 29...	2.23	184
Nov. 10...	10,726,000	Nov. 5...	2.21	183
Nov. 17...	9,717,000	Nov. 12...	2.23	184
Nov. 24...	10,160,000	Nov. 19...	2.21	183
Dec. 1...	8,943,000	Nov. 26...	2.25	186
Dec. 8...	9,929,000	Dec. 3...	2.19	181
Dec. 15...	9,938,000	Dec. 10...	2.18	181
Dec. 22...	10,545,000	Dec. 17...	2.19	181
Dec. 29...	536,489,000	Dec. 24...	2.16	178
		Dec. 31...	2.17	179



SPOT PRICES F.O.B. MINES ON THE BOSTON MARKET OF MINE-RUN COAL FROM THE CLEARFIELD DISTRICT OF PENNSYLVANIA

Passing of 1923 on Atlantic Seaboard Unmourned by Soft-Coal Producers

Disaster Stalks in the Guise of Oil Competition and Sales at Prices
Below Production Cost — Anthracite Demand
Strong and Prices Hold Firm

By R. W. MORRIS

There will be little regret at the passing of 1923 by the soft-coal producers who ship to the Atlantic seaboard markets. The year was disastrous to them, notably through the loss of trade due to oil competition, principally in bunkers, and the selling of a considerable tonnage at prices, in many instances, below the cost of production. Quite the reverse is true of the hard-coal industry. Demand for domestic coals was strong during the entire twelve months and at no time were operators and selling agents compelled to force sales of the larger sizes. On the other hand the steam sizes felt the competition of oil and soft coal and nearly half a million tons of these coals have been lost within the last couple of years to the trade, the majority of this tonnage in New York alone.

Due to the scarcity of the domestic coals throughout the year many users of these sizes have been converted to the use of either oil, bituminous screened coals or coke, but the tonnage permanently lost is not believed to be large. Welsh anthracite to the amount of about 40,000 tons was brought across the seas to the New York, Philadelphia and Baltimore markets.

The year could hardly have been worse for the soft-coal operator. With the exception of the first few months of the year, prices were low and the producer had the choice early in the year of either selling his coal at a price or of closing his operation. Many chose the latter course. The result was that much of the coal offered to buyers in the New York, Philadelphia and Baltimore markets was of the better grades and much of it at prices usually asked for the poorer coals.

In the East the soft-coal trade played its part with other industries. Demand for coal, like production in industrial plants, was slow and uncertain. Contract coals moved steadily but in reduced volume, while spot buying was slow and considerable of the tonnage went into reserve stocks.

At no time during the year did the soft-coal market show any considerable strength. The year opened firm with prices around \$6 f.o.b. mine for the better grades. With a falling demand along the Atlantic seaboard, notwithstanding the lack of anthracite and the efforts of Federal Fuel Administrator Wadleigh to induce the use of soft coal in order to avoid a fuel famine, prices began to fall and, save for a brief period in late April and early May, continued to drop by degrees throughout the year. Even when it was apparent that there would be a strike in the anthracite region and during the period when the mines were idle, there was no activity in soft coal and most quotations either held steady or showed slight fluctuations.

While the old-line companies adhered to their price schedules, which, with the advance in September occasioned by the increase given the miners in the new wage agreement, did not go above \$9.25 f.o.b. mine, the quotations for independent domestic coals even in the time of least demand did not go below \$11 for stove and chestnut sizes, the preferred coals, and during the periods when demand was strongest reached \$13, with some sales reported at higher figures.

The introduction of other methods of heating big buildings resulted in less demand for buckwheat, rice and barley coals and caused considerable annoyance to the trade, with the result that retail dealers, who desired the domestic coals, frequently found it necessary to take some of the small sizes or bituminous coal with their orders. The effect of this was later felt in the tidewater market when these surplus coals were returned for resale at prices which in many instances were considerably below the current market quotations.

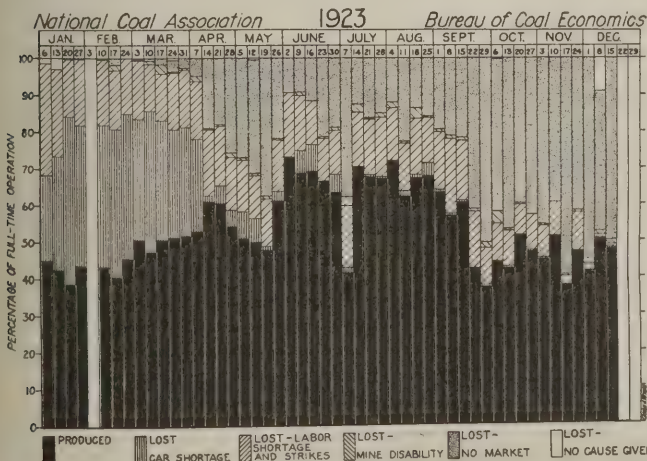
The soft-coal market started the year with lack of supplies and prices in keeping. Car supply was wretched and even the curtailed output due to the holiday season could not be taken care of. The better grades of coal moved either on contract or on consignment, and the coals offered for sale in the open market were of the cheaper grades. Quotations ranged from \$5 to \$6 for Pools 1, 9 and 10 coals but did not remain long on that basis. Railroads were buying and there was a demand for coke to help out in the emergency caused by the lack of domestic anthracite sizes. Reserve stocks in New York, Philadelphia and Baltimore were not heavy and with the scarcity of the better grades of soft coal many consumers were hard pushed.

The trend of the market along the seaboard is evident from the prices submitted to the U. S. Shipping Board at New York early in February for furnishing and delivering alongside vessels in that harbor monthly tonnages of either Pool 9 or Pool 71 coal. These

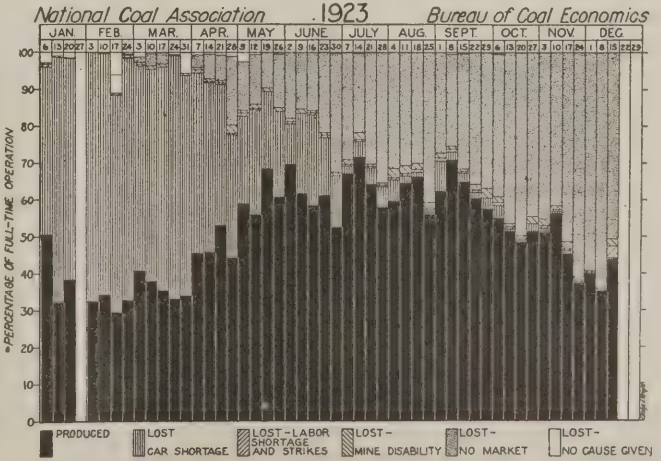
Spot Prices, F.o.b. Mines, of Bituminous Coal, Southern West Virginia Smokeless, 1923

AVERAGE OF QUOTATIONS AT BOSTON,
CHICAGO, CINCINNATI AND
COLUMBUS MARKETS

	Mine-Run
January	\$5.95
February	4.60
March	4.24
April	3.85
May	3.98
June	3.79
July	3.25
August	2.91
September	2.90
October	2.59
November	2.13
December	1.97



Cumberland-Piedmont District



Fairmont Region

PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

Spot Prices, F.o.b. Mines, of Bituminous Coal, Pittsburgh, 1923

PITTSBURGH (PA.) MARKET			
	Gas Lump	Steam Mine-Run	Gas Slack
January.....	\$5.20	\$3.43	\$3.30
February.....	4.22	2.85	3.07
March.....	3.86	2.52	2.69
April.....	3.10	2.00	2.11
May.....	2.88	2.06	1.76
June.....	2.86	2.13	1.53
July.....	2.66	1.97	1.46
August.....	2.78	2.11	1.55
September.....	2.93	2.25	1.50
October.....	2.56	1.92	1.20
November.....	2.55	1.95	1.14
December.....	2.51	2.02	1.53

ranged from \$7.33 to \$9.10 per gross ton for three months delivery, and \$7.20 to \$8.74 per gross ton for six months delivery.

After the first six weeks of the year consumers began to look for bargains, buying only when they desired and prices were right. They held fair-sized stocks and the better grades were scarce in the spot-coal market. Operators became hungry for business and some thought was given to the closing of mines unless conditions improved.

Prices continued to decline. A contract was awarded for delivering 250,000 tons of Fairmont or Kanawha gas coals alongside, Boston and Providence, for railroad use at \$5.95 and \$6.04 respectively. In April quotations for Pool 1 coal reached \$4 and operators thought the bottom in prices had been reached, but before the close of the year this quality of coal was quoted as low as \$2.75 in the open market, with some sales reported at lower figures.

There was keen competition in the Baltimore market during the early autumn, due in part to heavy buying by one of the Canadian railroads as a result of a strike of Nova Scotia miners. Screened bituminous coals and coke were active previous to the settlement of the anthracite wage agreement, but following its signing they were almost discarded.

Demand for hard coal was heavy in all twelve months. Although, as indicated by the Geological Survey reports, production was maintained at a high rate throughout the year, receipts along the seaboard were not sufficient to meet the demands of consumers.

Demand for anthracite domestic sizes along the Atlantic seaboard was active the entire year. The strike of 1922 had left the country bare of hard coal and when Jan. 1 arrived there were no stocks available. The hard-coal consuming states were in the hands of fuel administrators and fair-price committees as well as distributing bodies whose efforts were devoted to seeing that the coal was evenly divided and that everybody was kept warm. Consumers in nearly all communities besieged retail yards while the dealers sought help from producers and selling agents.

In New York as well as other cities peddler pools operated under the direction of the State Fuel Administration bodies, and although the operators asserted that allotments were up to 60

per cent of former years, the loss of 40 per cent being attributed to the miners strike of the previous year, the public called for more coal. The use of substitutes was advocated by the authorities and largely adopted by consumers, many still continuing the use of coke and oil.

On April 1 anthracite mine operators reduced prices on steam coals 50c. a ton and two companies cut 15c. from their price for pea coal. No changes were made in the other domestic coal prices. Likewise cuts were recorded on retail prices in most of the Eastern cities. Immediate filing of orders was urged upon consumers by both retail

dealers and by the Federal Fuel Administration.

Soon after the resumption of mining on Sept. 20 the larger operating companies announced an increase in mine prices for the domestic sizes ranging from 70c. to 90c. for egg, stove and chestnut coals and 15c. to 30c. for pea coal. This was soon followed by increases of about 75c. a ton by retailers.

Early in December demand for independent coals fell off and quotations, which had held around \$12 for several weeks, became easier, dropping to around \$11 for stove and chestnut and less for the other sizes, with indications pointing to further cuts.

Bright Early Outlook Unfulfilled In Pittsburgh Market

After First Three Months the Coal Trade Waited in Vain for Relief from Depression—Anthracite Strike Scare Had Fleeting Influence—Connellsville Market Ran Similar Course

By B. E. V. LUTY

Except for the first three months, 1923 was a poor year for the coal trade in the Pittsburgh district. A combination of heavy demand and restriction of production by car shortage held prices at a high level during January and February, compared with normal times, but they declined sharply in March, being at an unsatisfactory level for the remaining nine months of the year. Pittsburgh district steam coal in the spot market was at \$3 or higher throughout January and at above \$2.50

throughout February, but by the end of March the market was down to about \$2.

For about six months after April 1 the trade lived more or less in hope that something would occur to lift the market out of its rut—a car shortage or some other influence—but nothing occurred except a mild rise in August, on the occasion of the anthracite suspension scare.

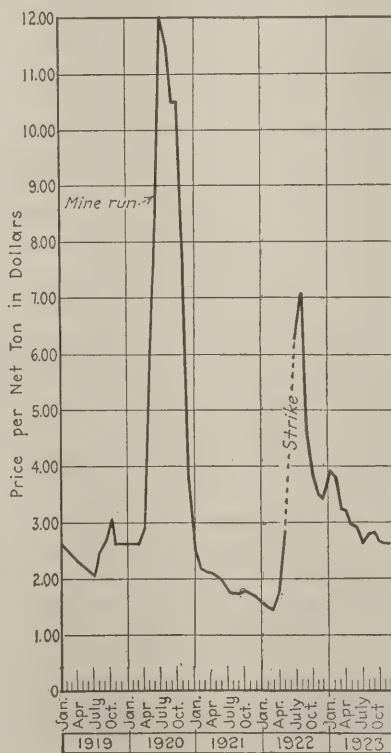
The Pittsburgh district sold heavily in the lake trade, getting a larger share of the business than in many preceding years, but at the expense of prices. Lake buyers practically made the market. Early in the season operators quoted on season contracts considerably more than the spot market, but lake buyers simply bought in the spot and prompt market until finally the operators yielded and sold for the remainder of the season at only a trifling premium above the spot level.

Production in the district was highest in August and September, reaching approximately 80 per cent of mine ratings.

Youghiogheny gas coal held much better in price than steam coal, the better grades being in control of strong operators, able to leave the coal in the ground rather than accept prices that would not net full depletion charges.

The district experienced strong competition from many adjacent fields. There was more competition from West Virginia than from the Connellsville region, where the best coal had a good outlet in beehive and byproduct coking, while the poorer coal, chiefly Sewickley vein, cannot compete at all in quality with the Pittsburgh seam.

Connellsville byproduct coal brought good prices during the first three months of the year. The spot market went down to about \$3 and consumers expected to buy second quarter on



AVERAGE SPOT PRICE, F.O.B. MINES, ON PHILADELPHIA MARKET OF MINE-RUN COAL FROM FAIRMONT DISTRICT

about that basis, while operators looked for a rise, and some were unwilling to sell beyond April at \$3.25. By the middle of the year competition had brought the market down nearly to \$2 and the average realization during the second half of the year was but little above that figure. In many cases the making of contracts was practically abandoned, the transaction of business occurring substantially by the buyer posting a price and accepting deliveries at the price until further notice.

The Connellsville coke market had gone well above \$10 during the strike of 1922 and was not only slow in declining but had its decline arrested in November of that year, showing a slightly higher price in December, and then a higher price still in January, 1923. Late in January the market began to soften, and this continued until the middle of February, when furnacemen seemed to become fearful that they would not be fully supplied during the second quarter. The pig-iron market was then rising rapidly. What amounted almost to a stampede occurred, and after one or two second-quarter contracts were made at \$6.75 the market advanced to \$7@7.25, while one or two contracts were made at \$7.50.

Almost immediately after the last second-quarter contract was made, and before the end of March, the spot market began to weaken, and then in the next two months it tumbled, so that by early in June coke could be bought readily at \$5, while furnaces were paying on their contracts an average above \$7.

Third-quarter contracts naturally proved much harder for the operator to put through than second-quarter contracts had been. There was a fair volume of business done at \$5.25@5.50, but some consumers refrained from contracting, preferring to buy from time to time, and they saved money, for during the entire third quarter the prompt market ranged well below \$5. For the fourth quarter there was little contracting.

Coke production in the Connellsville region increased quite sharply in the first three months of the year, held steady in the next three months and

then declined almost continuously and rather sharply in the second half of the year.

For the fourth quarter a Youngstown steel interest with byproduct ovens took a contract with a merchant furnace which normally had bought Connellsville coke, by naming a lower price than Connellsville operators could meet. The steel interest was faced with lighter blast-furnace operations and it was highly desirable to keep its byproduct ovens warm.

Monthly average of spot or prompt furnace coke and 72-hour selected foundry coke, per net ton f.o.b. ovens, Connellsville region, were as follows in 1923:

SPOT PRICES OF CONNELLSVILLE COKE, 1923					
	Furnace	Foundry		Furnace	Foundry
Jan.	\$8.30	\$9.25	July	\$4.60	\$5.60
Feb.	7.30	8.50	Aug.	4.65	5.55
Mar.	7.35	8.60	Sept.	4.60	5.90
Apr.	6.25	7.80	Oct.	3.85	5.30
May	5.25	6.50	Nov.	3.90	5.25
June	5.00	5.85	Dec.	3.90	5.25

Year of Early Promise at Cincinnati Came to Blue Finish

Wide Diversity of Elements Tended to Muddle Market—Pressure Following Strike Lessens as Coal Pours In from All Points—Mild Weather Proves Finishing Touch

By HAROLD WILSON COATES

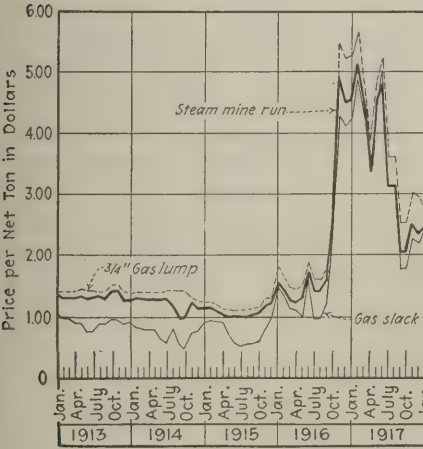
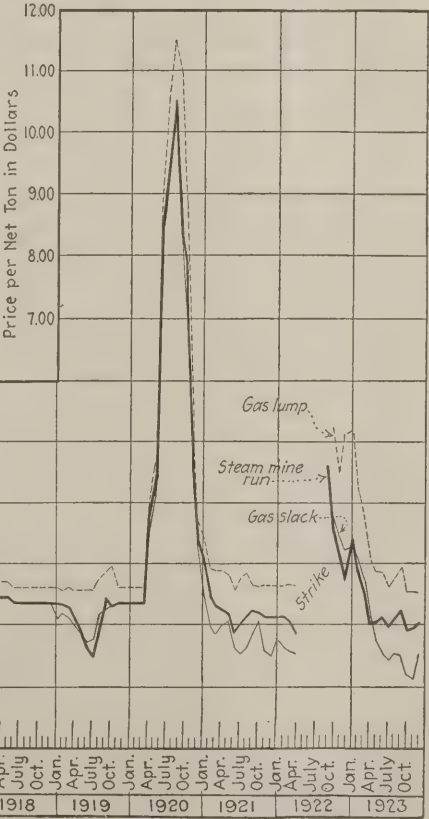
Greater variety to a year's endeavor in the coal business has scarce been witnessed at the Cincinnati gateway than in the one that has just closed. It did not run in streaks of fat and lean—it was either good or "good and rotten." Every element that there is to provide a scrambled condition can be found in turning back the pages to get a summary of the swing of the trade in the past twelve-month. Things that could be relied upon to chart the way went by the board and the close of 1923 found most of the trade at this point sitting around rather blue—with little roseate in the outlook.

And 1923 started out with the best of

prospects. The high tide of pressure for coal following the labor trouble continued with the dawn of the new year, and even though the union mines to the north, east and west were pouring out their offerings there seemed to be no let-up to the demand for West Virginia and Kentucky offerings.

Perhaps the earliest intimation that things were a bit out of the usual groove came in midwinter, when brokers and wholesalers as well as firms with direct mine connections found that lake buyers were not rushing madly into the market to make deals for the opening of navigation. By mid-February cars were being reported in distress and it appeared that the reservoirs were filling up with coal, a sure sign that the era of high prices was breaking and that if there were to be price readjustments these would be more violent than ever. The lake buyers held the whip hand, and they continued to hold it until the last cargoes were on their way. In fact holding to this one angle, lake purchases of coal failed to figure prominently in this market's affairs much after the latter part of August.

By April 1 nearly all of the buyers—except probably the takers of smokeless coal—were playing a waiting game. Salesmanship had to be reckoned with and the "order takers" of several months past were sent out to beat the highways and byways and turn in business. May saw a new element enter-

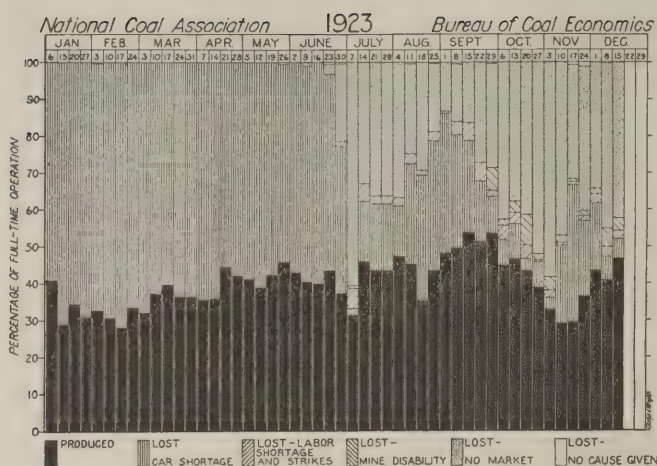


SPOT PRICES, F.O.B. MINES, ON THE PITTSBURGH MARKET OF COAL FROM THE PITTSBURGH DISTRICT

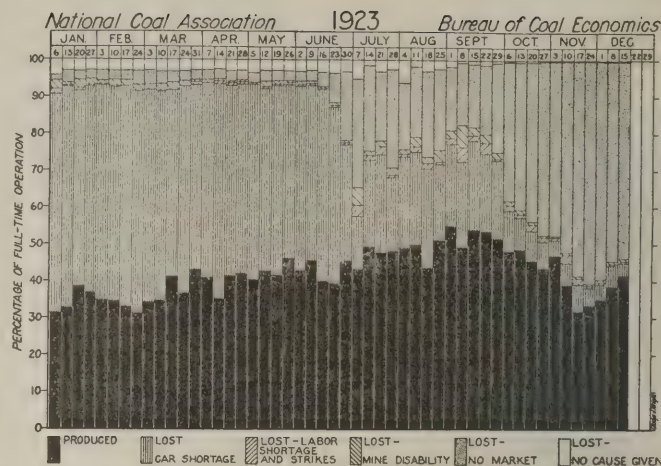
Spot Prices, F.o.b. Mines, of Bituminous Coal, Kanawha, 1923

AVERAGE OF QUOTATIONS ON COLUMBUS AND CINCINNATI MARKETS

	Lump	Mine-Run	Screenings
January.....	\$6.14	\$3.52	\$3.27
February.....	4.56	2.82	2.44
March.....	4.14	2.93	2.49
April.....	3.76	2.46	2.33
May.....	3.46	2.12	1.82
June.....	3.17	1.90	1.44
July.....	3.09	1.80	1.09
August.....	3.12	1.78	1.10
September.....	3.44	1.87	1.24
October.....	3.30	1.73	.93
November.....	3.11	1.69	.83
December.....	2.79	1.63	.97



Winding Gulf District, W. Va.



New River Field

PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

ing the situation. The weakened car supply, caused by the shopmen's strike of the year previous, was being remedied. More than that, new equipment was beginning to show on the roads, and this brought to an end, for the time, the question of whether the coal could be moved or not. In this respect it might be said that the statistics of the regional director for the American Railway Association will show figures for each week of the year ranging from 8,000 to over 10,000 cars a week being interchanged from south of the Ohio River to the north for 1923 and it is only three or four years ago that a 5,000-car or higher week was an exception.

The latter part of May and the first of June saw the flooding of the inland markets. Diversions from the lakes on several occasions threatened to "break" the market here, but prices kept the even tenor of their downward way (with the exception of the low volatile) and nothing seemed to stay the trend. For the first time in many months there came talk of lowering production and the July holidays saw some of the mines closed down with an intimation that they would be unable to resume until either volume business was obtained or better prices were offered.

August brought a peculiar situation. It was the old story—the coal came along without a definite destination and "spoiled the party." This grew so unwieldy that there were really two sets of prices for fuel passing through this mart. One represented a figure that miners of standard coals set upon their tonnage and below which they refused to budge; the other the day to day quotations from the brokers and wholesalers, sometimes \$1 to \$1.25 a ton below the set figures, but which had its ultimate effect upon the top prices. Domestic business was now getting the bulk of attention and with the screens going in again, slack had to be sacrificed as long as the price of sized stuff held up. September saw it ranging around 75c. a ton and the last of that month brought it even lower.

Now the autumn swing of business

should have been on—it was a weather proposition once more, but up to this writing old Boreas has failed to function. That has been the "last straw," for without Jack Frost the rail communications with the mines have been unimpeded and the interchange shows that production for the past three months has continued "top notch," even though reports come in from all quarters of mines closing down or suspending.

The first of the year saw the mad scramble for Pocahontas No. 3 coals still on. There was still the flavor of the "government price" in the air and quotations of \$7@\$.75 for the prepared sizes were being made by the standard companies. Most of their business was under contract or being allotted to customers, so that brokers could and did make sales at \$8@\$.85 for what tonnage they could lay hands on. Lump was quoted at \$6@\$.65 with about the same price for screenings.

From April 1 on, with the exception of a break in June, the low-volatile coals ranged pretty well around \$6 for prepared and \$4@\$.425 for mine-run and screenings. It is rather remarkable that these prices were maintained up to about the last of September while the high-volatile coals were struggling along facing week to week reductions. The first to feel the gaff was mine-run, which following the closing of active business of the lakes, dropped into the \$2@\$.3 range. Since then readjustments have followed that brought the price down to \$3@\$.35 for lump, \$1.75 @\$.225 for mine-run and \$1.25@\$.2 for screenings. At no time during the year did labor trouble disrupt the flow of this coal.

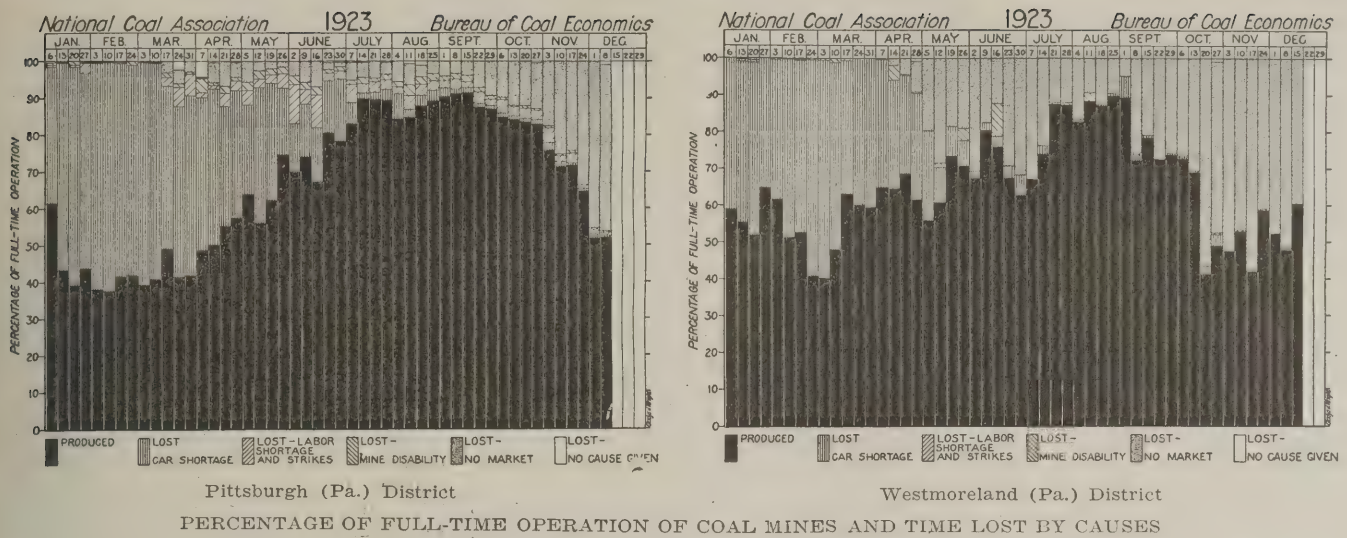
The southern West Virginia high-volatile fields still are the volume producers for this market. Those who keep an eye on Logan County assert that she will again create a record for coal shipped up the Guyan branch of the Chesapeake & Ohio. Until early autumn the Norfolk & Western high-volatile mines had their lean streaks, especially when motive power and car

supply were not of the best, but the summer business was all that could be asked. These latter mines responded quickest to the waning prices and some of them have been down for months rather than show "red figures" on the ledgers.

The story of the ups and downs of this territory as well as of the Kanawha and Coal River groups is told best in the figures when it is considered that last January 4-in. lump sold around \$5.75@\$.6; mine-run \$3.75@\$.425 for byproduct; mine-run steam at \$3.25@\$.35 and slack \$3@\$.35. By April the best lump was selling at \$4.25 top, mine-run at \$2.50 and slack \$1.75@\$.2. The midsummer spread saw virtually another dollar reduction and from that it has whittled off to the present low ebb.

The volume of tonnage that has been coming from the Hazard and Harlan fields to the Cincinnati market continues to show the upturn that has marked this as one of their primary markets for the past twelve years. The expansion of these fields as well as the extension of equipment there mean even more coal pouring through as time goes on. The word that the Louisville & Nashville and the Clinchfield roads will be "hooked up" so as to give a seaboard outlet through Southern ports is going to mean much. That figures in this review because of the virile prospects. During the past year there has rarely been a time when prices on Hazard and Harlan coals have been more than 25c. out of range with the same types of coal from the southern fields of West Virginia, so it would be merely a repetition of figures to go over that once more.

There is this exception, however: During the first three or four months of last year—and it always happens when prices perk up—there was a differentiation in the price of byproduct and malleable, the good gas coals and just coal (or steam, for lack of a better or more suitable name). Today all of these niceties both in buying and selling seem to have gone by the board. Strange, isn't it?



Spot Prices, f.o.b. Mines, of Bituminous Coal, Pittsburgh No. 8 District, Ohio, 1923

CLEVELAND (OHIO) MARKET			
	Lump	Mine-Run	Screenings
January.....	\$4.95	\$3.49	\$3.25
February.....	4.30	3.42	3.10
March.....	3.76	2.76	2.58
April.....	2.93	2.22	1.94
May.....	2.94	2.17	1.65
June.....	2.75	1.98	1.34
July.....	2.54	1.92	1.27
August.....	2.60	2.04	1.27
September.....	2.66	2.09	1.30
October.....	2.58	1.90	1.05
November.....	2.56	1.90	1.05
December.....	2.47	1.91	1.47

but \$1.50 at the lower Lake ports, 45c. lake freight, 25c. or less across the docks and \$2.25 rail freight to the market battle ground around the Twin Cities and below, was strangling the normal Illinois northward flow. Also cheap Pocahontas mine-run at \$1.50 or even less cut into both Illinois and Indiana from the east. The result of this market scramble was a reduction of prices to a point where a large volume of Midwest coal moved at a loss—sometimes a heavy loss.

As the new year 1924 dawned most Midwest producers looked forward to April 1 as a definite stopping point, though a few were inclined to say: "Well, there's no use trying to whip this union into taking a reduction in wages, so the next best thing is to sign up so as to be sure the market stays flat, thus preventing any of these fly-by-night operators from getting back into the business, and then take our chances." Somehow I have an idea that's just what will be done.

At the beginning of the year prices were reasonable, but poor car supply cut down volume. In Illinois and Indiana prices were rather firm. Good association lump from southern Illinois brought \$5.50, though price-cutting independents at times sold down to \$4. Good southern Illinois screenings were \$2.75@\$. Fourth Vein Indiana lump and screenings moved at nearly those same levels. Illinois Standard district operators were able to make money with lump at \$4@\$.4.25 and screenings \$1.75@\$.2.

Viewed only from the standpoint of prices, the coal industry in the Midwest was "sitting pretty," but poor railroad service cut the volume low. Whereas Illinois and Indiana started the year at about 65 per cent of capacity, they both went into February at about 50 per cent and Kentucky slumped even more. There was no great interest in storage among any class of consumers

except gas plants. Nobody was crying for coal and it can frankly be said that car shortage is all that saved the market from a bad February slump.

The general shading of the market started late in February, when Indiana and Illinois clipped from 25c. to 50c. from everything except big lump. By that time a good deal of smokeless from West Virginia had begun to percolate into the Midwest at prices that were tapering down. Pocahontas lump and egg that had sold in Chicago at the beginning of the year for \$8 was easy to get at \$7.25. By March 1 it stood at \$6.50 on its steady downward way to the \$3 it reached by the end of the year. Pocahontas mine-run, which opened the year at \$5, coasted down all spring and summer until it reached \$1.40@\$.1.50 awhile before the end of the Lake season. Periodically all year the Midwest caught floods of this coal.

The spring struggle to get consumers to contract was vigorous but largely unavailing until the government officially advised industrial summer storage on a large scale. Then the Western railroads that were in soundest financial conditions began putting coal on the ground. The Illinois Central, Burlington and Big Four entered upon great programs ranging up to a million tons, accepting, at various times, about every size of coal produced on their lines. These contracts varied from \$2.50 to \$3. They made nobody rich but they resulted in long runs of production.

The car supply, which had been so poor during the winter months, improved rapidly with the coming of spring. That started the general tumble of prices. By late March the percentage of causes for lost working time at mines experienced a complete change. That charged to bad car supply flopped to "no market," and "no market" increased all summer long, getting low enough at times so that the average for the year was close to 50 per cent.

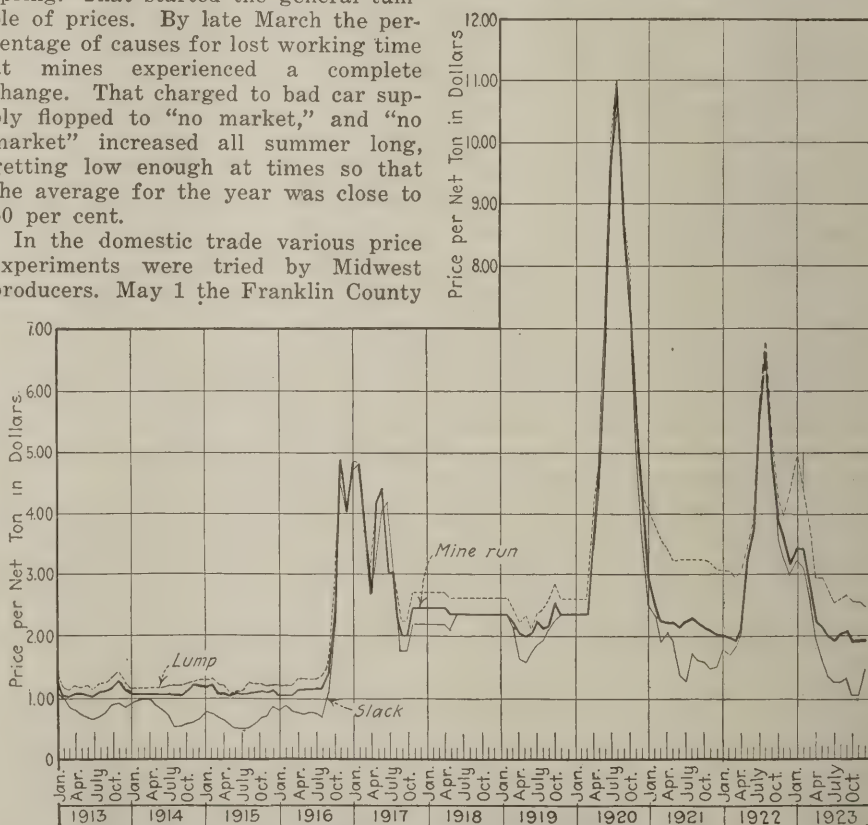
In the domestic trade various price experiments were tried by Midwest producers. May 1 the Franklin County

lump price was hoisted from \$3.85 to \$4.10 and on June 1 to \$4.35, where it remained, so far as circulars were concerned, until late in the autumn, however. The circular price was by no means maintained, and finally, with the virtual collapse of the market early in December, Franklin County lump caved to \$3.75 and other Midwest coals followed. Central Illinois was \$2.75; Fourth Vein Indiana, \$3.25; Mt. Olive (Ill.), \$3; Standard district, \$2.75, and West Kentucky, \$2.75.

All during the summer the market was so lifeless that price cutting created no business. For a long time in St. Louis practically no trading was done, except a little on the lowest priced coal within reach—Standard district, whose lump at one time got down to \$2. In those months the best lump nearby—Mt. Olive—moved practically not at all because the operators were unwilling to give it away for less than \$3.

All the while the Midwest drive into the Northwest by rail was going on. Coal moved into that territory at times but on narrowest margins and against throat-cutting competition.

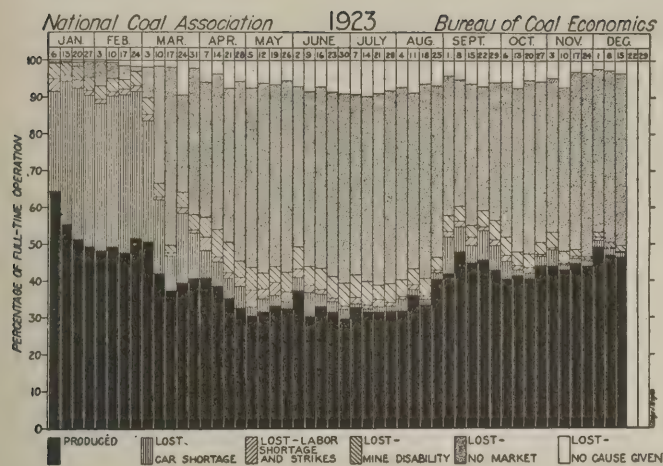
The anthracite strike in September had very little effect on the flat Midwest domestic market. Not much home-produced coal was sold because of the fact of the strike, though soft coal was favored by the increase which Governor Pinchot's strike settlement slapped onto the price of anthracite. This increase added 50c. to 90c. a ton in Midwest retail yards. But by the same sign a large number of householders shifted clear away from all coal and



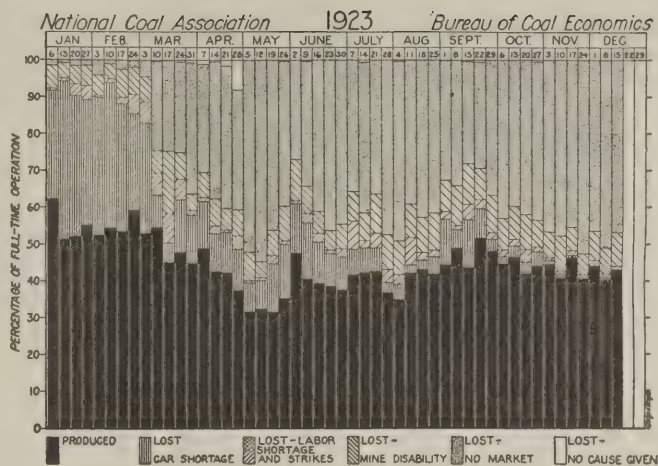
SPOT PRICES, F.O.B. MINES ON THE CLEVELAND MARKET OF COAL FROM THE PITTSBURGH NO. 8 DISTRICT OF OHIO

Spot Prices, F.o.b. Mines, of Bituminous Coal, Hocking

COLUMBUS (OHIO) MARKET			
	Lump	Mine-Run	Screenings
January.....	\$5.13	\$3.02	\$2.75
February.....	4.39	2.63	2.26
March.....	3.92	2.48	2.05
April.....	3.05	2.14	1.71
May.....	2.73	1.97	1.53
June.....	2.69	1.89	1.30
July.....	2.75	1.88	1.23
August.....	2.75	1.88	1.10
September.....	3.04	1.93	1.15
October.....	3.08	1.90	.94
November.....	2.96	1.88	.80
December.....	3.08	1.70	1.03



Illinois



Indiana

PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

installed oil burners. The tonnage of smokeless used in the Central West also increased greatly, so that Midwest coals lost more than all they might have gained by reason of anthracite's difficulties.

The steam market naturally suffered all the year. Screenings began to pile up around Midwest mines. Big mine-run contracts to railroads gave some relief at times during the spring and summer, but the open market always was full of steam coal. Prices slid lower and lower. Very few producers put any screenings on the ground. When Franklin County screenings bumped down to \$1.75 in June, central Illinois, Standard district and west Kentucky fines were at \$1.50 and sinking. Nothing stayed the grand slide.

In such periods medium-grade fields got screenings business because they had short freight rates to strong markets. This is what enabled central Illinois and Indiana to sell screenings in Chicago for \$1.50 when other regions could hardly dispose of any at all. But the worst was yet to come.

In October producers tried their best to hold back their screenings so as not to give them away. The railroads stood for tied-up cars as long as they could and then forced the disposal of great volumes of this coal on wheels. The result was Franklin County sank so low that it touched \$1 now and then, central Illinois got down to 80c. and Standard district to the ridiculous level of 40c.

In November, with such conditions prevailing in the steam market, the Standard Oil Co. quit trying to operate its two mines in Illinois, shut them down cold and contracted for about all the available central Illinois screenings output to April 1 at \$1.25.

General shutdowns all over Illinois and Indiana finally prevented the steam market from going clear through the bottom, and by the end of the year production was down low enough so that Franklin County had pushed its screenings back up to \$1.65, central Illinois to \$1.50, Standard district to \$1.10 and west Kentucky to 85c. @ \$1.

Kentucky had a troublous year. While the market during the early part

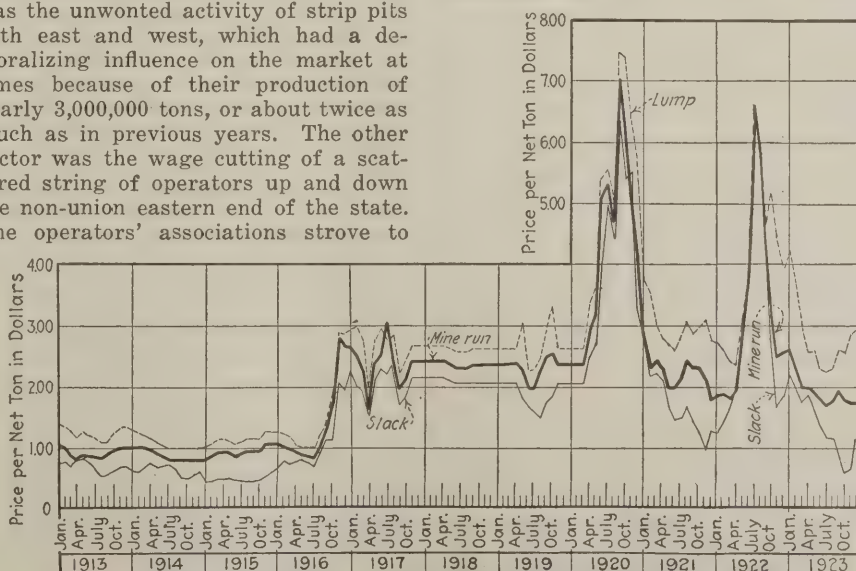
of the year ranged from \$2 to \$3 above the same months of 1922, car supply choked all Kentucky down to about one-third of its potential production until well along into the spring in time for the Lake season. By that time, however, prices had dropped until good eastern Kentucky lump and mine-run, which had opened the year at \$6.50 and \$4, had declined to \$4.25 and \$2.85. By the middle of the summer this same coal had slumped another dollar.

During October, with the bottom about out of the market, in spite of fairly good fag-end Lake movement, some ridiculously low prices were quoted on various Kentucky coals. Elkhorn mine-run in distress and in the hands of jobbers sold down to 85c. Harlan and Hazard gas mine-run was circulated at the time for \$2@2.25, but some of it sold as low as \$1.50. Toward the end of the year \$3.50 was a good price for best eastern Kentucky lump as compared with \$6.50 the December before, and nothing interfered with the production of it except the trifling fact that hardly anybody wanted it at any price.

Two factors added to the Kentucky perturbation during the summer. One was the unwonted activity of strip pits both east and west, which had a demoralizing influence on the market at times because of their production of nearly 3,000,000 tons, or about twice as much as in previous years. The other factor was the wage cutting of a scattered string of operators up and down the non-union eastern end of the state. The operators' associations strove to

hold these interests in line, but with only moderate effect. The wages of 1917 were paid in several mines during November and December, with the inevitable market undercutting. Somewhat of chaos was created in that section including an unexpected show of secret union strength and the usual movement for consolidating many mines under a few ownerships was brought to the fore.

Western Kentucky, also handicapped during the spring by car shortage, produced a vast tonnage during the summer and, with the aid of low prices, sold it all over the middle of the United States, striving for new markets. This coal was a serious factor as far north as Minnesota. Where a nation is full of coal, however, and where margins of profit are narrow or absent, such production could not continue; so by the end of the summer about 75 Kentucky mines were shut down. Many of them reopened in September only to shut down again in November after a hopeless effort. The general hope—and expectation—in all Kentucky is that the union bituminous coal fields of the nation will be tied up by a long strike beginning April 1.



SPOT PRICES, F.O.B. MINES, ON THE LOUISVILLE MARKET OF COAL FROM WESTERN KENTUCKY

West's Production Broke No Records and Market Is Lifeless Generally

Efforts to Get More Favorable Freight Rates Were Unavailing
But May Produce 1924 Results—Labor Troubles Few—
Two Terrible Explosions Occur

Little delight was registered by the coal producers of the West and the Southwest during the year 1923. In the mountain states Utah dropped about 600,000 tons under last year's production and Colorado rose about 500,000 tons above it, but this does not mean that the two states experienced a lively market at any time, and the price of their coal was low. In Kansas and Oklahoma the wails of the coal man are loud and mournful. "The least profitable season in history," they say, and the fact that Kansas production went 600,000 tons above the 2,955,000 tons of 1922 helps not at all. Average Kansas selling price was \$1 a ton less than in 1922. In the other Southwestern states—Oklahoma, Missouri and Arkansas—the output fell well below that of last year.

The hope of changes in freight rates out of both these two groups of Western fields during the year was not realized. The mountain producers met the dock coal at the usual points in the North and Northwest and could not drive further. The strong appeal for more favorable rates from the mountains into the Missouri River region was not granted during the year but Colorado men are hopeful of aid from this source soon. If it comes, markets will be extended. The Southwesterners tried in vain to get an important readjustment of rates on coal from their own and the Illinois fields into the Kansas City-to-Omaha territory, and so there was no general change in competitive conditions except that Illinois producers, hampered by stiff competition elsewhere, shipped more coal into Kansas and Nebraska than usual.

Thus the year ran its course with nothing much in its favor except a comparatively calm performance by labor. Uncomfortably short running time in all fields a good deal of the year offers no good argument for an increase in union wage scales for 1924 but producers in the union fields of the Central West look for a cessation of labor for a while after April 1 in which

to get the present labor contract renewed. In Wyoming and Washington union operators want no cessation. Many of them are ready to sign a continuance of the contract right now.

In Kansas and Oklahoma oil competition was as sharp as ever, but the operators snatch at the straw of hope that oil prices may rise during 1924. To regain the market lost to oil it is necessary to lower the cost of production and increase dependability of supply. Since labor is the determining factor in both, operators look forward with exceeding interest to see what attitude union labor takes in the coming negotiations.

Two fearful explosions marked the year as particularly costly in life. On Feb. 8 a blast in the No. 1 mine of the Phelps Dodge Corporation at Dawson, N. M., killed 122. The other explosion killed 99 men in the Frontier No. 1 mine of the Kemmerer Coal Co. at Kemmerer, Wyo. Seldom has the West suffered so heavily.

The opening of the year was not particularly encouraging anywhere in the West or Southwest. Car supply in Utah and Wyoming ran only about 70 per cent but that was ample to enable the mines to produce all they could readily sell. Colorado trailed along about 15 per cent to the rear. In Kansas, with car supply at 40 per cent, lump sold for \$5.50, mine run, \$3.75, and screenings, \$2.50. These were circular prices, which the trade strove to maintain for a long time thereafter. Arkansas, with about 25 per cent of the rated allotment of cars, was not kicking for more, because, as usual, that state was having a hard time to

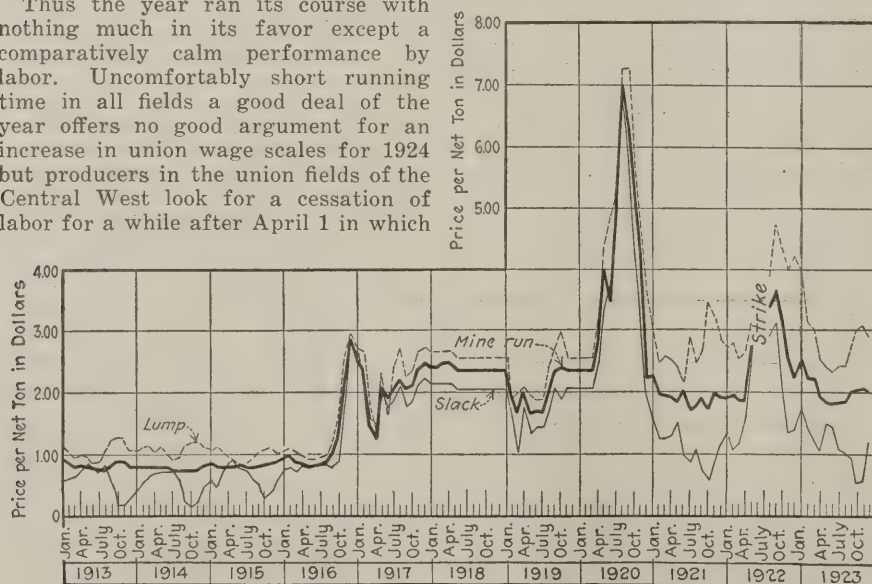
move what it produced at \$6@8 for lump, \$3.50@4.50 for mine-run, and \$2 for screenings.

As the winter advanced into spring the Far West continued to produce fairly well with running time better than 75 per cent. Utah and Colorado both dropped to little above 50 per cent, but regained a little with a rather raw March. Kansas and Oklahoma slid far below that. While the East, especially West Virginia and eastern Kentucky, was suffering keenly for want of cars, the West had all the cars it could use and plenty more. "No market," and nothing less, was the affliction. In Kansas City in early March the market was as full of holes as a Swiss cheese. Circulars were not changed, but undercutting was going on generally and became worse.

Late in March Kansas dropped lump from \$5.50 to \$4.50 in an effort to get business. The expedient helped only a little. Colorado shaded domestic a dollar to encourage spring buying, but with only modest results. A new low rate on the C. M. & St. P. and the Northwestern gave mountain states coal some encouragement in the Dakotas. Then came a little spell of cold weather all through the trans-Mississippi region and "no bills" in both Kansas and Colorado fields were hurriedly cleaned up before the weather again warmed and the summer began to stifle the trade.

In April shutdowns in Kansas became so numerous that Governor Jonathan Davis began his now famous official inquiry, at the instigation of union miners disgruntled by loss of working time, to determine whether the laws of supply and demand could be tinkered up so that the miners might work. He found they could not. The operators' main effort, failing to find a ready market, was to get a change of rates into the Missouri Valley region, either to give the Southwest a reduction or competing Illinois an increase. No adjustment has yet been made.

In the Rocky Mountains some raw weather in May helped the market and the usual periodic landslides choked off Routt County by stopping up a tunnel or two on the Moffatt road. Wyoming worked an average of approximately 55 per cent that month, Colorado 45 per cent and Utah a little less. Summer storage prices still were helpless to awaken the market. A slight decrease in intrastate freight rates on coal announced that month had the ef-



SPOT PRICES, F.O.B. MINES, ON THE ST. LOUIS MARKET OF COAL
FROM STANDARD FIELDS OF ILLINOIS

Spot Prices, F.o.b. Mines, of Bituminous Coal, Western Kentucky, 1923

AVERAGE QUOTATIONS ON THE LOUISVILLE AND CHICAGO MARKETS

	Lump	Mine-Run	Screenings
January.....	\$4.24	\$2.57	\$2.20
February.....	3.63	2.25	1.95
March.....	2.94	2.00	1.73
April.....	2.53	2.00	1.86
May.....	2.55	1.90	1.60
June.....	2.28	1.76	1.33
July.....	2.25	1.69	1.15
August.....	2.29	1.76	1.13
September.....	2.58	1.96	.89
October.....	2.54	1.76	.58
November.....	2.86	1.72	.63
December.....	2.96	1.72	1.14

Spot Prices, F.o.b. Mines, of Bituminous Coal, Standard, Illinois, 1923

ST. LOUIS (MO.) MARKET

	Lump	Mine-Run	Screenings
January.....	\$3.98	\$2.56	\$1.75
February.....	3.13	2.25	1.45
March.....	3.01	2.22	1.23
April.....	2.53	1.93	1.07
May.....	2.41	1.84	1.50
June.....	2.35	1.81	1.46
July.....	2.43	1.83	1.08
August.....	2.42	1.85	1.03
September.....	2.73	2.01	.93
October.....	3.02	2.06	.53
November.....	3.08	2.06	.55
December.....	2.92	2.00	1.20

fect of pulling prices down another 25c. or so, again without much market effect.

Utah's market picked up during June, thanks to real industrial activity in that state on the part of smelters and copper companies and the beet-sugar making campaign. Running time for the state climbed to about 60 per cent. Even domestic trade there picked up a little, but there was little lifting of prices. Steam coal moved on contracts at \$1.25@\$.150. By July 1 Colorado prices had firmed up noticeably and the upward trend toward autumn business started. Good lump advanced 25c. as a starter, but this warning that summer storage prices were going off did not put much life into trading.

One of the noteworthy contributions to the summer's coal history was the campaign of public education which the Southwestern operators put on in their principal markets, such as Kansas City. In a long series of well-done advertisements, the producers laid the cards on the table so that the people might see something of what coal cost, why they should not wait until the dead of winter to buy and why they should give up belief in "coal baronism." It was a first-rate effort. Of course it did not cause an immediate and noteworthy strengthening of the market but some of those back of it felt that it established better feeling between the coal man and the public.

Another effort of importance—futile but interesting—was the attempt of the Kansas operators to get the union to agree upon a scale for mining machines. After much jockeying and many meetings of a joint subcommittee the two parties failed of agreement. The operators offered first a differential of 15c. below the hand scale of \$1.25. The miners would agree to nothing over 6c. The operators finally offered a compromise of 11c. This was refused, and the effort was abandoned. Today there is no machine scale in Kansas though there are machines at several mines where union domination is not complete.

On Aug. 1 prices in the mountain states began noticeably to stiffen, and a slight market pick-up appeared. Most domestics advanced 25c. Utah noticed a pick-up in Pacific Coast and Northwestern trade and domestic buying in Utah was fairly well started, but not in sufficient volume to exhaust the considerable stocks that retailers put in earlier in the summer. By the end of

August the whole West felt an improvement. Kansas and Colorado were getting three full days' running time each week and Utah was doing almost as well. This betterment continued through the middle of September, but turned again about Oct. 1, so that the production curve dipped once more and running time in all fields fell down below 50 per cent for awhile.

Late in October the curve rose noticeably so that both Kansas and Colorado worked more than 60 per cent

of the time and even Utah increased its output some. Then came the drop in December, when all fields, especially Utah, declined. Working time there was barely 50 per cent. Low production of domestic sizes all through the mountains at least had the virtue of stiffening up screenings. In Kansas and Oklahoma, with very low running time, coal of various sizes was piling up at the end of the year and Arkansas was about shut down. Thus ended an unprofitable year.

Northern West Virginia Set New Record For Production in 1923

Output, 27,024,050 Tons, Exceeds That of 1920 by 4,000,000 Tons—Financial Conditions Not So Rosy—Operators Discouraged—Yield of Sewickley Coal Growing

By H. A. WILLIAMSON

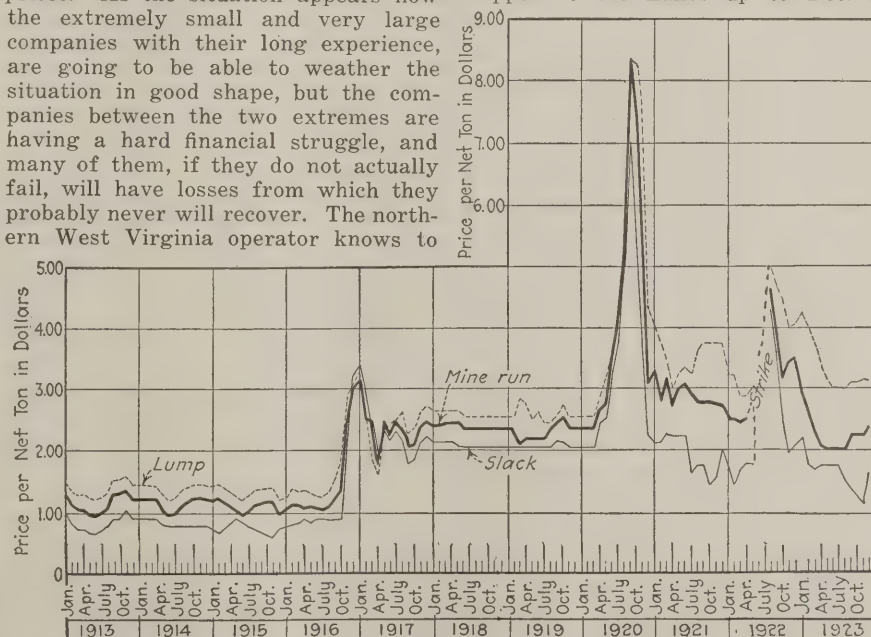
To Dec. 15, 1923, northern West Virginia, comprising about twelve and one-half counties, had shipped 27,024,050 tons of bituminous coal, the largest annual output in the history of the region, being over four million tons more than was produced in 1920. This large output, however, is not reflected by equally bright financial conditions. The price of coal steadily declined since the beginning of the year and by Dec. 15 the average price per ton probably was well below \$2—possibly around \$1.75—although accurate figures on this are not yet available if they ever will be.

This is the first year for a number of years that the operators appear actually discouraged. The smaller companies, with little or no overhead, are able to close down their operations and thus save themselves to a certain extent, but companies of any size are obliged to continue operations even though the coal is sold at ruinous prices. As the situation appears now the extremely small and very large companies with their long experience, are going to be able to weather the situation in good shape, but the companies between the two extremes are having a hard financial struggle, and many of them, if they do not actually fail, will have losses from which they probably never will recover. The northern West Virginia operator knows to

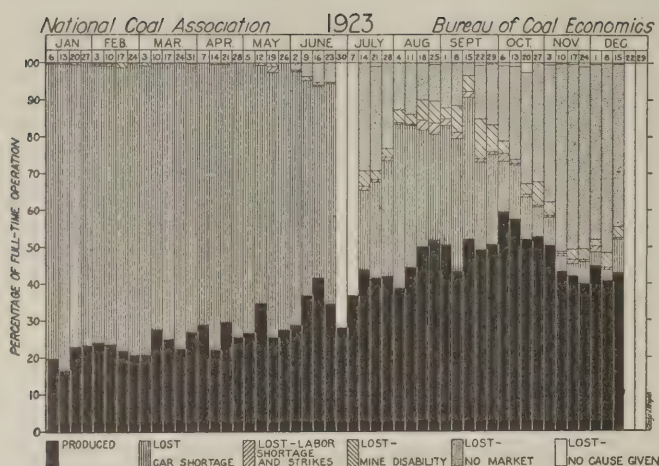
his sorrow that if the consumer is not getting cheap coal in 1923 it is certainly not the operator's fault.

One of the outstanding features of 1923 was the production of Sewickley coal in the Scott's Run district of Monongalia County. Practically the first Sewickley coal was mined from this district in 1916, when 19,041 was produced; in 1921 about one million tons was produced and to Dec. 15 in 1923 the total coal loaded from the Scott's Run district was 3,429,150 tons, of which it is estimated that approximately 2,750,000 tons was Sewickley.

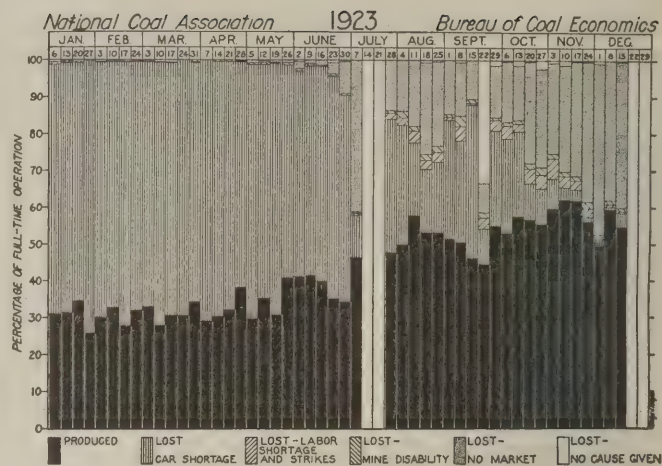
The Lake trade, generally conceded to be lost to northern West Virginia because of the differential between freight rates for Ohio and northern West Virginia, has been revived strongly this year but probably at the sacrifice of any possible profit and only because the shippers were willing to accept almost any price. The region shipped to the Lakes up to Dec. 15



SPOT PRICES, F.O.B. MINES, ON THE ST. LOUIS MARKET OF COAL FROM THE MT. OLIVE DISTRICT OF ILLINOIS



Kanawha District, W. Va.



Logan District, W. Va.

PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

2,273,900 tons. If prices return to anything like "reasonable profit," however, there will be practically no Lake trade from this region. The freight differential again was increased by 10c. per ton in 1923. At the beginning of 1917 the differential was 25c. per ton and during that year it was increased to 40c.; now it is 50c. Normally nearly a third of our production should go to the Lake trade and probably would even at 25c. differential, but with 50c. it is impossible and this must be remedied or shipment of this percentage of the region's production must cease with much resultant idleness.

The first months of the year were marked by considerable nervousness on the part of both miners and operators as to the possibility of strikes during the year. All parties concerned were pretty well fed up on labor troubles but there was worry as to what outside influence might do. Nothing serious developed, however, and the old confidence that existed between miners and operators before the union entered the field may be re-established more strongly than ever if sinister outside influences can be held in check.

Naturally with so depressing a year new development has been at a standstill, yet trade in coal lands has been constantly going on and several rather large deals have been put through. While naturally it cannot be confirmed rumor has it that at least a major portion of the dealing is in the interest of one or two railroad organizations intent on securing reserves of coal for future development.

All the usual evils have been in evidence during the year—fear of strikes, assigned cars, car distribution, increase in freight differentials, investigating committees, Coal Commission, representatives of the Department of Justice, federal taxes, state sales taxes and so on. The miner is worried because, except for a few fortunate mines having contracts, work is very slack; the operator is worried because of all the things enumerated above and a lot of others, 1924 is coming in with the region in a gloomy and downcast condition.

Restricted Demand for Commercial Coal Marked Year in Alabama Market

Consumers Without Contracts Kept but Little Ahead of Actual Requirements—Making of Furnace Coke Absorbs Increased Tonnage—Union Influence Fades Out

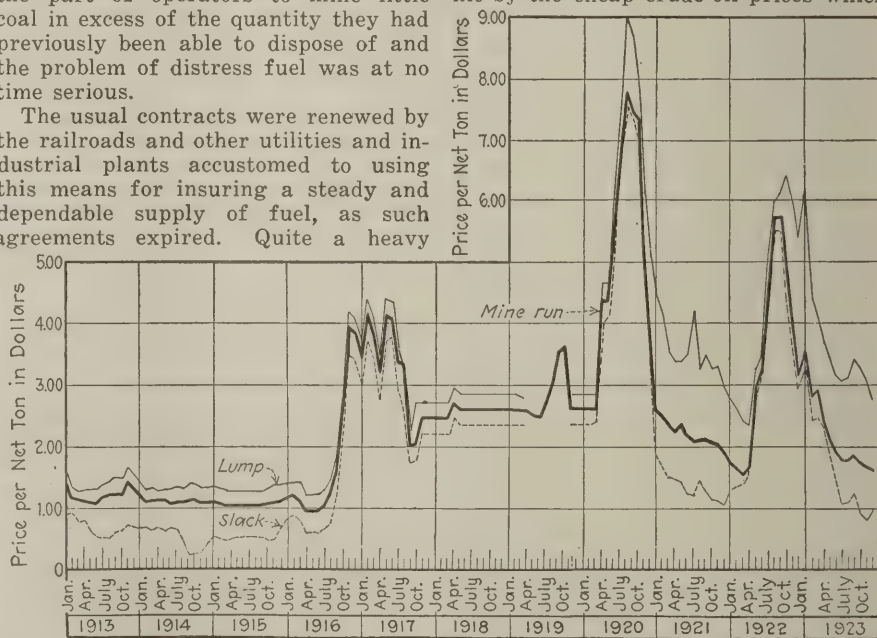
By H. B. McLaurine

The Birmingham market was featured by a very restricted demand for commercial coal throughout the year. Apparently assured that the mines would produce an adequate and uninterrupted supply of fuel, non-contract consumers adopted and maintained a policy of providing for their needs only a short while in advance of actual consumption, and no interest was manifested in the accumulation of stocks, necessitating uninterrupted efforts on the part of brokers and sales organizations to dispose of the output in excess of contract obligations assumed by the mines. However, there was a disposition on the part of operators to mine little coal in excess of the quantity they had previously been able to dispose of and the problem of distress fuel was at no time serious.

The usual contracts were renewed by the railroads and other utilities and industrial plants accustomed to using this means for insuring a steady and dependable supply of fuel, as such agreements expired. Quite a heavy

tonnage over and above the previous year was absorbed in the manufacture of furnace coke, as an unusually active iron market kept in operation beyond the first half of the year an abnormal number of stacks. The demand for foundry coke went hand in hand with the active iron market and the commercial output was heavy for a like period. Quotations ranging from \$8 to \$9 per ton declined to \$6.50 to \$7 f.o.b. ovens when the dull period was reached.

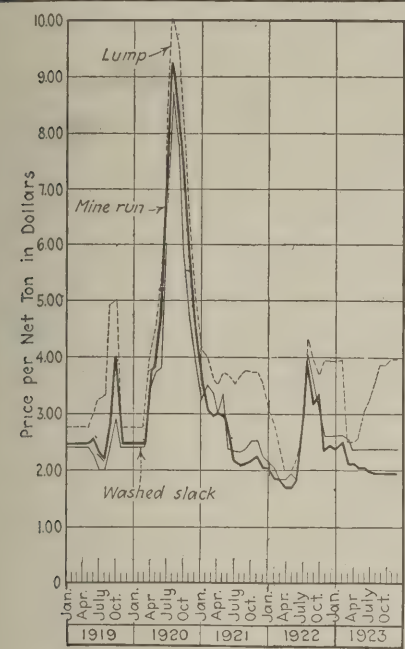
The development of bunker business through the Southern ports made no material progress during the year. The trade in this direction was hard hit by the cheap crude-oil prices which



SPOT PRICES, F.O.B. MINES, ON COLUMBUS AND CINCINNATI MARKETS OF COAL FROM THE KANAWHA FIELD

Range of Prices on Alabama Coal During 1923

	January			April			July			October to December		
	Mine-Run	Washed	Lump	Mine-Run	Washed	Lump	Mine-Run	Washed	Lump	Mine-Run	Washed	Lump
Big Seam...	2.25@2.50	2.50@2.75	3.45@4.45	2.00@2.50	2.25@2.50	2.50	1.85@2.25	2.25@2.50	3.15@3.40	1.75@2.15	2.25@2.50	3.75@4.00
Carbon Hill...	2.25@2.75	2.50@3.00	4.45	2.25@2.50	2.50	2.75	1.85@2.50	2.50@2.75	3.40	1.75@2.50	2.50	4.00@4.25
Cahaba...	3.00@3.25	3.00@3.50	5.20	3.00@3.25	3.25	3.75@4.00	2.75@3.00	3.00@3.25	4.35@5.60	2.25@2.50	2.25@2.75	5.00@5.50
Black Creek...	3.00@3.25	3.00@3.50	5.20	3.00@3.25	3.25@3.50	3.75@4.25	3.00	3.00@3.50	4.35@4.85	2.75@2.85	3.00@3.30	5.00@5.50
Pratt...	2.75@3.00		4.55@5.00	2.75@3.00		3.00@3.25	3.00		3.65@3.90	2.50		4.25@4.50
Corona...	2.75@3.00	3.00@3.75	6.00	3.00	3.25	5.00@5.25	2.75@3.00	3.25	5.60@5.90	2.50	2.85	6.50@7.00



SPOT PRICES F.O.B. MINES OF THE BIRMINGHAM MARKET OF COAL FROM ALABAMA FIELDS

prevailed at Gulf ports, many thousands of tons of bunker fuel being displaced by the substitution of oil-burning equipment in vessels with home bases at New Orleans, Mobile and Pensacola, as well as numerous craft which called at these points formerly for fuel-coal supply. Only a limited amount of coal was exported.

Hydro-electricity made further serious inroads into the domain of fuel coal at many interior points, municipal electric plants with steam-driven equipment being taken over by the Alabama Power Co., as well as numerous industrial plants being equipped with hydro-electric power. Several large pipe plants in the Birmingham district installed equipment for burning by-product gas instead of coal. These several factors vitally affected the marketing of Alabama coal.

The domestic demand was good with the exception of the last quarter, when unseasonable weather and consequent inability of retailers to dispose of their stock accumulations brought about a dull condition in the trade. During the first nine months of the year domestic coal moved in a most satisfactory manner. Contracts were more extensively entered into during April, the beginning of the coal year, than had been the case for several seasons past, and together with the spot demand which prevailed during this period afforded ready disposition for mine output.

Quotations on steam coal showed only slight decreases at the close of the year over the schedules in effect in

January. Domestic grades took on a gradual increase from the base prices effective April 1, as was customary, the quotations in effect in December being slightly higher in some instances and lower on other grades than ruling prices when the calendar year began.

It is estimated from figures now available that production for 1923 will approximate 19,000,000 net tons, or from one-half to three-quarters million tons in excess of the previous year. This increase probably should all be credited to furnace company mines, little of which found its way into commercial channels.

Several million dollars was involved in the organization of new mining enterprises and increases in capital stocks of going concerns for improvements and modernization of plants and equipment. Mergers involving a capitalization of perhaps eight to ten million were consummated, the DeBardeleben Coal Corporation taking over the properties of the Empire Coal Co., DeBardeleben Coal Co. and Corona Coal Co., and the Pratt Coal Corporation acquiring the holdings of the Kershaw Mining Co., Dora Fuel Co. and extensively developed and virgin coal lands of the Bryan Coal Corporation in Walker and Jefferson counties.

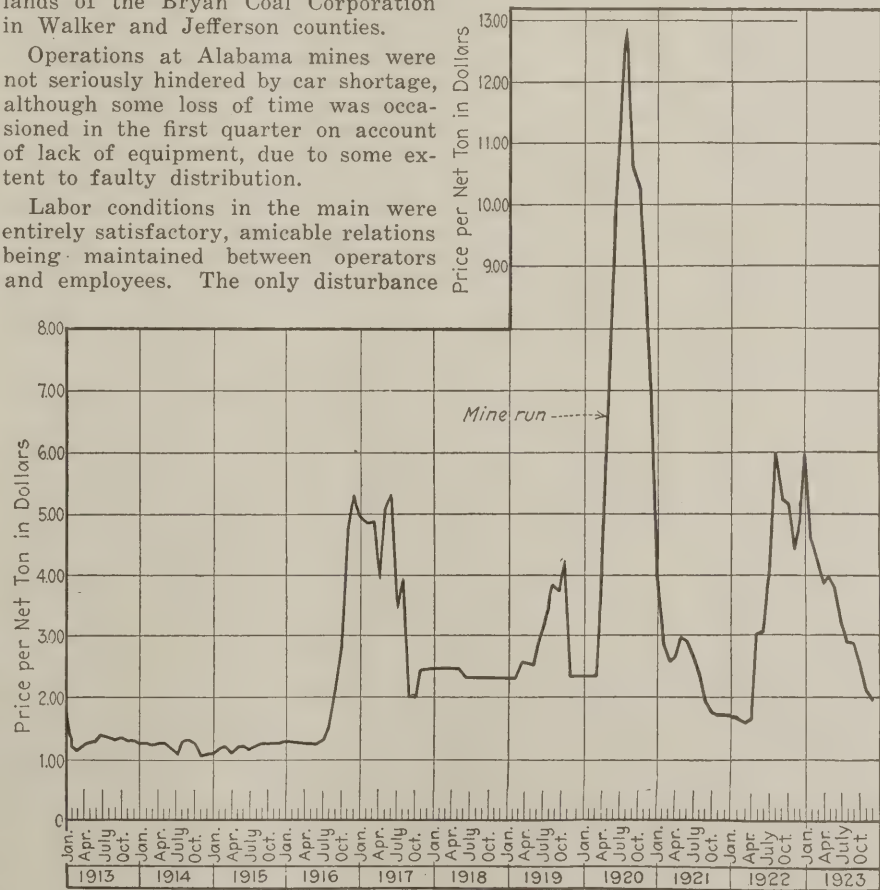
Operations at Alabama mines were not seriously hindered by car shortage, although some loss of time was occasioned in the first quarter on account of lack of equipment, due to some extent to faulty distribution.

Labor conditions in the main were entirely satisfactory, amicable relations being maintained between operators and employees. The only disturbance

of any consequence was the strike of union miners at the Beltona Mine of the American Mining Co., when officials declined to renew an expiring contract with the union. The places of these men were quickly filled and little tonnage was lost. The year marked the passing of the influence of the United Mine Workers in Alabama, the autonomy of District 20 being abrogated by the national organization after a struggle since about 1893 to establish permanent and effective domination of mining labor in this district, the open-shop being thoroughly and irrevocably established as the policy of Alabama operators.

Spot Prices, F.o.b. Mines, of Bituminous Coal, Mt. Olive District, 1923

ST. LOUIS (MO.) MARKET			
	Lump	Mine-Run	Screenings
January.....	\$4.25	\$2.90	\$2.20
February.....	4.00	2.57	1.75
March.....	3.75	2.29	1.69
April.....	3.35	2.05	1.73
May.....	3.16	2.00	1.75
June.....	3.00	2.00	1.75
July.....	3.00	2.00	1.75
August.....	3.00	2.00	1.50
September.....	3.10	2.25	1.36
October.....	3.10	2.25	1.25
November.....	3.13	2.25	1.13
December.....	3.10	2.40	1.63



SPOT PRICES, F.O.B. MINES, ON BOSTON MARKET OF MINE-RUN COAL FROM SMOKELESS FIELDS OF WEST VIRGINIA

FOREIGN MARKETS

Reviews by Our Correspondents in London, Paris and Berlin, Recording Economic Progress in Europe as Reflected in the Basic Industries of Coal and Coke

British Trade Unsettled at Year's End

Unusual Activity Throughout First Half of Year—Decline Began in June—Production and Shipments Still Fairly High—Lighter Demand Causes Rapid Fall in Prices

BY C. H. S. TUPHOLME

Though the coal industry throughout Great Britain may be said to have improved gradually during the past two months, it is actually in a very unsettled state. The year 1923 opened full of promise for both the Welsh and the north of England coal fields; the demand from Europe, especially Germany, and also from America was considerable, and for some time such rapid recovery was made that even pre-war exports were exceeded. This unusual activity lasted nearly half the year, but since June a gradual decline has set in, and though both production and shipments are still at a fairly high level, a shortened demand has caused a rapid fall in prices.

An instance of this fall may be taken from the Welsh steam coal market. In June the operators were able to obtain any figure up to 42s. 6d. per ton for best Admiralty large steam coals. As a result the industry was making good profits, and the miners' wages were raised from the minimum of 28 per cent above the 1915 standard, where they had been almost stationary for nearly a year and a half, to 41.47 over the standard. At the present time Admiralty large steam does not command above 27s. 6d. per ton in the open market. This decline has meant that while some pits are still able to show a narrow margin of profit, the majority are operating at a loss.

The output over the second half of the year, with the exception of one week, has been consistently over the 5,000,000-ton mark. South Wales alone is still producing over 1,000,000 tons per week and is exporting 600,000 tons, so it cannot be said that there is any fault either with the volume of output or of trade. In spite of this the operators are confronted by a serious problem. Production, especially at the newer and more modern shafts, is very high. Thus, as it is essential to obtain heavy outputs so as to obtain economic operating costs, there is a continual striving after higher and higher output, and this rivalry between pits grows keener every day.

Buyers abroad appreciate this position and quite naturally take full advantage of it. Thus European customers especially have suspended their custom of placing contracts for de-

livery over long periods, now basing their orders on the fact that the colliery operators must accept current business at low figures so as to keep the pits going and so endeavor to avoid the additional costs incident to a stoppage.

This probably is the chief factor in the present unsettled position and accounts for the drop in the price of Admiralty large steam on the Welsh market from 42s. 6d. to 27s. 6d. in the space of a few months. Naturally there is considerable difference in the various classes of coals marketed in South Wales, and while only the figures for Admiralty large steam have been quoted, identically the same argument applies to all other kinds.

The coal industry was decontrolled in March, 1921, and from that time to the late summer of 1922 the operators had to bear exceptionally heavy costs, arising not only from a three months' strike but also on account of the rapid decline in selling prices which followed.

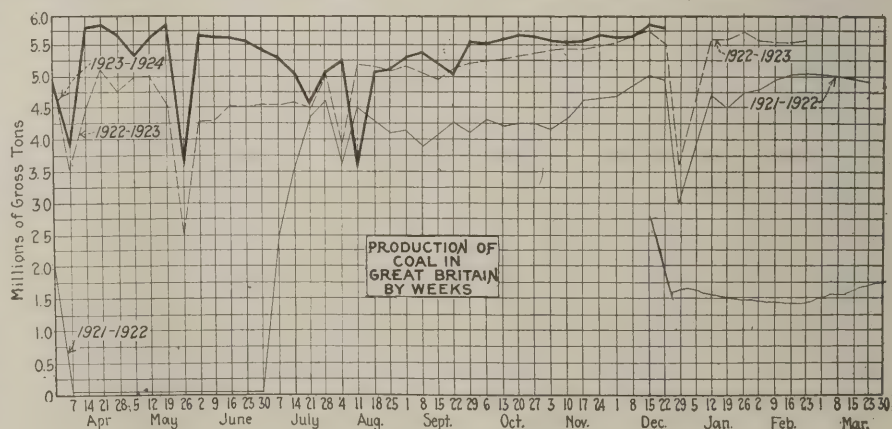
Fortunately for many pits, which would otherwise have had to close down, a demand for coal arose in the United States because of the strike there, and also on the Continent on account of the suspension of operations in the Ruhr. These two factors so changed the outlook of the entire British coal trade that the few months' comparative prosperity enabled the pits to recover. Unfortunately, this prosperity was too short-lived to enable the collieries to collect any substantial reserves. There is no doubt that the next three months is to be a crucial period for the entire trade.

This year has seen the culminating point of a rather remarkable recovery from the disaster of the national strike. Nineteen hundred thirteen was a record year for the industry; the output in that year in South Wales was 56,830,000 tons. In 1920 the output was 46,250,000 tons; in 1921 (the year of the national strike) it was only 30,570,000; 1922 saw production rise to 50,325,000 tons. This year, up to the end of the September quarter, the output of the South Wales pits amounted to 41,000,000 tons, which is at the rate of 55,000,000 for the year, or nearly up to the pre-war record. The total output of the British pits this year up to and including the week ending Dec. 1 is 247,577,000 tons, which is at the rate of over 260,000,000 for the whole year—quite a creditable performance.

This total it must be remembered is being produced in a seven-hour day against eight hours before the war, and by men fluctuating in number between 1,160,000 and 1,180,000. In the Welsh coal fields alone 243,000 men are employed against 233,000 before the war. The wages of these men are stabilized by the Agreement of 1915 at a minimum of 60 per cent above the pre-war level. It follows, therefore, that the Welsh operators must get at least 60 per cent above pre-war prices; otherwise their industry is in danger.

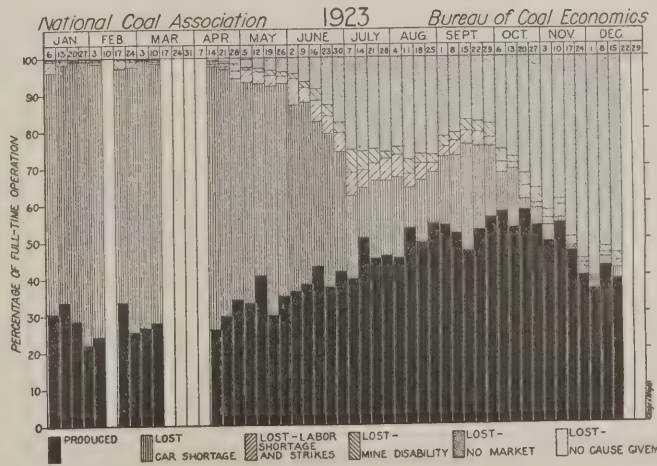
Realizing that new pits must be sunk to replace those worked out, many of the leading concerns during the prosperous period at the beginning of this year began operations on new shafts in unworked areas. These pits must be worked for some time before they can be regarded as paying propositions, and the burden of the operators is thereby increased. Costs have gone up on these new pits and suitable labor has not been easy to find.

Many of the new shafts have been sunk in virgin districts far removed from the centers of labor supply. In



During the first ten months of 1923 the production of coke was 1,613,000 tons as against 808,000 tons for the corresponding period of 1922, an increase of 805,000 tons. In 1913 the French

When with the beginning of the occupation of the Ruhr Germany ceased



PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

mines were producing around 2,635,000 tons of coke, including 2,445,000 tons for the Nord and Pas-de-Calais, a monthly average respectively of 220,000 and 204,000 tons. Production in the northern coal fields during the first ten months of 1923, was about 1,045,000 tons and the output is increasing every day, especially in the Nord Department. The independent cokeries have produced an average of 117,000 tons a month.

Production of patent fuel for the first ten months of 1923 was 2,536,200 tons of briquets and ovoids against 2,271,000 tons in the corresponding months of 1922, an increase of 265,000 tons. In 1923 the Nord and Pas-de-Calais mines produced in ten months about 1,290,000 tons and in 1913 1,802,000 tons, or 150,000 tons a month.

France imported 21,620,509 tons of coal during the first ten months of 1923, as compared with 18,192,441 tons for the corresponding period of 1922. The 1913 imports for the whole year were 18,693,000 tons, or a monthly average of about 1,558,000 tons.

Imports of coke for the first ten months of the year were 2,839,549 tons against 4,162,280 tons in 1922. Comparison of these figures shows the deficiency of supply, for which Germany is responsible; in fact, reparation deliveries up to Oct. 31 were only 1,476,427 tons, against 3,522,442 tons for the past year. Total imports in 1913 were 3,071,000 tons, or 256,000 tons of coke per month.

During the first ten months of 1923 Great Britain supplied France with 14,904,010 tons of coal and 358,983 tons of coke; shipments from the United States totaled 620,128 tons of coal and 168,856 tons of coke.

French occupation of the Ruhr began Jan. 11. Soon thereafter the Germans voluntarily cut down reparation deliveries; from Jan. 20 on France received only insignificant tonnages. France immediately bought coal in Great Britain and contracts were placed with American firms. British shipments of coke were important during the months of February, March and April. American coke was received mainly in May (76,696 tons), June (33,103 tons), and July (44,044 tons). Since July imports of British and American cokes have been very small.

Imports of patent fuel for the first ten months of 1923 were 624,541 tons, as compared with 1,048,711 tons during the corresponding period of 1922. In 1913 1,086,000 tons was imported, or a monthly average of 90,000 tons.

France was actuated to exporting coal through her proximity to Belgium, some of her collieries being nearer to part of the Belgian consumption centers than some of their own mines. France also exports coal to Switzerland and Italy, two countries very poor in coal supplies.

During the first ten months of 1923 coal exports amounted to 1,840,474 tons, including 941,192 tons to Belgium (Belgian exports to France in the same period were 1,895,338 tons); 326,279

tons to Switzerland; 93,268 tons to Italy; 213,721 tons to the Saar during the strike and 55,008 tons to Germany. Exports for the corresponding period in 1922 were 1,551,726 tons, or 200,000 tons below the 1923 level. The average of exports for 1913 was 109,000 tons a month.

Coke exports from January to October, 1923, were 385,671 tons, including 221,356 tons to Italy, 114,567 tons to Switzerland. Exports during the first ten months of 1922 were at about the same level, the monthly average in 1913 being 19,250 tons.

Exports of patent fuel were about 200,000 tons for the first ten months of the year just past. Switzerland was supplied with 130,000 tons. During the corresponding period in 1922 patent-fuel exports amounted to 80,000 tons. In 1913 the monthly exported tonnage was 16,000 tons.

Apparent consumption of coal in France—that is, production plus imports less exports—was lowest in February, when it amounted to 3,062,360 tons, and was highest in June, when it was 5,657,634 tons. The consumption by months, in tons, was:

January.....	4,746,376	June.....	5,657,634
February.....	3,062,360	July.....	5,510,471
March.....	4,732,829	August.....	5,458,460
April.....	4,829,505	September..	5,660,812
May.....	5,090,535	October.....	5,502,760

The prices generally applied on Oct. 1, 1922, were maintained in January, 1923. At that time prices changed according to the region to which coal was to be delivered. In the inland zone surrounding the coal field, prices were higher. In the Paris area, where British and Belgian producers compete, but with rather heavy transportation charges, prices were lower than in the local zone; in the so-called "British, Saar and Belgian zones"—that is in the region where imported coals are better situated as far as transportation is concerned than the Nord and Pas-de-Calais products—the latter must evidently get the benefit of lower pithead prices; and in the district outside of the British, Saar and Belgian zones, where

the products of other French and foreign coal fields can be found, prices were 1 fr. higher.

The Nord and Pas-de-Calais companies on Feb. 17, 1923, granted their employees wage increases of 3.25 fr. a day for adults, to be divided as follows: 2 fr. dating from Feb. 1 and 1.25 fr. dating from April 1. While the index of living remained unchanged, the salaries, thanks to these various increases, corresponded as of Feb. 1 to the index of the last three months of 1921.

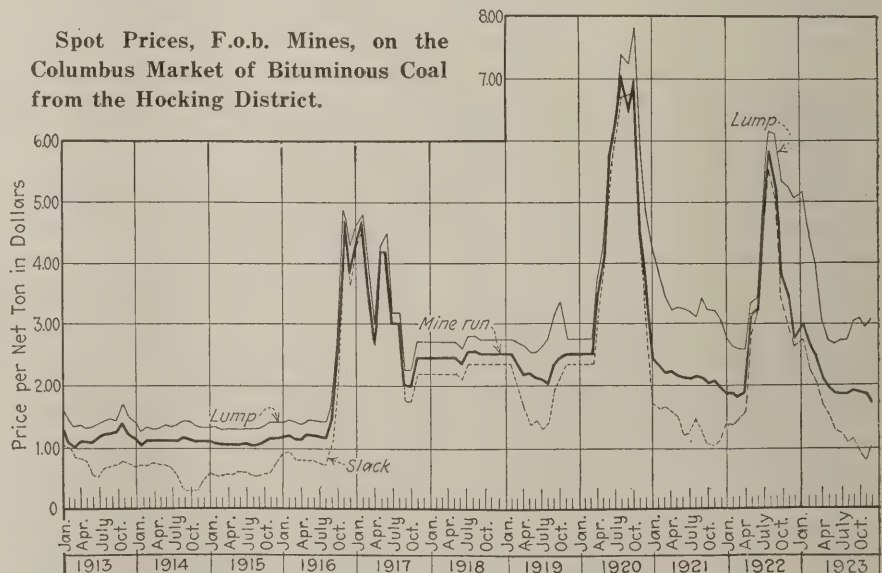
As soon as this decision was taken, selling prices were revised. Beginning April 1 prices of sized products were raised from 13 to 26 fr. per ton, up to Sept. 30. Briquets and ovoids also were raised 5 to 10 fr. a ton, but industrial coal and metallurgical coke prices were unchanged. On Oct. 1 these prices were maintained and quotations would still be on the same level had not the companies been obligated to grant further wage increases at the beginning of November, varying from 1 to 3 fr. and as much as 5 fr., which caused an increase of 5 fr. in industrial coals, 10 fr. on sized products except beans, which was raised only 5 fr.; 5 fr. on ovoids and 10 fr. on large coke.

New rates also have been applied in the other coal basin, following the example of the northern collieries, and on a similar basis.

Summing up, as the reparations problem has not yet been solved, we cannot expect 1924 to be an era of industrial prosperity, though there is not much probability of a shortage of fuel. Nevertheless unless the Ruhr agreements fully give what France has a right to expect, the present year will not be a period of abundant coal. The main point lies in the amelioration of the coke situation, but from the present outlook, it is extremely unlikely that there will be a repetition of the precarious condition that prevailed during the past year.

Prices, except for coke, are generally expected to be higher in 1924.

Spot Prices, F.o.b. Mines, on the Columbus Market of Bituminous Coal from the Hocking District.



German Coal Industry Seeks Way Out of Debris of Ruhr Blockade

Buried in Most Momentous Situation Ever Evoked by Coal Mining —
Fear Felt of Probable Partition of Ruhr and Rhineland —
Await Process of Deflation

By H. O. HERZOG
Berlin, Germany

The reviewer of the German coal situation in 1923 is greatly handicapped by lack of authentic data. Official information ceased to be compiled at the beginning of the Ruhr occupation for all of Germany. The sparse figures given out cannot be regarded as reliable, as they have been devoted to substantiate arguments and influence public opinion. In surveying the situation estimates have to be substituted.

The coal situation of 1923 was held completely under the sway of the Ruhr occupation. The latter situation came about, it will be remembered, because deliveries of fuel for reparations constantly fell short of the stipulated quantities and were deficient in quality. This at least is the official explanation, which, by the way, is not accepted in Germany, where deeper designs of the occupying powers are commonly suspected. The shortage was stated by the German side to be about 10 per cent, but it really was somewhat higher. Anyway, experience since then has proved beyond doubt that the quantity of fuel by which Germany was in default was insignificant in relation both to total output and consumption and could have played no part of any importance whatsoever with regard to German needs. The sinister consequences of the Ruhr occupation to the German state are now common property. This is no doubt the most momentous issue in history which coal has evoked.

After the detachment of Upper Silesia and the Sarre district but prior

to the occupation of the Ruhr, the remaining fields' contribution to the total production was as follows:

	Per Cent
Ruhr.....	79.0
Left bank of Rhine.....	5.2
Upper Silesia.....	7.8
Lower Silesia.....	4.4
Saxony.....	3.3
Other parts.....	0.3

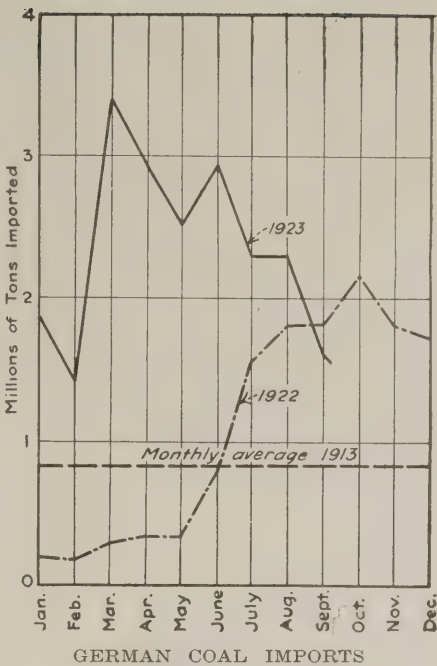
During the first months of the occupation the Ruhr mines continued operations at an undiminished rate, hopeful of an early settlement and trusting that the Franco-Belgian engineering mission would not be able to remove the fuel produced. When these hopes failed to materialize operations were restricted to such quantities as could be disposed of immediately. This strategy was maintained until traffic came to an almost complete standstill, all available storing space occupied.

Beginning in April restriction was placed on extraction and coke production, which in June resulted in a nearly complete shutdown of operations. Only the mines under contract to Holland and Switzerland and engaged in reparations supply to Italy continued at work, hampered however, by transportation difficulties. Production of by-products was continued at a reduced rate. Still the situation did not become precarious until the metallurgical works were deprived of their supply of fuel. The growing unemployment resulting therefrom, which spread over nearly all lines of industry, together with the enormous strain it caused upon the state finances, was responsible for the ultimate collapse of the passive resistance.

RUHR OUTPUT DROPS 90 PER CENT

The output of the Ruhr in 1923, which in January was still 100 per cent, or even more, of the 1922 average, dropped step by step to about 10 per cent at the end of the year. The average was in the neighborhood of 30 per cent. The Ruhr mines outside of the occupied zone produced about 6,000,000 tons of coal and 1,500,000 tons of coke. The total Ruhr production in 1923 may be estimated at 36,000,000 tons instead of 93,788,000 tons in 1922 and 91,006,000 tons in 1921. The shortage compared with last year is about 58,000,000 tons.

In the other districts operations were carried on through the whole year, disturbed, however, by frequent strikes, passive resistance of the workers and impaired by a generally reduced rate of efficiency. The 36,177,000 tons produced in 1922 outside of the Westphalian basin dropped in 1923, by a safe



estimate, to 30,000,000 tons. If these estimates are accepted, the total German production of bituminous coal in 1923 compared with previous years was as follows:

	Metric Tons
1913.....	190,109,000
1921.....	136,227,000
1922.....	129,965,000
1923.....	66,000,000

It is quite impossible to gain any insight on production of coke. In 1913 it was 36,630,000 tons; in 1921, 27,913,000 tons, and in 1922, 29,664,000 tons. In 1923 the production could hardly have exceeded 13,000,000 tons, of which about 5,000,000 tons was contributed by the Ruhr.

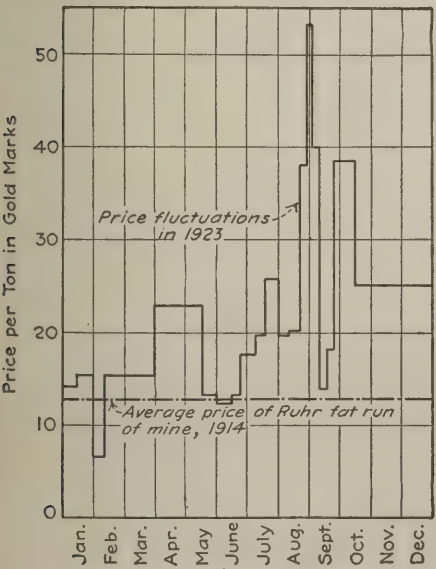
BROWN COAL OUTPUT ALSO SAGS

Brown coal production increased greatly during the first months of the Ruhr occupation, but the declining market in the second half of the year caused a marked reduction of output. The Rhenish brown-coal basin, which was drawn into the vortex of the Ruhr blockade, deprived of part of its market, suffered from a regular glut. All in all brown coal production in 1923 was at least 10 per cent behind the 137,207,000 tons of 1922. The estimated production of 120,000,000 tons of brown coal is equivalent to about 28,000,000 tons of bituminous coal.

In view of the possibility of Ruhr and Rhineland becoming detached from Germany as a separate state, it is of interest to ascertain the distribution of coal reserves which would result therefrom. The following figures present a survey in this respect:

	Metric Tons
Germany's reserves in 1913.....	410,000
Lost to Poland.....	146,000
Lost to France (Lorraine).....	800
Sarre district.....	15,700
Total.....	162,500
Remaining to Germany.....	247,500

The remaining reserves are situated as follows:



MOVEMENT OF COAL PRICES COMPUTED IN GOLD MARKS (PRE-WAR PARITY)

Occupied Rhineland.....	10,500
Occupied Ruhr.....	195,400
	205,900
Unoccupied Ruhr.....	18,200
All other interior parts.....	23,400
	41,600

In the event of such partition the German interior would retain only about 10 per cent of the coal reserves within German frontiers in 1913.

Coal prices in 1923 showed an almost unbroken upward flight. They were changed in ever shortening intervals, at times even weekly. Toward the end of the year they were placed on a gold basis, at which after a few violent convulsions, they remained stable. The paper mark movement of prices showed strong fluctuations. At first it followed the vagaries of the mark rate in the proximity of pre-war prices, always, however, with a marked tendency to rise beyond. In the course of the year this tendency became so pronounced that the coal tax had at first to be reduced to three-quarter and later on was abolished entirely. The price movement is illustrated by the accompanying diagram which compares the prices for Ruhr fat run-of-mine, in 1914 with 1923. The prices have all been reduced to their pre-war gold equivalent at the mark rate prevailing when the prices came into force. The wild jumps, even of the gold equivalent of prices, makes this an interesting record.

PRICE CONTROL BREAKS DOWN

The break-down of the control of coal prices carefully preserved during post-war years was caused by a number of circumstances, foremost of which were the growing dependency on imports, the rapid mark depreciation, the greatly increased price level of mining material and, lastly, the labor situation. At the end of 1923 prices were double the pre-war level.

Most remarkable among the several surprises which the Ruhr occupancy afforded was the fact that an actual shortage of coal in the German interior did not result. The visible supply remained at all stages behind the commonly assumed average of con-

sumption. Still the scarcity, such as there was, was kept within moderate limits. Temporary shortages occurred at various times, confined, however, to certain locations and caused rather by deficiencies of transportation than by lack of supply.

The explanation is to be found in the fact, revealed soon after the beginning of the Ruhr blockade, that the stocks of fuel on hand far exceeded all estimates. Large quantities of fuel had been rushed from the Ruhr to the interior as long as the frontier was open. While these shipments materially increased the stocks in hand, they were of course insufficient to balance the shortage of fresh supply during five or six months.

SUPPLY AND DEMAND RULE AGAIN

When the stocks of fuel were exhausted and the market was closely approaching a hand-to-mouth condition, the decline of industrial activity and stinted consumption caused by the enormous rise of prices quickly restored the equilibrium of supply and demand. Consumption dropped to a level without precedent. Whereas during the first months of the year all mining districts of the interior, working under high pressure, could not cope with the demand, toward the middle of the year a state closely resembling overproduction was reached. The decline became noticeable as early as April. In the subsequent months only coke and brown coal briquets continued in brisk demand. In July, however, a complete calm settled upon the market, lasting without a break until the end of the year.

Imports of coal reflect the decline of consumption but to some extent only. During the first months of the year all efforts were made to obtain as much foreign coal as possible and as finances permitted. Contracts were closed for months ahead. In May, buying on a large scale was stopped and efforts were made to cancel or reduce running contracts. The sharp drop of the market is evidenced in the curve of imports in a much slower decline. Besides, the import continued at a certain

extent even in the face of a pronounced slump on the market of domestic coal, because the latter could not substitute Ruhr coal quality.

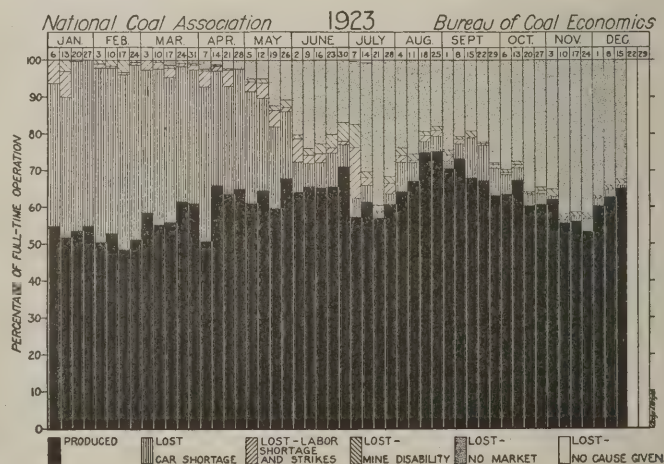
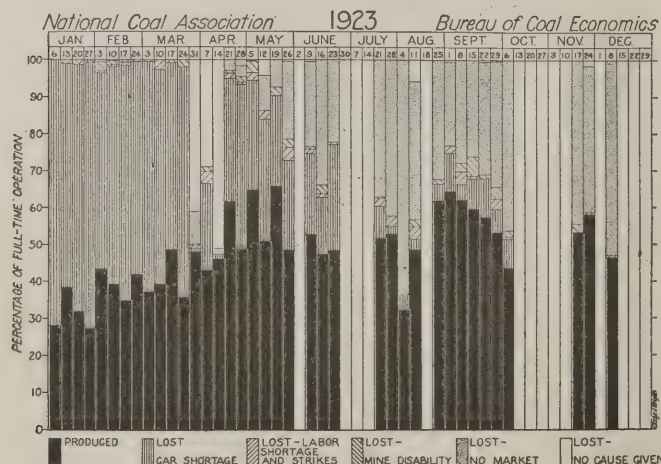
The following figures show coal imports from January to September, 1923, the latter month being the last for which foreign trade returns had become available at the end of the year. The corresponding figures of 1922 are added for comparison. The period mentioned coincides with the duration of the Ruhr occupancy, and therefore its effect on importation is reflected.

GERMAN IMPORTS OF COAL, JANUARY-SEPTEMBER, 1923 AND 1922
(In metric tons)

	1923	1922
January.....	1,870,127	194,078
February.....	1,421,832	162,735
March.....	3,397,658	284,979
April.....	2,920,097	336,921
May.....	2,495,649	333,704
June.....	2,977,179	789,799
July.....	2,286,010	1,542,223
August.....	2,280,952	1,721,173
September.....	1,601,913	1,815,036
Total.....	20,311,996	7,180,647

The zenith of imports was reached in March. Comparing the figures of 1923 and 1922 it would seem that about 13,000,000 tons represents the total import increment due to the Ruhr occupancy. There is, however, a doubtful element in this conclusion. It leaves out of consideration the fact that in the six months preceding the Ruhr occupation imports had reached an average of 1,750,000 tons per month. The monthly average of January-September, 1923, was 2,250,000 tons. On the basis of the former the increase of the latter would appear to be only 500,000 tons per month. It must be supposed that the Ruhr occupation was considered in Germany an inevitable fact and preparation for it made long before it took place. The only feasible explanation seems to be that the sharp rise of coal imports in the second half of 1922 was part of the program to accumulate reserves for this event.

The following figures show imports of coal and byproducts in January-September, 1923, in comparison with the corresponding period of 1922, in metric tons.



Southern Appalachian. PERCENTAGE OF FULL-TIME OPERATION OF COAL MINES AND TIME LOST BY CAUSES

	1923	1922
Bituminous coal.....	20,311,996	7,180,647
Brown coal.....	1,183,352	1,751,948
Coke.....	1,074,673	1,781,090
Patent Fuel { bit. coal.....	121,340	14,227
brown coal.....	44,548	29,661
Coal tar.....	10,772	24,017
Pitch.....	11,421	18,411
Light oils.....	18,014	1,627
Heavy oils.....	6,401	508
Naphthalin.....	2,135	561

With regard to countries of origin, Great Britain is first by a wide margin, Polish Upper Silesia following. The respective figures are, in metric tons:

	1923	1922
Great Britain.....	12,076,847	4,957,488
Polish Upper Silesia.....	7,235,043	984,486
Sarre district.....	103,680	814,672
Czechoslovakia.....	652,959	101,654
Other countries.....	243,466	322,348

Of the 1,074,673 tons of coke imported 745,446 tons was of British origin, 139,900 tons came from Polish Upper Silesia and the rest from other countries not specified.

The export of coal and byproducts in January-September, 1923, in comparison with the corresponding time of 1922 was as follows, in metric tons:

	1923	1922
Bituminous coal.....	841,703	4,675,186
Brown coal.....	5,083	11,732
Coke.....	197,042	729,726
Patent fuel { bit. coal.....	14,338	37,968
brown coal.....	196,431	299,957
Coal tar.....	14,409	15,158
Pitch.....	14,568	56,926
Light oils.....	914	4,326
Heavy oils.....	27,284	97,161
Naphthalin.....	3,170	2,958

Alaska Coal Output Jumps 25 per Cent in 1923

In 1922 Alaska produced 79,000 tons of coal from twelve small mines and in 1923 about 100,000 tons from the same number of mines, according to the U. S. Geological Survey. The largest quantity came from the Evan Jones mine, in the Matanuska field, and the Healy River mine, in the Nenana field, both served by the Alaska R.R. The significant feature of the year is that the territory is supplying more and more of its own fuel.

Though some exploration of the high-grade coal of the Matanuska and Bering River field was continued in 1923, it has not yet been proved that these fuels can be mined cheaply enough to find an export market. Meanwhile evidence of the enormous reserves of lower grade bituminous and lignitic coals in Alaska is accumulating each year. S. R. Capps reports the finding of workable beds of coal carrying about 60 per cent of fixed carbon at Mile 341, on the Alaska R.R. This coal, which has been opened up, occurs in the Cantwell formation (Eocene), which is widely distributed in this region and long known to carry small seams of coal, but this is the first bed found that has been proved to be of commercial value. The bed mined is from 5 to 6 ft. thick. The discovery of the bed itself is significant, as it is easily workable and quite accessible. Of possible greater significance is the proof of the presence of a new coal-bearing formation near the railroad.

Though the development of Alaska's

The chief countries of destination of coal and coke exports were Holland, Czechoslovakia, Switzerland and Austria.

The situation at the end of the year, three months after the end of the Ruhr blockade, is greatly involved and very precarious. Business is still ebbing and no turn of the tide is in sight. The retrogression of prices, from the exorbitant level they reached during the last excesses of inflation, which put German industry completely out of business for the time being, is a slow and tedious process. No decided revival of the coal market can be hoped for until this process is completed.

GLOOMY OUTLOOK FOR 1924

The bold experiment of rebuilding a gold currency without a gold basis is yet untried. Confidence is lacking. In consequence a dangerous unstability of basic conditions prevails. The outlook for this coming year is therefore gloomy in the highest degree. Moreover, the fate of the Rhineland and the Ruhr is hanging in the balance. Developments point in the direction of a gradual but inevitable alienation of these two provinces. The consequences of their ultimate detachment would be quite impossible to forecast. The understanding arrived at between the Ruhr mines and the Interallied Mission of

Control also is more in the nature of an experiment, compelled by the force of circumstances rather than a well-considered action. It remains to be seen, whether the coal industry of the Ruhr can carry the enormous burden it involves.

The only gleam of light visible at the advent of the new year is the labor situation. The resistance of the miners and the labor element in general to the return to pre-war condition, assisted by a regular tidal wave of unemployment, apparently has been broken. The re-establishment of pre-war labor conditions seems to be on the way. It is impossible, however, to overlook the fact that the acquiescence of the working classes is not due to any change of mind in the matter of their much cherished so-called revolutionary achievements but rather to the fact that, labor funds having been swept away by the vortex of inflation, labor has no hope of defending them effectively in a drawn-out struggle.

The end of 1923 finds the German industry trying to hew a way out of the heap of debris under which the great landslides of the year nearly buried it. This road is strewn with a great number of "Ifs" which defy forecast. Only the great vitality still remaining in the people supports the belief in ultimate success.

high-grade coal has thus far been disappointing, there are vast coal reserves of less fuel value in the territory, and a considerable percentage of these has been made accessible by the government railroad. There can be no reasonable doubt that these reserves will eventually be drawn upon to supply the growing population of the Pacific seaboard.

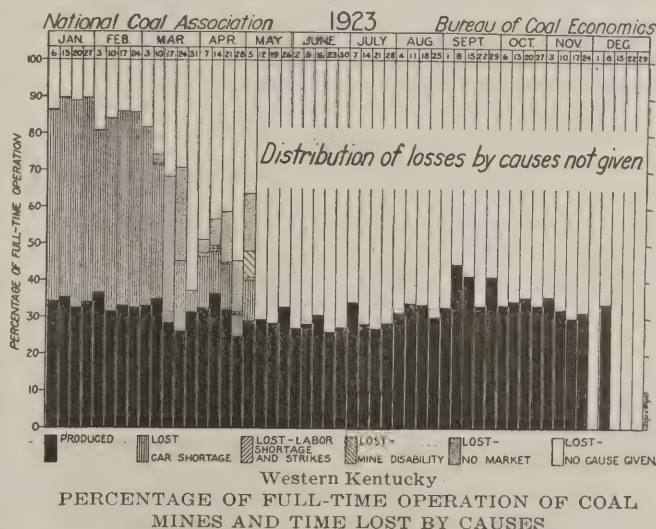
There are enormous areas of coal-bearing formations in northern Alaska, though most of them are now too inaccessible to be utilized. William T. Foran, of the U. S. Geological Survey, who last summer explored the Arctic littoral between Cape Beaufort and Wainwright Inlet, found evidence of a northern and inland extension of the Corwin coal beds.

Mr. Foran found some gently folded coal beds on Kukpowruk River, five or six miles from the coast, which dip from 20 to 40 deg. and are not broken. Some thirteen beds were seen, 4 to 10 ft. thick. Though not yet analyzed, these coals appear to be of the quality of the Corwin coals, which are sub-bituminous. This part of the Arctic coast is accessible to vessels from two to three months, and it af-

fords better shelter than that at Corwin. These coals, which probably are of the Jurassic age, might be utilized to supply Nome and northeastern Siberia.

Shipments from Duluth Drop

Shipments from Duluth-Superior docks suffered a falling off during the past year, according to figures made public last week by the Duluth dock authorities. These figures show that during 1923 199,503 cars went out from the local docks, as compared with 245,683 cars in 1922. This falling off in shipments, coupled with the largest receipts in years, leaves large stocks on the docks. Only continued cold weather will assure a clean-up before spring.



News Of the Industry

No Bituminous-Coal Dictator—Yet; Industry Can't Afford Big Salary

The bituminous coal industry, for the present at least, is not to have a dictator. This was decided definitely at a meeting of the Board of Directors of the National Coal Association in Washington Jan. 8 and 9. The reason given for the action is that the industry cannot afford to pay such salaries as are received by Will Hayes and Judge Landis. There are some who see in this nonchalant dropping of the proposition that had been so stoutly urged a few months ago the passing of the crisis which loomed then.

The directors paid a high tribute to John C. Brydon, president of the association, and expressed their deep appreciation of the sacrifices he has made to further the welfare of the industry. Harry L. Gandy, the executive secretary, was instructed to relieve Mr. Brydon of as much work as possible in the future, so that the demands on his time would be less exacting.

President Brydon was authorized to name several committees. One of these committees is to confer with a similar committee of the American Mining Congress and to study Senator Oddie's bill providing for a Department of Mines. Another committee is to study the practicability of establishing coal exchanges. Still another committee is to be named to prepare resolutions expressing the sorrow of the directors occasioned by the death of Julian B. Huff, of the Keystone Coal & Coke Co., of Greensburg, Pa.; R. M. Randall, of the Consolidated Coal Co., of Michigan, and of Kuper Hood, of the Houston Coal Co., Cincinnati.

The time and place of the annual meeting are to be determined by an-

other committee which Mr. Brydon is authorized to name.

C. E. Bockus, D. B. Wentz and another member to be chosen were designated as the National Coal Association's representatives on the committee which is to act in an advisory capacity to the coal division of the Department of Commerce. The American Wholesale Coal Association and the National Retail Merchants' Association already have designated the three members which each association was asked to select for service on that committee. For service on the committee in the absence of the members, three alternates will be chosen. The anthracite operators and the railroads also are to be represented on the committee.

The railroad relations committee is to be known in the future as the transportation committee. George C. Eastwood, general manager of the Consolidated Coal Co., of Saginaw, was elected a director to fill the unexpired term of R. M. Randall.

Whether or not the association will print an annotated edition of the report of the Harding Coal Commission will be decided when enough members have indicated their desire to purchase the book, at cost, to justify its printing.

The Board of Directors of the association unanimously adopted the following resolution regarding taxation at the quarterly meeting:

"Whereas, A strong expression of opinion coming from members of the National Coal Association, located in the twenty-nine bituminous-coal producing states, is to the effect that the present system of federal taxation is seriously interfering with the re-estab-

lishment of stable and prosperous industrial conditions in the country, and

Whereas, the condition of the times requires the greatest possible reduction in taxes for all classes, therefore Be it resolved, That we favor a curtailment of governmental expenditures and a much needed reduction in taxation so that capital, instead of finding its way into tax-exempt securities, will seek investment, resulting in industrial expansion."

Twenty-six of the thirty-six directors were present. Six of the ten who were prevented from attending were represented.

Commends Coal Commission's Handling of Complex Job

Commenting on the report of the Harding Coal Commission, Richard T. Ely, a widely known economist, says:

"The complexity of the problems in mineral lands is illustrated by the recent investigation by the U. S. Coal Commission. While there are those who are expressing themselves as dissatisfied with the reports of this commission, it is generally conceded that its work is commendable because of the commission's effort to get at the economic as well as technical facts regarding this one industry.

"Pressing problems of a complex nature have resulted from the rapid growth of the mineral industry and we cannot expect to wave a wand and correct all ills.

"In the past, much effort and time have been spent in solving the technical problems of the industry, and in the solution of these rapid progress is being made. The economic aspect of the problems has been neglected to a great extent, but the time has come when more attention must be paid to these."

Average Spot Prices of Bituminous Coal, F.o.b. Mines

(Unit, net ton of 2,000 lb.)

Month	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
January	\$1.46	\$1.21	\$1.13	\$1.53	\$4.15	\$2.48	\$2.57	\$2.57	\$3.26	\$2.25	\$4.38
February	1.22	1.16	1.12	1.40	4.18	2.53	2.49	2.58	2.77	2.20	3.59
March	1.17	1.17	1.09	1.27	3.89	2.58	2.47	2.58	2.63	2.12	3.20
April	1.17	1.16	1.08	1.24	3.21	2.64	2.43	3.85	2.62	2.24	2.84
May	1.15	1.16	1.07	1.21	4.14	2.67	2.38	4.59	2.68	3.11	2.68
June	1.14	1.12	1.07	1.26	4.00	2.57	2.40	7.18	2.52	2.56	2.56
July	1.18	1.12	1.05	1.22	3.17	2.58	2.47	8.24	2.40	4.67	2.40
August	1.22	1.13	1.07	1.30	3.24	2.58	2.76	8.51	2.42	6.13	2.39
September	1.23	1.11	1.10	1.57	2.02	2.58	2.91	8.52	2.37	5.58	2.46
October	1.29	1.13	1.12	2.26	2.02	2.58	3.09	7.78	2.33	4.48	2.28
November	1.31	1.10	1.17	3.87	2.48	2.58	2.57	5.87	2.35	4.11	2.25
December	1.26	1.11	1.33	4.01	2.48	2.58	2.58	4.38	2.26	4.05	2.18
1st Quarter	1.28	1.18	1.11	1.40	4.07	2.53	2.51	2.58	2.89	2.19	3.72
2nd Quarter	1.15	1.15	1.07	1.24	3.78	2.63	2.40	5.20	2.61	2.64	2.69
3rd Quarter	1.21	1.12	1.07	1.36	2.81	2.58	2.71	8.76	2.40	5.46	2.42
4th Quarter	1.29	1.11	1.21	3.38	2.33	2.58	2.74	6.01	2.31	4.21	2.23
Yearly average	1.23	1.14	1.12	1.85	3.25	2.58	2.59	5.64	2.55	3.67	2.77

Relative Prices of Bituminous Coal

SPOT PRICES JULY, 1913-JUNE, 1914, AS BASE

1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
120	100	93	126	343	205	213	212	270	186	362
101	96	92	116	346	209	206	213	229	182	297
97	96	90	105	321	214	204	213	217	175	264
97	96	89	103	265	218	200	318	217	185	235
95	96	89	100	342	221	197	379	222	257	221
95	93	88	104	331	212	198	393	208	212	212
97	93	87	101	262	213	204	681	198	386	198
100	93	88	107	268	213	228	786	200	507	198
102	92	91	130	167	213	241	704	196	461	203
106	93	93	187	167	213	256	643	193	370	188
108	91	97	320	205	213	212	485	194	340	186
104	92	110	332	205	213	213	362	187	335	180
106	97	92	116	337	209	208	213	239	181	307
96	95	89	102	313	217	198	430	216	218	222
100	93	89	113	232	213	224	723	198	451	200
106	92	97	280	192	213	227	497	191	348	184
102	94	91	152	269	213	214	466	211	303	226

Daugherty Would Forbid Dissemination of Trade Data by Associations

In "Informal Correspondence" Says He Sees No Objection to Collection of Statistics by Organizations, but Would Put Distribution in Hands of "Responsible Medium"

Another chapter in the history of trade-association activities was added last week, when there was released another batch of correspondence between the Secretary of Commerce and the Attorney General. Mr. Hoover asked Mr. Daugherty whether the Department of Justice interpreted the consent decree in the Tile case as a prohibition to trade associations co-operating with the Department of Commerce from distributing tabulations among members. That, it will be remembered, was one of the things prohibited in the Tile decree. Mr. Daugherty replied that that is just what he meant and added much about trade associations and collection of statistics in general.

The letter of the Attorney General to Mr. Hoover says that it is a fallacious idea that just because data collected by associations relate to past and closed transactions, there can be nothing illegal about such collection. It is further stated that it is a fallacy to conclude that just because the figures collected are given to the public in any form, no matter how thoroughly, the transactions are legal by reason of such publicity.

When asked for an expression of opinion as to the correspondence between Secretary Hoover and Attorney General Daugherty, Judge Nathan B. Williams, associate counsel of the National Association of Manufacturers, said:

"It is sincerely to be regretted that on a question of vital public policy, interesting alike to the business community and all who buy or consume the products of our industry, the Secretary of Commerce and the Attorney General of the United States engage in 'informal' letter writing. This extensive correspondence makes slight, if any, contribution to the clarification of the law concerning the statistical activities of trade associations.

"Apparently, legitimate trade associations will continue their statistical and other activities without reference to this 'informal' correspondence; they will not transgress the well-known inhibitions of existing law, in that they will not misuse their statistical or other trade information in promotion or furtherance of any agreement or conspiracy to fix prices, limit production, restrict sales, divide territory, or otherwise restrain lawful competition in commerce; and it appears likely that they will decline to supply any of such information to any department of the government except that which may be called for by statute under the provisions of the laws providing for the taking of the decennial and other censuses."

Secretary Hoover's letter of Dec. 11

to Attorney General Daugherty was, in part, as follows:

"Some time ago I realized that the carrying out of the purposes of this department as set forth in the organic act 'To foster, promote and develop a foreign and domestic commerce, the mining, manufacturing, shipping and fishing industries, and the transportation facilities of the United States,' required that the character of information desired, and the gathering of it from the individual units of industry would involve such a gigantic physical task that this department with its facilities could not undertake such action with the faintest hope of attaining the ends desired. I therefore have in the past utilized to a very considerable extent the trade associations as a medium for securing such information and have received splendid co-operation from them as a whole.

"Seeking to clarify the situation regarding legitimate trade association activities, I set forth my views in several letters to you in February, 1922, and requested your informal opinion as to the legality of many association functions, including the collection and distribution of the character of information herein referred to. Predicated principally upon your informal views in reply thereto, this department formulated a plan of co-operation with trade associations under which the association's secretary collects and compiles unidentified current information and distributes it to the members simultaneously sending identical reports to governmental agencies, competitors of the association's members, and to any other person who arranges for them. Under this plan no supplemental or separate reports are transmitted to the members only. This department receives all such reports for wide dissemination by publication.

"My attention has been directed to a decree entered Nov. 26, 1923, in the District Court of the United States for the Southern District of Ohio, in the case of United States vs. Tile Manufacturers Credit Association, et al, paragraph two of page four of which is as follows:

Provided, however, that the defendants are not restrained or enjoined from maintaining an association, either voluntary or incorporated, for the following objects and purposes and none other.

after which various permissible activities are set forth. Paragraph 2 of page 3 is as follows:

Provided, however, that the defendants may through the association, or corporation hereinafter provided for, receive and compile for transmission to any governmental agency such information and statistics as it may request as to the production, shipments, the stocks on hand and the prices of tiles, but are restrained from distributing said information among them-



Wide World Photos.

Harry F. Bovard

Mr. Bovard, who lives in Greensburg, Pa., was recently elected president of the Keystone Coal & Coke Co., the largest producing company in Westmoreland County, succeeding Julian B. Huff, who died in Philadelphia Dec. 23. Thirty-two years ago Mr. Bovard became a clerk in the employ of Coulter & Huff, predecessors of the Keystone company, whose coal operations were the first in the Greensburg basin.

selves, except that information respecting sales may be collected annually and used to enable the assessment of the several members for their proportionate parts of the several expenses of the association, and for no other purpose.

"I interpret the last quoted paragraph to mean that it would be unlawful for the proposed association on behalf of its members to transmit information and statistics of the character therein described to its members, but that it could receive and compile it for the purpose only of transmitting it to a governmental agency that might so request.

"It is my understanding that this decree is only binding between the parties thereto; however, in view of informal conversation between representatives of your department and this department on the subject of trade-association activities, I am inclined to be of the opinion that the last-mentioned paragraph embodies an expression of the present policy of your department relative to the collection, compilation and distribution of information and statistics of the character therein set out applicable to trade associations in general.

"It is not the desire or purpose of this department to continue operations under the co-operative plan if it is in conflict with the policy of your department; it is our desire, however, to call your attention to the situation that in my opinion will develop, if my interpretation of this decree correctly expresses the policy of your department.

"I think there is great likelihood that not only the associations from which this department now receives valuable statistics but a great many others will

discontinue the collection of information and statistics as to production, shipments, stocks on hand and the prices on closed transactions. They will not go to the expense of collection, if the only use that can be lawfully made of them is to transmit them to some governmental department. If this should happen, I fear that the efficiency of this department in carrying out the purposes set forth in the act creating it would be very greatly impaired.

"I respectfully request that you informally advise me, in view of the foregoing, whether or not this department should discontinue its present plan of cooperation with trade associations."

MR. DOUGHERTY'S INFORMAL REPLY

Replying under date of Dec. 19, 1923, Mr. Daugherty wrote in part as follows:

"You will observe that this proviso in the decree complies strictly with the paragraphs above quoted from your letter of Feb. 3, 1922.

"Two objects were had in mind during the conferences which preceded the above-mentioned correspondence, both of which it was thought were secured by the limitations embraced in the above quoted paragraphs of your letter: First, that the information distributed should be general, and, second, that individual contact between those engaged in the same industry with reference to matters which vitally affect prices should be avoided. If the character of the information and the manner of its dissemination be restricted as specified in your letter, one member would not be informed as to the individual activities of another member, and those engaged in the industry would be prevented from revealing their business to their competitors.

"Under the system now practiced by many of the associations each member reports its production, shipments, stocks on hand, and each individual sale, stating the price at which it is made and, generally, the locality where made; and this information is distributed by the secretary or manager of the association among all the members, though in some associations the names of the members making the sales are omitted. Thus each member reveals the details

Wooden Coal

Out West they used to burn buffalo chips, cobs, hay, corn and whatnot instead of coal, but these things hardly were ranked as fuel "equal to anthracite." The latter claim, however, is made for pressed sawdust briquets, now being manufactured in the State of Washington. It is announced that tests show this "wooden coal" to be 97 per cent carbon, 2 per cent volatile and 1 per cent ash. It can be briquetted for \$6 a ton, according to those interested. The enterprise would depend upon the great waste piles of sawmills for its raw material.

of his entire business to every other member, which, as suggested by the Supreme Court in the Hardwood case, is entirely inconsistent with the normal attitude of real competitors.

"In my judgment the effect of general information as to the conditions of an industry, such as the total production, shipments, stocks on hand and the average price, or range of prices, is entirely different from that resulting from each person engaged in an industry receiving directly, or through a common medium, reports which reveal to him the exact condition of the business of all of his competitors. When thus informed each one is invited, and is naturally inclined, to imitate the conduct of his most successful competitor; and the spirit of comradeship created by the confidential exchange of information of this character necessarily prevents the free competition between them which would otherwise prevail.

"Those who organize and conduct these associations appear to entertain the idea that if the information imparted relates only to past and closed transactions there can be no violation of the Anti-Trust Act. In my judgment such an idea is wholly fallacious. One's future conduct is to be judged by what he has done and is then doing, and not so much by what he says he will do. It is one's actual conduct that is taken as an example for imitation.

It has developed in the trial of cases involving associations that the members first agreed-upon prices; but such a plan did not work because the members could not be relied upon to keep the agreement; and the system of exchanging statistics was adopted because it was found to be the only effective way to procure co-operation as to prices and production; and such co-operation could be thus procured even in the absence of any positive agreement.

"Again, the idea seems to be prevalent that no exchange of information between the members, regardless of its extent or character, can be unlawful if at the same time publicity be given thereto through the press or some governmental agency. In my judgment this idea is likewise fallacious. The illegality as well as the evil results arise from the co-operation among the members pursuant to a positive or tacit understanding; and this co-operation is not affected by publicity. Those who purchase the commodity, though fully informed as to the activities of the association, can protect themselves only by an organization and co-operation of like character, which, if it were lawful, is an impossibility upon the part of the public.

"I have no doubt that it is important that those engaged in an industry have general information as to the conditions of that industry, but I think that information should be distributed strictly through a responsible medium, like your department; and I see no objection to its being gathered by an association provided it be strictly guarded and the association be prohibited from distributing it among its membership. This is the same view that I entertained when the communications were exchanged in February, 1922; and it has since been strongly confirmed by decisions of the Supreme Court, and by investigations of a number of associations and the trial of cases involving associations.

"This is but a statement of the position I feel impelled to take as Attorney General of the United States in enforcing the Anti-Trust Act. But, of course, as to what activities and how far you will co-operate with trade associations are matters for your determination in conducting your department."

Bituminous Coal Loaded Into Vessels at Lake Erie Ports During Season of 1923

(In Net Tons)

Ports	Railroads	1923			1922			1921		
		Cargo	Fuel	Total	Cargo	Fuel	Total	Cargo	Fuel	Total
Toledo.....	Hocking Valley.....	5,026,533	151,965	5,178,498	3,241,786	92,597	3,334,383	4,426,687	116,157	4,542,844
	N. Y. C.-Ohio Central Lines.....	1,182,193	36,966	1,219,159	860,814	27,965	888,779	1,106,251	32,319	1,138,570
	Baltimore & Ohio.....	2,891,967	84,402	2,976,369	2,912,587	77,864	2,990,451	2,561,015	78,085	2,639,100
Sandusky.....	Pennsylvania.....	3,008,096	95,726	3,103,822	2,794,264	99,730	2,893,994	1,853,148	52,138	1,905,286
	Wheeling & Lake Erie.....	1,481,428	58,439	1,539,867	430,222	17,587	447,809	1,577,500	45,468	1,622,968
Lorain.....	Baltimore & Ohio.....	3,667,957	196,569	3,864,526	1,836,014	91,529	1,927,543	2,546,216	103,113	2,649,329
Cleveland.....	Pennsylvania.....	1,870,527	201,470	2,071,997	1,056,464	93,239	1,149,703	2,062,722	91,910	2,154,632
	Erie.....	739,025	31,920	770,945	381,903	14,464	396,367	359,981	12,782	372,763
Fairport.....	Baltimore & Ohio.....	912,131	82,236	994,367						
Ashtabula.....	New York Central.....	3,380,040	255,746	3,635,786	1,515,608	88,464	1,604,072	1,125,792	62,214	1,188,006
	Pennsylvania.....	2,147,144	94,482	2,241,626	1,674,618	90,038	1,764,656	2,300,210	78,097	2,378,307
Conneaut.....	Bessemer & Lake Erie.....	2,783,640	242,057	3,025,697	1,618,192	63,317	1,681,509	1,474,202	20,603	1,494,805
Erie.....	Pennsylvania.....	738,103	96,532	834,635	199,670	72,387	272,057	1,018,656	66,183	1,084,839
Totals.....		29,828,784	1,628,510	31,457,294	18,522,142	829,181	19,351,323	22,412,380	759,069	23,171,449

Compiled by Ore & Coal Exchange, Cleveland, Ohio; H. M. Griggs, manager.

Midwest Retailers Decide Not to Split From Their National Association

Instead They Appoint at Chicago Meeting Half of East-and-West Committee on New Policy—Hear Proposals for Coal Exchange and for National Coal Institute

Coal men representing the most important retail interests in the Middle Western States decided at Chicago on Jan. 12 not to withdraw from the National Retail Coal Merchants' Association, although a considerable number of them went to the meeting frankly favoring the creation of a separate Midwest retailers' group. Instead they spent the entire day debating with some heat various problems over which there has been difference of opinion as between East and West, and the evening listening to plans for a coal exchange and a national coal institute, and finally chose a committee of eight which will meet a committee to be appointed by Samuel B. Crowell, president of the National, to represent the Eastern groups of the association. This body is expected to report at the next national convention in Bluefield, W. Va., in June, various changes in the policy and program of the National that will make that body stronger and of more complete service to all sections of the country.

The eight Westerners on the committee are Marshall Keig and Ashley Miller, of Chicago; Ely Barkhume, of Detroit, Mich.; R. H. Jones, of Kenosha, Wis.; H. L. Laird, of Minneapolis, Minn.; Frank G. Laird, of Indianapolis, Ind.; H. S. Mitchell, of Kansas City, Mo., and R. D. Kelly, of Springfield, Mo.

During the day the Midwesterners, who were in session at the invitation of the Chicago Coal Merchants' Association, passed resolutions favoring the Mellon plan of tax reduction and favoring the House bill introduced by Representative Dyer, of Missouri, aimed to reduce the loss of coal caused by theft in transit, by stiffening the penalty for such theft.

John R. Mauff, a member of the Chicago Board of Trade, which operates the grain-trading mart of that city, spoke at a banquet of retailers and producers on the proposed creation of "The United States Coal Exchange," which he would like to see the coal trade set up. He has had much experience in creating such exchanges in various industries. The last venture was in paper—an exchange which did not survive in its original form because of too great diversity of interests.

Mr. Mauff's plan would draw together producers, sellers and buyers of coal on a membership basis like that employed in any other trading exchange. It would bring coal trading into the light of day—in raucous voices—with much benefit to the industry, he thinks. It would be intended to protect the coal trade from "unjust and unlawful exactions," to diffuse accurate

and reliable information among members, to produce uniformity in contracts and the customs of coal trading, to settle differences between members, to provide standards of quality and other such advantages.

Mr. Mauff would have the exchange accept the best known grades of coal as setters of basic prices "with other grades established at a differential higher or lower according to quality and the actual scientific and demonstrated monetary difference in values existing from time to time." He would have a statistical service broadcast the statistics of the market and a daily report go to all members showing sales and shipments. He denied that the exchange would replace coal men's associations, pointing out that the grain exchange in Chicago has not dissolved the several associations of its members. In fact he believes, in view of Attorney General Daugherty's recent ruling against the compilation of trade statistics by associations, that an exchange is the only legal vehicle by which such compilations and reports could be made.

President Crowell of the National association, described the "National Coal Institute" which the retailers' national association would like to see created. It would be a bureau equipped to make various studies of all manner of fuel problems from a scientific and more or less disinterested viewpoint. Such an institute should aid the coal industry in the defence against oil, it should educate the public concerning coal, through publicity and other channels, in a way that has never been so much as approximated, and should serve as a valuable contact between coal producer, coal seller and coal consumer.

"For a good many years," said Mr. Crowell, "I have been thinking—dream-

ing would be a better word—of a day when the coal industry, all branches of it, would be united in a great co-operative movement for its own betterment and the better service of the public—the awakening of public opinion to the fact that we coal men are in reality decent citizens and not rascals. Recent happenings would seem to indicate that there is a possibility of my dream coming true.

"Most of you probably are aware that the anthracite operators have opened in Philadelphia what they call a Coal Economy Show. They have gone to great expense and have spared no pains to interest the public in this show, which is the first of four similar exhibitions to be opened within the month in the principal cities of the East. Primarily, these shows are designed to create a domestic market for the small sizes of anthracite, but the Philadelphia exhibition is having a much wider influence. It contains a mass of valuable information concerning the production and distribution of anthracite and the producing companies have detailed the best men among their engineers and fuel experts to explain the exhibits and advise consumers regarding various heating problems.

"One of the principal features of the show is the handling of complaints made by disgruntled consumers. This is done through the co-operation of our retail organization, the Philadelphia Coal Exchange. Complaints regarding quality, received at the show, are referred to the Exchange. We send an impartial investigator, employed by the organization, to look into the complaint, which usually has to do with quality; we take care of correct weights ourselves. If the fault lies with the dealer—if he has made a bad delivery—we get after him. If the fault lies with the shipper the operators get after him. The system is by no means perfected yet—it has been in operation only a little more than two weeks—but the point I want to emphasize is that it marks the beginning of closer co-operation between dealers and producers and the beginning of the end of the ancient and profitless system of buck-passing between these branches of the industry.

"The effect of this attempt at co-operation with the public and the endeavor to adjust disputes is seen in the changed attitude of the Philadelphia newspapers, which heretofore have been merely passive where they were not openly hostile. Now, without exception, they are saying nice things about the anthracite industry.

"I believe that the co-operative spirit is more in evidence in the retail coal trade than anywhere else in the industry, but it is mainly co-operation among ourselves. What I want to see and what must come about if the industry is to assume before the public and the politicians the position to which its importance entitles it, is not merely co-operation between retailers, or wholesalers, or producers as such, but the

Oiling St. Louis

A study of oil competition with coal made in and around St. Louis, Mo., awakens many coal producers whose natural market is in that territory to the fact that during 1923 the number of oil burners in the region grew from 200 to almost 3,000. It is estimated that each has replaced 25 tons of coal per year, which means "no market" for 75,000 tons in total. The local retailers' association of the region is running an advertising campaign in defence of coal though a great many dealers have taken on an important side line and now sell both coal and oil from the same yard.

broadest kind of co-operation of all branches, one with another.

"Much can be accomplished to this end through the national associations. We have ours, the wholesalers have theirs and so have the producers. We should use these organizations to the fullest extent in an effort to co-ordinate the entire industry into a harmoniously working body.

"Let us, therefore, proceed to mend our own fences in a spirit of harmony as between the various branches of the trade. And in doing so I ask you to keep in mind the goal which is my dream—a broad co-operative organization of coal men, a coal institute if you like—to which everybody, public, coal men and, if you will, politicians, may turn for information and advice on every subject connected with fuel, freely given by men of recognized ability whose words will be accepted as authoritative; an organization the very character of which will eventually place the industry where it belongs in the public mind."

At the banquet the National Association presented a grand piano to Homer D. Jones, of Chicago, former president for a year. John Lloyd, of Philadelphia, was toastmaster. Charles M. Moderwell, of Chicago, a veteran operator and wholesaler, in a brief speech warned the retailers that the coal industry must pull together or "something unpleasant is going to happen to us."

Kansas Governor Finds Coal Prices Lower

The usual winter protests on coal prices have been reaching Governor Jonathan Davis, especially from Topeka, Lawrence and Emporia. He insisted somebody should investigate. All state departments that might logically make such a quiz asserted that they were too busy. So Governor Davis made the Industrial Court judges assistant attorneys general. Finally Judge John J. Crawford reported that in Topeka prices are from \$1.25 to \$1.75 lower than last year with no changes in freight rates. He said that Illinois producers, with thick coal, are making a drive to take the Missouri Valley markets with prices too low for Kansas and Oklahoma producers to meet, in spite of their short-haul advantages.



R. M. Randall

Mr. Randall, who died at Battle Creek Jan. 1, was a man of varied interests, having been a banker and lumberman as well as general manager of the Consolidated Coal Co. of Michigan. He also was a director of the National Coal Association.

Conclude Argument in Maynard Case

Concluding arguments in the case of the Maynard Coal Co. against the Federal Trades Commission were presented to the Court of Appeals of the District of Columbia Jan. 10. The case was argued by Mr. Basic, attorney for the Trade Commission, and by former Judge Stephen A. Foster, of Chicago.

In his argument Mr. Basic contended that in demanding cost of production data the commission was merely seeking information from the coal industry, while Judge Foster insisted that the commission in doing so was trying to regulate the industry.

At the request of Mr. Basic, the commission was permitted to file with the court the brief of the Solicitor General of the United States filed in the U. S. Supreme Court in the Claire Furnace case.

The indications are that the Court of Appeals will not render a decision in the Maynard case until after the U. S. Supreme Court decides the Claire Furnace case.

Daily Byproduct Coke Output Slightly Lower Last Month

The daily rate of output of byproduct coke declined slightly during the last month of 1923. While the total output of byproduct coke was somewhat greater than in November—2,999,000 tons against 2,942,000—the output per day decreased from 98,055 tons to 96,740 tons, a decline of 1.3 per cent. The percentage of production to capacity declined from 81.1 per cent to 80.1 per cent. There was no change in the number of plants active; out of 70 byproduct installations now in existence, 65 were in operation and 5 were idle.

The total production of the beehive ovens in December was 1,063,000 tons, a decrease of 40,000 tons compared with November. The output in December, however, was reduced by the Christmas holiday and by the occurrence of five Sundays in one month, and the rate of production per working day underwent no change.

MONTHLY OUTPUT OF BYPRODUCT AND BEEHIVE COKE IN THE UNITED STATES (a)
(In Thousands of Net Tons)

	Byproduct Coke	Beehive Coke	Total
1917 Monthly average	1,870	2,764	4,634
1918 Monthly average	2,166	2,540	4,706
1919 Monthly average	2,095	1,638	3,733
1920 Monthly average	2,565	1,748	4,313
1921 Monthly average	1,646	462	2,108
1922 Monthly average	2,374	669	3,043
October 1923	3,099	1,290	4,389
November, 1923	2,942	1,103	4,045
December, 1923	2,999	1,063	4,062

(a) Excludes screenings and breeze.

In spite of this gradual decline in the output of coke, the ovens continue to require very large quantities of coal. To manufacture the coke produced in December required the charging of 5,986,000 tons of coal, of which 4,309,000 tons was used by the byproduct ovens alone.

ESTIMATED MONTHLY CONSUMPTION OF COAL FOR MANUFACTURE OF COKE (a)
(In Thousands of Net Tons)

	Consumed in Byproduct Ovens	Consumed in Beehive Ovens	Total Coal Consumed
1917 Monthly average	2,625	4,354	6,979
1918 Monthly average	3,072	4,014	7,086
1919 Monthly average	2,988	2,478	5,466
1920 Monthly average	3,684	2,665	6,349
1921 Monthly average	2,401	706	3,107
1922 Monthly average	3,411	1,056	4,467
October, 1923	4,452	2,035	6,487
November, 1923	4,226	1,740	5,966
December, 1923	4,309	1,677	5,986

(a) Assuming a yield of merchantable coke of 69.6 per cent of the coal charged in byproduct ovens, and 63.4 per cent in beehive ovens.

Receipts of Coal at Milwaukee by Months in 1923

(In Net Tons)

Month	By Vessel			By Car Ferry			By Rail			By Lake and Rail	
	Hard	Soft	Total	Hard	Soft	Total	Hard	Soft	Total	Grand Total	
January				18,047	65,451	83,498		73,778	73,778	157,276	
February				23,605	62,383	85,988	130	79,184	79,314	165,302	
March				32,220	55,239	87,459		179,024	179,024	266,483	
April				18,427	80,176	98,603		109,612	109,612	208,214	
May	166,851	562,688	729,539	30,636	48,242	78,878		50,428	50,428	858,845	
June	124,668	532,163	656,831	27,977	31,495	59,472	50	42,124	42,174	758,477	
July	161,789	453,895	615,684	24,768	41,986	66,754	3,400	61,341	64,741	747,179	
August	148,154	274,447	422,601	16,408	35,478	51,886		49,556	49,556	524,043	
September	32,177	262,151	294,328	14,114	39,662	53,776	3,341	43,569	46,910	395,014	
October	150,685	512,357	663,042	16,097	41,612	57,709		41,515	41,515	762,266	
November	146,400	558,021	704,421	16,625	40,140	56,765		43,134	43,134	804,320	
December	35,500	83,000	118,500	10,814	33,791	44,605	750	49,910	50,660	213,765	
Total	966,224	3,238,722	4,204,946	249,738	575,655	825,393	7,671	823,175	830,846	5,861,185	
Total 1922	360,070	2,331,407	2,691,477	108,620	272,664	381,284	879	428,805	429,684	3,502,445	
Increase over 1922	606,154	907,315	1,513,469	141,118	302,991	444,109	6,792	394,370	401,162	2,358,740	

Sees Nation's Economic Future Dependent On Adequate Transportation

Herbert Hoover Urges Far-Sighted Policy at Opening of National Conference—Barnes Asks Better Treatment from the Government—Hines Discusses Budget System

The formulation of long-view national policies in transportation that will effect economical and adequate handling of goods is the first fundamental to our whole economic future, declared Herbert Hoover, Secretary of Commerce, at the opening session of the National Transportation Conference at Washington on Jan. 9. Continuing, Mr. Hoover said that "the solution of the problems in such policies is only in part a matter of legislation and governmental relations. They are in large part to be solved by initiative and voluntary co-operation among the business community. It marks a great step in our business progress when all the elements such as are represented in the sub-committees may come together and agree on solutions of important questions, and outline a method of co-operation by which they may be attained."

Julius H. Barnes, president of the Chamber of Commerce of the United States, which body had arranged the conference, presided, and another speaker at the session was Walker D. Hines, former Director General of Railroads.

In his opening remarks Mr. Barnes said there should be no place for misunderstanding and antagonism between American methods in production and American methods in transportation, which have marched hand in hand to make secure the standard of possession on the western farm.

"Production, both of farm and factory," he continued, "stimulated and expanded by ready access to a great, wide market of adequate buying power, is dependent at every stage on adequacy of transportation for the enormous volume of national production. The great rising curve of living standards, the security of American health, the widening of American opportunity and the strengthening of American individual content and happiness—all these run parallel with the rising curve of the tonnage of commodity distribution. The problem is to visualize, in terms which every man can understand, the fact that transportation, adequate, ready, possessed of the means not only of present expansion but responsiveness to new methods and new devices, is the very structure on which their earning power and the possession of articles of necessity and comfort depend."

Referring to increase of industry values, Mr. Barnes said:

"It is suggestive of study when we find the increase in forms of wealth between 1900 and 1920 recorded in their major aspects as follows:

Farm values.....	281 per cent
Manufacturing industries.....	398 per cent
Railroads.....	93 per cent
Total national wealth.....	295 per cent

"The time has come when America must divest itself of the accumulated prejudices and passions in the treatment of transportation; when it must realize its dependence upon a continued and constant expansion, and plan such relations of government to this industry that it shall be able to serve the full measure of national progress."

Mr. Hines, in his address, spoke of the budget system and the proposed repeal of the rate-making rule. Of the latter proposal he said he has been able to think of but one group of the public than can find an adequate motive for advocating such a change in the law, and that is the group that wishes to see private operation fail, so as to make government operation a necessity.

Speaking of the budget system Mr. Hines said:

"We have heard a great deal in this country about a budget system and gradually the country is adopting the budget system. Section 15A is really the application of the budget principle in a broad sense to railroad regulation. The statute thus expresses the homely truth "look before you leap," and the other homely truth "count the cost." It is designed to prevent the haphazard dealing with specific rate problems without regard to the effect upon the general situation. This new railroad rule is a simple and honest recognition of the fact that the public cannot have satisfactory railroad service without paying the cost, including a fair compensation for the capital employed."

Southern Gem Coal Co. Lifts Receivership

The U. S. Court of Appeals at Chicago has lifted the receivership placed upon the Southern Gem Coal Corporation, of Chicago, by a federal court in East St. Louis. This leaves the corporation free to continue operating its various central and southern Illinois mines and other properties, including the Wabash, Chester & Western Ry., and also free to fulfill its contract to supply the output of its two Franklin County mines to Simon Levy, of Chicago, a direct-to-consumer dealer doing a big business all over the central west.

Although the East St. Louis federal court order put the property of the corporation into the hands of C. B. Thomas and W. S. Wilson as receivers, an ancillary receivership was necessary in order to give the receivers control of the books, records and operating headquarters. Without it, neither the receivers nor the corporation could produce a ton of coal. The application for this ancillary receivership was denied, Judge Wilkerson, of the District Court

95 per Cent Less Babel

A few years ago, when the Pacific Coast Coal Co. issued any notices to its employees, the communications had to be printed in half a dozen foreign languages. Today 95 per cent of the employees are American citizens and practically every one can read English, according to A. E. Holden, editor of the company's new weekly magazine for employees, *The Pacific Coast Bulletin*.

of northern Illinois, hearkening to the corporation's contention that it was now in position to meet its payrolls, interest charges and other obligations and that a majority of the creditors did not approve of the receivership. Then on Jan. 10 Judges Evans, Alschuler and Baker, of the U. S. Court of Appeals, set aside the receivership and returned the property to the corporation.

It was reported late in the week that Mr. Wilson intends at once to make a new effort to get the receivership ordered once more—this time on a basis that will make it bulletproof.

66 Convicts Mutiny in Alabama Coal Mine

Sixty-six convicts leased by the State of Alabama to the Thomas-Weller Mining Co., operating coal mines forty miles south of Birmingham, mutinied against operating methods on Jan. 11. It is reported that leaders in the strike include white prisoners who took part in the revolt at Banner mines last September, which led to a movement of state officials to better conditions under which leased convicts work in privately owned mines. The men worked in the Aldrich mines of the bankrupt Montevallo Mining Co. Officials of the company denied that any serious disturbance had taken place but did admit that the day shift had refused to work. Reports from Montevallo are that the men barricaded themselves in the slope after entering without guards. Reports that the machinery had been damaged considerably by dynamite were denied by the mine officials at the company's office in Birmingham.

Who Greeted Union with Dynamite?

It was reported from Harlan, Ky., on Jan. 8 that officials of a new office opened in that city by the United Mine Workers were greeted with a package of dynamite at the door on that date, and that the union leaders immediately left town. While it has been intimated that the dynamite was a threat, coal men believe that it may have been placed there by union men themselves, with the idea of trying to make labor feel that the operators were resisting the union idea, even to the extent of using dynamite threats.

Oddie Sifts All Coal Plans and Hearings In Drafting Administration Bill

Opposes Government Ownership and Regulation in Peace Time — Sees
Need for Encouragement and Assistance Through Mines
Department Represented in the Cabinet

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Despite Senator Oddie's desire to introduce the legislation prompted by the report of the Harding Coal Commission, it has been found that delays are numerous in attempting to frame the actual bill. It is no easy task to translate into the concise form which a bill must take the varied and intricate provisions of such a measure. While the initial bills will embody certain of Senator Oddie's ideas, which are at variance with the recommendations of the Coal Commission, it is probable that the legislation as introduced will not represent his final opinion as to what should be enacted. He is anxious to get the matter in concrete form so as to obtain criticisms and suggestions from all concerned.

The Nevada Senator, however, is not waiting for the introduction of the bill to begin work. He is studying all the different plans which have been put forward, in addition to those of the Coal Commission. He is going over the hearings conducted in previous sessions of Congress when coal legislation was proposed.

He is definitely and finally opposed to government ownership, and to the regulation of prices, profits, wages and margins in peace times. He realizes that any such enactment, in addition to being unconstitutional, would not be in the public interest. He is approaching the whole problem with the idea of obtaining an abundance of coal of good quality.

Among the things he believes will contribute to this improved service is the current publication of facts as to supply and demand, in order that both buyer and seller may act intelligently and not blindly as they did in 1916, 1917, 1920 and even during the last bituminous strike in 1922. He also would like to see gathered all facts bearing on labor disputes and upon transport, the factors which have caused interruption of supply. He thinks there should be readily available at all times facts regarding such important matters as the real earnings of mine workers and of the ability of the industry to pay. He recalls that almost all the studies of either wages or costs of production have not been so timed as to have a bearing on wage negotiations. He thinks they should be kept up currently.

The commissions which have been called together periodically to deal with difficulties arising in the coal industry soon complete the main purpose for which they were created. The facts and figures which they collect are published, but they are not kept before

the industry and the consuming public. Were there a Department of Mines, Senator Oddie argues, this highly essential information could be kept before all those concerned. The Secretary of Mines would receive from the fact-finding agency, for instance, the statistics covering quantity of coal in storage. If they should show that stocks had fallen below the margin of safety, he could urge the stocking of the approximate amount of coal necessary to provide for possible interruption.

Senator Oddie is thinking of more than an agency which will issue only bare facts. He thinks there should be in the federal government a major subdivision to which the mining industry can look for encouragement, for advice and for the formulation of policies. The current reporting of facts, however, will be only an incidental phase of his measure.

In this connection it is known that the Senator is re-reading with much interest Dr. Garfield's recommendation for an advisory committee of operators and miners to be presided over by a Cabinet member. Dr. Garfield suggested that this would be an effective means of keeping in touch with the state of the industry, its problems and its needs.

It is Senator Oddie's purpose to draft legislation in the form that does not seem to indicate that the coal industry is an enemy of the public. He recognizes it as one of the great basic industries on which the public is compelled to depend as on few others and without whose prosperity there can be no general prosperity. As a mine operator himself, Senator Oddie is in a position to appreciate the engineering achievements and the other great accomplishments that have taken place in the coal industry. He is rather impatient with the attitude of fault finding into which so many persons fall when they consider the problems of the coal industry. While he admits there is some ground for criticizing the industry, he suggests that sight be not lost of the fact that the producing power of the American miner, working with highly efficient mechanical equipment, is four times as great as that of the British or German miner and five times as great as that of the French miner.

Much has been said in condemnation of the distribution of coal. With all the faults of the existing system, Senator Oddie is rather struck with the fact that there is something to be said in favor of an achievement which involves the moving of nearly 600,000,000

tons of a bulky product from 9,000 mines to 90,000 carload buyers in 48 states.

Since our whole progress as an industrial nation depends on an abundant supply of cheap fuel, Senator Oddie feels that Congress must be careful not to create conditions which handicap the industry in the realization of maximum efficiency.

His opinion is that the federal government should play its part in creating conditions under which this great enterprise can grow and keep pace with the country's development. To accomplish this in the ideal way, he believes, calls for nothing less than a separate department with representation at the Cabinet table.

Holidays Hit Production in Central Pennsylvania

Approximately 3,480,350 tons of coal was produced in the central Pennsylvania district in the month of December, or 60 per cent of the estimated production capacity. The loadings for the last week of December showed a decided drop over the previous week, being 10,737 cars as compared with 16,664 cars the week previous.

There was a slight gain over the month of November; the December production, not including Dec. 31, was 58,466 car loads, compared with 54,695 car loads in November. The daily average production for the month of December was 2,436 carloads, as compared with 2,486 carloads in November. Prices remain the same. The number of no-bill cars in the district at the close of December was 1,034.

Working figures for the mines in the district for the last week are as follows:

Mines idle	357
Mines working 1 day	63
Mines working 2 days	64
Mines working 3 days	66
Mines working 4 days	68
Mines working 5 days	38
Mines working 6 days	0

The total production figures for the year in carloads are as follows:

January	82,835	July	73,784
February	69,297	August	80,361
March	79,542	September	67,790
April	69,567	October	63,466
May	73,768	November	57,074
June	77,416	Dec. (inc. 29)	58,466

Asks Congress to Settle For Navy Coal

President Coolidge has requested Congress to appropriate \$242,080.29 to settle judgments rendered against the United States in the U. S. District Court for the District of New Jersey and affirmed by the U. S. Supreme Court in favor of the New River Collieries Company, in which suits were instituted to recover just compensation for coal requisitioned by the Navy Department under Section 10 of the Lever Act. Judgments were rendered on April 15, 1921, in favor of the New River Collieries Company in three suits, as follows: No. 1 for \$213,100.11; No. 2 for \$19,700.91 and No. 3 for \$9,279.27.



Production And the Market



Bituminous-Coal Output Is Absorbed Readily; Spot Trade Active; Contract Movement Steady

The soft-coal market is in good condition, notwithstanding the low prices quoted. Production is easily absorbed, spot business is active and contract coals are moving in steady volume. Contracting is in the making although neither producer nor consumer appears anxious. Reported quotations for contracts range all the way from 25c. to 75c. above current spot figures at New York to from \$3 to \$3.25 at Philadelphia, with reports that a quotation close to \$1.65 had been given to a Southern railway. There also are reports that some high-grade northern West Virginia coals were being held close to \$2.75. Strike talk is having scarcely any effect on consumers, although at Pittsburgh there is a belief that there will be a suspension.

The cold wave which covered most sections of the country recently was of too short duration to have any lasting effect on the coal markets. Demand for domestic coals improved slightly, but the steam coal market was not stimulated and in the Middle West quotations softened. Domestic sizes of anthracite are easier and quotations for independent product are slightly lower. Arkansas semi-anthracite is making an impression around the Twin Cities as a substitute for Pennsylvania hard coal at \$2 less per ton.

Soft-Coal Production Recovers Quickly

Coal Age Index of spot prices of soft coal as of Jan. 14 does not show any change from the previous week, standing at 182 with an average price of \$2.20.

The drop in production of soft coal due to the holiday season was quickly recovered, but the pick-up in buying expected by some producers was not forthcoming. Interest now centers in the stock report to be made public about Feb. 1, which it is expected will show a considerable increase in consumers' reserves over Sept. 1, when they were about 56,000,000 net tons.

Conditions in the Middle West are quiet again fol-

lowing the few days of lower temperatures. Demand is easier and prices of some grades are lower. The reported move to cut wages in some Pocahontas mines provoked some discussion, considerable non-union coal from Kentucky and other fields meantime making its appearance in the Chicago market, quoted at low figures. Retail business in St. Louis is the one bright spot, with greater demand reflected in middle grade coals.

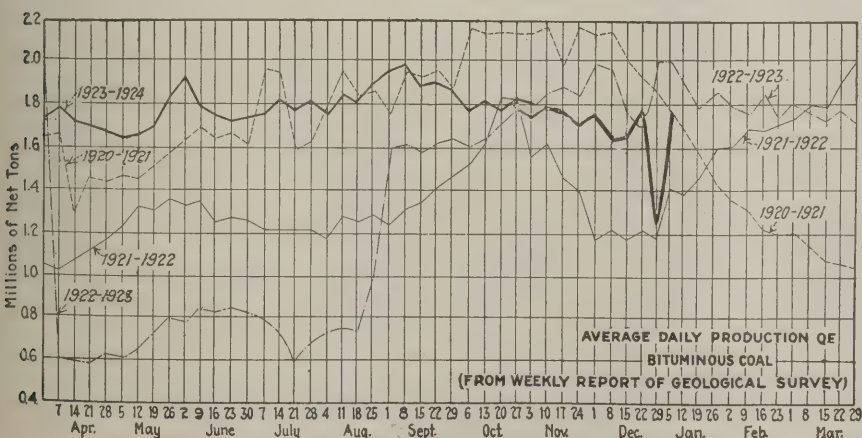
More Vigor in Ohio Market; Prices Steadier

There is more vigor in the Ohio markets than for some time and prices are steadier. Domestic coals improved slightly and while new orders have been freely placed some cancellations also have taken place. The steam-coal market was not stimulated and is quiet.

One market in which the cold wave did not affect the domestic trade to any great extent was at Pittsburgh. No distinct improvement was noticed, due principally to the well-filled cellar bins of both house owners and dealers. Industrial consumption is heavy and steel operations are reported as better than during December. There is no stimulus to buying in New England and industries are well supplied. Quotations for the better grades show a slight improvement. Further curtailment in industrial lines is under way.

The situation along the Atlantic seaboard is quiet. Some small contracts have been reported, while cement manufacturers are said to be picking up considerable slack. An improvement is noted in the export situation at Baltimore. Dumpings are on the increase when compared with the corresponding period of last year.

Production of soft coal during the week ended Jan. 5 is estimated by the Geological Survey at 9,031,000 net tons, an increase of 2,318,000 tons over the previous week. During the same period 1,419,000 net tons of anthracite was produced, an increase of 183,000 tons when compared with the week ended Dec. 29.



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Dec. 22	10,138,000	10,543,000
Dec. 29 (b)	10,171,000	6,713,000
Jan. 5 (a)	10,993,000	9,031,000
Daily average	2,074,000	1,747,000
Calendar year	10,993,000	9,031,000
Daily average cal. year ..	2,074,000	1,747,000

ANTHRACITE

Dec. 22	2,065,000	1,990,000
Dec. 29	1,588,000	1,236,000
Jan. 5	1,725,000	1,419,000
Calendar year	1,725,000	1,419,000

COKE

Dec. 29 (b)	260,000	223,000
Jan. 5 (a)	309,000	234,000
Calendar year	309,000	234,000

(a) Subject to revision. (b) Revised from last report

Midwest Flurry Calms Down

The considerable rush for Midwestern coal which followed immediately upon the opening of the below-zero weather of two weeks ago quieted down noticeably with the rise in temperature a week ago. Although most Illinois and Indiana mines worked an average of a little better than three days a week, few operations ran every day. Steam sizes from those fields softened a little, although the call for domestic coal was not sufficient to clean out all the "no bills" in the large sizes. Production did not get high enough to depress screenings much. Along toward the end of the past week there were signs of temporary car shortage here and there. This, however, was not serious.

Smokeless coals from the non-union East continued in Chicago at a mine price of \$2@2.25 without the increase which was expected if the bitter cold continued a few more days. A temporary shutdown of many Pocahontas operations growing out of a move to cut miners' wages was much discussed in the smokeless markets of the West, but the prices did not stiffen much, and by the end of the week no

shutdown had been made. A good deal of cheap non-union coal from various Kentucky and other Eastern fields continued to appear on the Midwest market, holding trade that Illinois producers lost by their policy of winter price cuts after they had stocked dealers during the autumn. This has taken about all the buoyancy out of a market that might have been made snappier by recent winter weather.

St. Louis Still Busy

St. Louis business continues good with the retailers. They did not clean up all their stock during the cold wave at New Year's but they got low enough to arouse them into buying. There has been a little demand for high-grade, but the greater call has been for middle-grade coal. Standard found a ready market with the domestic consumer. The 25c. advance in Standard did not stick, however. A burst of production set them back.

Country business has been unusually good, but for cheaper coals only. Wagonload steam continues to show improvement, while carload steam has eased up and there is a volume of screenings and nut unbilled, whereas a few

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Jan. 15 1923	Dec. 31 1923	Jan. 7 1924	Jan. 14 1924†
Smokeless lump.....	Columbus....	\$7.25	\$3.35	\$3.35	\$3.15@3.50	
Smokeless mine run.....	Columbus....	6.60	1.85	1.85	1.75@2.00	
Smokeless screenings.....	Columbus....	5.85	1.25	1.25	1.20@1.45	
Smokeless lump.....	Chicago....	7.75	3.50	3.10	3.00@3.25	
Smokeless mine run.....	Chicago....	6.35	2.10	2.10	2.00@2.25	
Smokeless lump.....	Cincinnati....	7.75	3.10	3.00	2.75@3.50	
Smokeless mine run.....	Cincinnati....	6.35	2.10	2.00	2.00@2.50	
Smokeless screenings.....	Cincinnati....	6.10	1.75	1.75	1.50@2.00	
*Smokeless mine run.....	Boston....	8.75	4.65	4.65	4.75@4.90	
Clearfield mine run.....	Boston....	4.85	1.85	1.85	1.50@2.25	
Cambria mine run.....	Boston....	5.50	2.50	2.50	2.15@2.85	
Somerset mine run.....	Boston....	5.10	2.10	2.10	1.75@2.50	
Pool 1 (Navy Standard)....	New York....	5.75	3.00	3.00	2.75@3.25	
Pool 1 (Navy Standard)....	Philadelphia....		3.00	3.00	2.75@3.25	
Pool 1 (Navy Standard)....	Baltimore....	6.10				
Pool 9 (Super. Low Vol.)....	New York....	5.25	2.10	2.25	2.00@2.50	
Pool 9 (Super. Low Vol.)....	Philadelphia....	5.75	2.30	2.30	2.10@2.50	
Pool 9 (Super. Low Vol.)....	Baltimore....	5.75	2.00	1.85	1.75@2.00	
Pool 10 (H.Gr.Low Vol.)....	New York....	4.75	1.85	1.85	1.75@2.15	
Pool 10 (H.Gr.Low Vol.)....	Philadelphia....	5.25	1.85	1.85	1.70@2.00	
Pool 10 (H.Gr.Low Vol.)....	Baltimore....	5.20	1.90	1.80	1.75@1.90	
Pool 11 (Low Vol.)....	New York....	4.25	1.60	1.60	1.60@1.75	
Pool 11 (Low Vol.)....	Philadelphia....	4.35	1.65	1.65	1.55@1.75	
Pool 11 (Low Vol.)....	Baltimore....	4.20	1.75	1.65	1.65	
High-Volatile, Eastern		Market Quoted	Jan. 15 1923	Dec. 31 1923	Jan. 7 1924	Jan. 14 1924†
Pool 54-64 (Gas and St.)....	New York....	3.60	1.60	1.60	1.60@1.75	
Pool 54-64 (Gas and St.)....	Philadelphia....	4.15	1.70	1.70	1.60@1.80	
Pool 54-64 (Gas and St.)....	Baltimore....	3.85	1.50	1.50	1.50	
Pittsburgh sc'd gas.....	Pittsburgh....	5.25	2.50	2.40	2.35@2.50	
Pittsburgh gas mine run.....	Pittsburgh....		2.25	2.30	2.25@2.35	
Pittsburgh mine run (St.)....	Pittsburgh....	3.35	2.00	2.10	1.90@2.10	
Pittsburgh slack (Gas)....	Pittsburgh....	3.20	1.65	1.60	1.50@1.75	
Kanawha lump.....	Columbus....	6.25	2.60	2.60	2.50@2.75	
Kanawha mine run.....	Columbus....	3.75	1.60	1.60	1.50@1.75	
Kanawha screenings.....	Columbus....	3.35	1.10	1.10	1.00@1.25	
W. Va. lump.....	Cincinnati....	6.50	2.60	2.60	2.25@3.00	
W. Va. gas mine run.....	Cincinnati....	3.75	1.55	1.65	1.35@2.00	
W. Va. Steam mine run.....	Cincinnati....	3.35	1.55	1.65	1.35@2.00	
W. Va. screenings.....	Cincinnati....	3.25	1.30	1.30	1.10@1.50	
Hooking lump.....	Columbus....	5.35	2.60	2.60	2.50@3.00	
Hooking mine run.....	Columbus....	3.10	1.80	1.80	1.65@2.00	
Hooking screenings.....	Columbus....	2.75	1.30	1.30	1.25@1.40	
Pitts. No. 8 lump.....	Cleveland....	5.00	2.45	2.45	2.00@2.95	
Pitts. No. 8 mine run.....	Cleveland....	3.40	1.90	1.95	1.85@1.90	
Pitts. No. 8 screenings.....	Cleveland....	3.15	1.55	1.55	1.60@1.70	
Midwest		Market Quoted	Jan. 15 1923	Dec. 31 1923	Jan. 7 1924	Jan. 14 1924†
Franklin, Ill. lump.....	Chicago....	\$5.35	\$3.35	\$3.60	\$3.25@3.75	
Franklin, Ill. mine run.....	Chicago....	3.85	2.35	2.35	2.25@2.50	
Franklin, Ill. screenings.....	Chicago....	2.70	1.85	2.05	1.90@2.00	
Central, Ill. lump.....	Chicago....	4.35	3.00	3.10	3.00@3.25	
Central, Ill. mine run.....	Chicago....	3.50	2.10	2.10	2.00@2.25	
Central, Ill. screenings.....	Chicago....	2.10	1.35	1.75	1.60@1.75	
Ind. 4th Vein lump.....	Chicago....	5.10	3.10	3.10	3.00@3.25	
Ind. 4th Vein mine run.....	Chicago....	3.60	2.60	2.60	2.50@2.75	
Ind. 4th Vein screenings.....	Chicago....	2.50	1.65	1.85	1.75@2.00	
Ind. 5th Vein lump.....	Chicago....	4.10	2.50	2.50	2.50@2.75	
Ind. 5th Vein mine run.....	Chicago....	3.10	2.10	2.10	2.00@2.25	
Ind. 5th Vein screenings.....	Chicago....	2.25	1.55	1.70	1.60@1.80	
Mt. Olive lump.....	St. Louis....		3.10	3.10	3.00@3.25	
Mt. Olive mine run.....	St. Louis....		2.50	2.50	2.50	
Mt. Olive screenings.....	St. Louis....		1.85	1.85	1.50@1.60	
Standard lump.....	St. Louis....	4.10	2.85	2.90	2.85@3.00	
Standard mine run.....	St. Louis....	2.60	1.95	1.95	1.90@2.00	
Standard screenings.....	St. Louis....	1.85	1.55	1.55	1.25@1.35	
West Ky. lump.....	Louisville....	4.35	2.85	2.85	2.75@3.00	
West Ky. mine run.....	Louisville....	2.55	1.65	1.65	1.40@1.75	
West Ky. screenings.....	Louisville....	2.30	1.35	1.40	1.25@1.60	
West Ky. lump.....	Chicago....	4.25	2.85	2.85	2.75@3.00	
West Ky. mine run.....	Chicago....	2.60	1.75	1.75	1.50@1.75	
South and Southwest		Market Quoted	Jan. 15 1923	Dec. 31 1923	Jan. 7 1924	Jan. 14 1924†
Big Seam lump.....	Birmingham..	3.95	3.85	3.85	3.75@4.00	
Big Seam mine run.....	Birmingham..	2.35	1.95	1.95	1.75@2.15	
Big Seam (washed).....	Birmingham..	2.60	2.35	2.35	2.25@2.50	
S. E. Ky. lump.....	Chicago....	6.25	3.10	3.10	2.75@3.25	
S. E. Ky. mine run.....	Chicago....	3.85	1.85	1.85	1.75@2.00	
S. E. Ky. lump.....	Louisville....	6.50	3.00	3.00	2.75@3.25	
S. E. Ky. mine run.....	Louisville....	3.50	1.75	1.70	1.40@1.90	
S. E. Ky. screenings.....	Louisville....	3.25	1.35	1.60	1.50@1.75	
S. E. Ky. lump.....	Cincinnati....	6.50	2.85	2.60	2.25@3.25	
S. E. Ky. mine run.....	Cincinnati....	3.60	1.50	1.50	1.25@2.00	
S. E. Ky. screenings.....	Cincinnati....	3.10	1.25	1.30	1.00@1.50	
Kansas lump.....	Kansas City..	5.50	4.75	5.00	5.00	
Kansas mine run.....	Kansas City..	3.75	3.00	3.25	3.25	
Kansas screenings.....	Kansas City..	2.50	2.00	2.00	2.25	

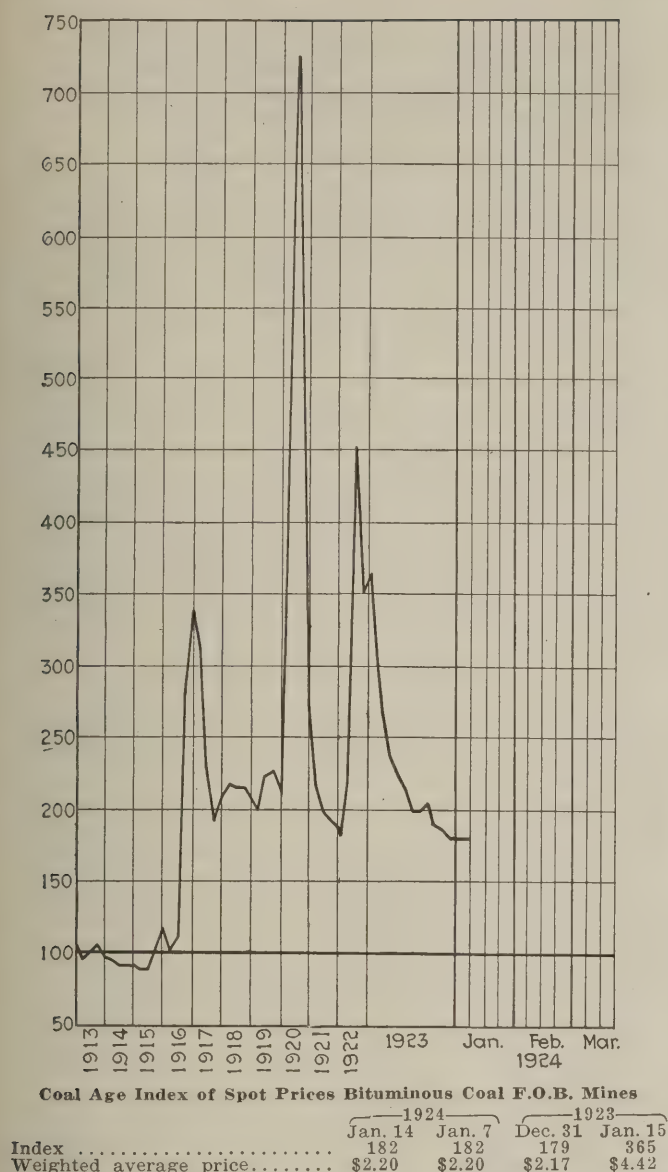
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	Jan. 15, 1923		January 7, 1924		January 14, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York....	\$2.34		\$9.00	\$7.75@8.25		\$8.00@9.25	\$8.00@9.25	\$8.00@9.25
Broken.....	Philadelphia....	2.39			7.90@8.10				
Egg.....	New York....	2.34		9.25@12.00	8.00@8.35	8.50@10.00	8.75@9.25	8.75@9.50	8.75@9.25
Egg.....	Philadelphia....	2.39		9.25@11.00	8.10@8.35	9.50@10.00	8.75@9.25	9.50@10.00	8.75@9.25
Egg.....	Chicago*....	5.06		12.00@12.50	7.20@8.25	9.60@12.50	8.00@8.35	9.60@12.50	8.00@8.35
Stove.....	New York....	2.34		9.25@12.00	8.00@8.35	9.85@10.50	8.75@9.25	9.85@10.50	8.75@9.25
Stove.....	Philadelphia....	2.39		9.25@11.00	8.15@8.35	9.85@11.00	8.90@9.25	9.85@11.00	8.90@9.25
Stove.....	Chicago*....	5.06		12.00@12.50	7.35@8.25	9.60@12.50	8.00@8.35	9.60@12.50	8.00@8.35
Chestnut.....	New York....	2.34		9.25@12.00	8.00@8.35	9.85@10.50	8.75@9.25	9.85@10.50	8.75@9.25
Chestnut.....	Philadelphia....	2.39		9.25@11.00	8.15@8.35	9.85@11.50	8.90@9.25	9.85@11.50	8.90@9.25
Chestnut.....	Chicago*....	5.06		12.00@12.50	7.35@8.35	9.60@12.50	8.00@8.35	9.60@12.50	8.00@8.35
Range.....	New York....	2.34			8.25		9.00		9.00
Pea.....	New York....	2.22		7.50@11.00	6.15@6.30	5.50@6.50	6.15@6.65	5.50@6.25	6.15@6.65
Pea.....	Philadelphia....	2.14		7.00@9.50	6.15@6.20	6.00@7.25	6.35@6.60	6.00@7.25	6.35@6.60
Pea.....	Chicago*....	4.79		7.00@8.00	5.49@6.03	6.00@6.75	5.40@6.05	6.00@6.75	5.40@6.05
Buckwheat No. 1.....	New York....	2.22		5.25@6.25	4.00@4.10	1.75@2.50	3.50	2.50@3.25	3.50
Buckwheat No. 1.....	Philadelphia....	2.14		5.00@5.50	4.00	2.00@3.50	3.50	2.00@3.50	3.50
Rice.....	New York....	2.22		2.75@3.00	2.75@3.00	1.35@2.50	2.50	1.75@2.50	2.50
Rice.....	Philadelphia....	2.14		2.75@3.00	2.75@3.00	1.50@2.50	2.50	1.50@2.50	2.50
Barley.....	New York....	2.22		1.65@2.00	1.50@2.00	1.25@1.50	1.50	1.25@1.50	1.50
Barley.....	Philadelphia....	2.14		1.50@2.00	2.00	1.00@1.50	1.50	1.00@1.50	1.50
Birdseye.....	New York....	2.22			2.10		1.60	1.50	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally, shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913, 1918," published by the Geological Survey and the War Industries Board.

days ago those sizes were much in demand. This applies to the Standard and Mt. Olive fields. Generally speaking, conditions are considered good now, but it is temporary on account of the weather.

Kentucky Business Is Fair

Domestic demand in Louisville and throughout most of Kentucky continues fair following the cold wave, which was the most severe that Kentucky has felt since 1918. However, dealers are not buying greedily from the mines, for previous stocks are not all cleaned up. Some dealers are willing to sell at low prices rather than take a loss on degradation of long-held piles in their yards. But even at that, lump coal at \$7@-\$8.50 seems high to the public and there are reports of an increase in the use of gas and oil.

Conditions at the mines show little change of note. There is about 15c. to 25c. a ton spread between eastern and western Kentucky on most sizes, the eastern being the higher, but gas coal and non-gas are selling on a parity.

Northwest Slumps Again

The fearful burst of trade that started with the severe weather of two weeks ago resulted in two things: The docks could not fill the immediate orders fast enough and

shippers from everywhere began rushing thousands of cars of coal into the Northwest region, thinking that there was bound to be a good market for it. The market was good for a few days, owing to the congestion of business, but it slumped at once with the arrival of mild days and now the territory is full of all sorts of coal.

Shipments off the docks were heavy for awhile and the general upturn brought more public utilities and commercial building owners into the market. However, there was little or no change in the market quotations around the Head-of-the-Lakes except that Hocking screenings spread a flat \$3.50 price to \$3.50@-\$3.75. Some anthracite has been moving from Duluth to Winnipeg, especially egg, which is often slow and frequently is held over at the end of the season. Around Milwaukee the market during the week was fairly active.

West Runs Strong

Three weeks of winter have brought joy to all those of the Southwest who depend on coal for a living. In three days mine tracks were cleared of "no-bills." Two hundred and fifty cars were in distress in Kansas one Saturday night. By Tuesday noon every one had been sold and dealers, who had disregarded warnings from operators and jobbers that just such a situation might develop, were crying for more. For the first time this season mines are working full time through Kansas, Missouri and Oklahoma. Those in Arkansas that are open also are running full time.

In Colorado the pick-up has been a little less lively, but lost time due to "no market" has been reduced to about 30 per cent. The cold snap in Salt Lake City and other sections of Utah has stimulated business. Working time has jumped from less than three days a week to around four and a half days. Circulars are firmer all around. Few "no bills" are accumulating now.

Better Demand for Domestic Coals

There was a slightly improved demand for domestic coals in the Ohio markets following the cold wave the first week of the year, but it did not last. Additional orders were placed and some of these were cancelled when milder weather made its appearance. Steam business was not stimulated and with the large reserves on hand users are not inclined to make any additions to their stocks. Railroad buying is on the increase, as some are buying to guard against a suspension on April 1. Screenings fell slightly in price as a result of a better production of lump. Production of the mines reporting to the Southern Ohio Coal Exchange during the week ended Dec. 29 was 91,952 tons from 447 mines having a full-time capacity of 569,250 tons. Of the deficiency "no market" was responsible for a loss of 440,789 tons.

More vigor was injected into the Cincinnati market by the cold snap, and concessions on sales have been practically cut off. Domestic coals are moving well, while the call for slack has been falling off. The smokeless coals have improved their position. While the quotations for the general market of coals range from \$2.25 to \$3.50 for lump and \$1.25 to \$2.50 for mine-run quotations on what have lately become known as exceptional coals, such as Yellow Jacket, Southern Gem, Millers' Creek and some of the high free burning gas coals of West Virginia have ranged from \$3.75 to \$4 for lump and around \$2 on mine-run. The cold weather drained retailers' stocks at Cleveland, causing them to enter the buyers' market, improving conditions slightly. Steam-coal consumers are buying as they need the coal and there is little additional storing done.

The three-day cold snap did not affect the Pittsburgh market to any great extent. Demand for domestic coals did not improve, but industrial consumption remains heavy. Steel operations are improving and running fairly well, adding to the consumption of coal. Retail dealers have good-sized stocks on hand, while cellar bins are well filled. A slight improvement was noticed in the central Pennsylvania field the first week of the year; the number of idle mines is given as 365. The situation at Buffalo shows no material change. Slack is the strongest of all sizes.

Few Developments in New England Market

Aside from slight indications of firmer prices in some directions there are few developments of any consequence in New England. There has been no appreciable stimulus to buying; the somewhat enhanced prices for spot shipment are due rather to a much restricted supply available, not alone at the loading piers but at the various rehandling points as well. The industries are well supplied and we hear of no railroads or power plants that are likely to enter the market during January for any comprehensive tonnage; on the contrary there are decided letdowns in anticipated consumption, due partly to less business and partly to the mild weather. Many of the streams are running full, unimpeded by ice, and in general there are few points open to the energetic sales agent keenly anxious to place coal.

At Hampton Roads the amount of coal on wheels is relatively small, and while sales are only scattering, the average net return is rather better than a week ago. An Italian contract covered some weeks ago was the means of keeping one group of Pocahontas operations at work for enough time to tide over the period of maximum dullness, and now with the assistance of contracts on many of which during the fall delivery was deferred the agencies are able to pinch along with an occasional sale at \$4.75@4.90 per gross ton f.o.b. vessel.

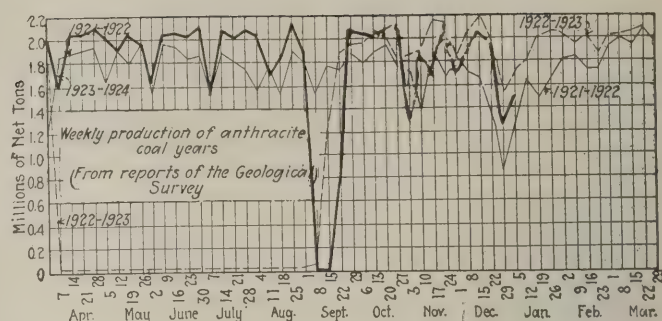
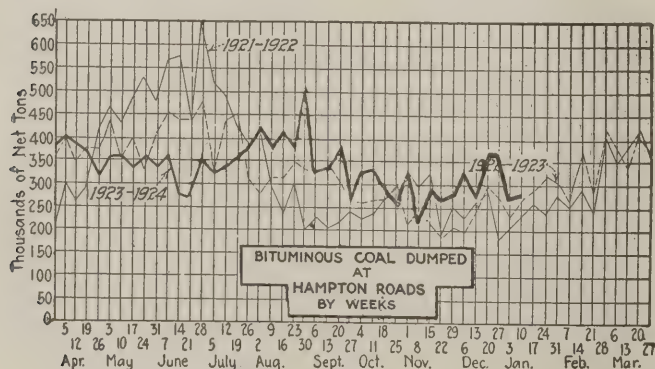
Navy standard coals are being held at better prices also by factors at this end. Not much is being moved at the figures asked, but on the other hand the coal is in comfortable storage and there is practically no distress supply that it is incumbent upon anybody to dispose of within a limited time. To that extent the market is in better position.

There is no change all-rail. A few shippers of the quality grades profess to hear tidings of better results, but as yet there is no perceptible reaction in this territory. There are those who are even beginning to propose contracts for the coming year, but for the present they are likely to meet with a cool reception. Talk of a possible strike seems to rouse no interest whatever among buyers in New England; they recall that in 1922 the non-union fields were for a long period able to care for current needs, and besides, the price of coal is not the large factor in production costs it once was and only in a few lines is there much disposition to purchase supplies far in advance of probable use. It has been a season notable for spontaneous combustion, and not only was coal that was taken on early a poor purchase but there were heavy expenses resulting from unusually large reserves. This will all have a bearing on the inclination of the buyer as he faces the next coal year.

Seaboard Market Quiet

There is very little activity in the spot soft-coal market along the Atlantic seaboard. Contract coals move well, however, and prices are sustained. A little contracting is reported and some operators report that December's business was as strong as that of last January. Increased inquiries are reported by some shippers, while some assert that the output of their mines is sold up for the present month. Cars at the New York terminals ranged from 1,812 to 2,105 during the first five days of last week.

There was no improvement in the soft-coal market at Philadelphia last week. There is a fair demand and some



contracting has been reported. Consumers are not anxious to enter into a contract agreement. While there is no boom in evidence, manufacturers show signs of becoming more active. No note of encouragement is evident at Baltimore. Demand for both steam and gas coals is poor. A firmer market is predicted during the next few weeks. Comparatively little change was noticed in the West Virginia markets, due to the change in weather conditions. A little spurt affected the domestic market at Birmingham and the cold weather occasioned many new orders for domestic coals, which aroused the spot market.

Anthracite Situation Easier

Unseasonable weather with fair shipments of hard coal resulted in an easier market for domestic sizes at New York and also lower quotations for independent coals. Retail dealers hesitate before buying premium coals and will do so only when it is absolutely necessary. Stove and chestnut are the most wanted sizes. At both New York and Philadelphia small orders comprise most of the new business. Consumers are well supplied. Pea coal is moving well in the Philadelphia territory and dealers have made inroads into their stockpiles. Retail dealers at Baltimore had a sudden rush of orders early last week, and while shipments have not been heavy, there is a fair supply in most yards.

Production of beehive coke in the week ended Jan. 5 was 234,000 net tons as compared with 223,000 tons the previous week.

Coal-Mine Development in West Virginia

Fifty new mine plants were put in operation in West Virginia during the fiscal year ended June 30, 1922, according to the annual report of the State Department of Mines. In the same period 43 new power plants were constructed and 81 fans.

One of the most important equipment improvements made, indicating at the same time the growth of the industry, was the purchase of 8,235 mine cars, the Logan field leading with 1,329, the McDowell mines coming second with 1,144 cars, followed by Fayette mines with 1,113 and Raleigh mines with 1,070. In all 85 new tipples were built, Logan having 9 of such structures to its credit, Raleigh 8, Fayette 7, Greenbrier 7 and Monongalia 7.

Companies operating in the state built 828 new houses for miners, Wyoming mines building the largest number, 114. Another important addition to equipment was locomotives. There were 187 new locomotives put in use, Logan mines obtaining the largest number, 35. McDowell and Raleigh county mines purchased 23 and 24 locomotives, respectively. There were 124 new mine openings; Preston County led in such development, with the opening of 18 new mines, McDowell County ranking next with 11 new openings.

Car Loadings, Surplusages and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended Dec. 29, 1923.	615,431	112,410
Previous week.	877,257	183,377
Same week in 1922.	704,224	172,132

	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
Dec. 31, 1923.	312,338	149,409	
Same date in 1922.	14,981	3,651	
Dec. 24, 1923.	237,343	115,071	

Foreign Market And Export News

Holidays Curtail British Coal Output; Coal Plentiful, Market Strong

Production of coal in Great Britain during 1923 was 278,501,000 tons, the highest recorded except for 1913, according to Board of Trade statistics. In the latter year the output was 287,412,000 tons, while last year it amounted to 251,850,000 tons. Output during the last week of 1923 was curtailed by the holiday season and amounted to 3,353,000 tons as compared with 5,886,000 tons the previous week, and 5,956,000 tons the week ended Dec. 15, according to a cable to *Coal Age*.

The labor situation is causing some uneasiness and loadings are slower due to the refusal of the tippers to work under the three-shift system, according to newspaper dispatches. Coal is plentiful, however, and the market remains strong.

The Welsh steam coal market continues in a strong position. There is a shortage of business and deliveries are somewhat behind, but orders on the books indicate that most of the mines will be heavily engaged well into January.

Inquiry from Europe is active, while business with Italy, South America and some of the Eastern countries is increasing. Belgium is inquiring strongly for coking coal.

The Newcastle market is also quiet. Nearly all kinds of coal are in good demand, best steams have improved slightly and there is a strong demand for gas coals.

Welsh Collieries Merge

A merger involving four large collieries near Swansea has been affected according to reports received by the Department of Commerce at Washington from Consul A. B. Cook, of the State Department stationed at Swansea. The collieries involved are the Great Mountain Collieries, the Ammanford Collieries, the Pontyberem Collieries, and the New Dynant Collieries. The new concern will be known as The United Anthracite Collieries, Limited, with a nominal capital of £2,500,000, of which £1,600,000 will, it is stated, be

offered to the public in the near future. The collieries involved are all important Welsh collieries, the oldest having been registered in 1891 and the newest in 1914. They employ at present about 3,000 workmen, and the annual total output of anthracite coal is about 500,000 tons.

This is the second important combine effected in the Welsh anthracite colliery field within the past six months, and the third important merger in the whole Welsh colliery field.

The new combine is further evidence of the marked inclination of Welsh industries to form into combines.

Less Coal at Hampton Roads

The coal market at Hampton Roads tightened noticeably last week, largely because of reduced supplies which was thought attributable to the reluctance of operators to resume full-time work after the holidays. Inquiries had not increased, however, and demand was only slightly improved.

Movement coastwise was slightly better, though retarded to some extent by recent storms. Bunker business was dull. Some foreign movements were noted, although not on the increase.

The tone of the market was firm, though higher prices were regarded as temporary. Shippers were exerting considerably more energy in booking cargoes, and increase in shipments was predicted on all hands.

French Industry Dull

Dullness continues in the French coal market, with supplies sufficient to meet the demand. Industry is quiet in all branches. Due to the excessive cost of British coal there is more buying of French coals. Mild weather affects the demand for house coals, and as money is scarce the "coalman" is only called upon when absolutely necessary. Retail yards are well stocked and dealers are not anxious to replace the small quantities of coal they sell.

The Belgian coal market is quiet, prices are easier and offers are made

to French buyers under the official tariff quotations, which would ordinarily attract buyers, were market conditions more satisfactory. French coal exports to Belgium during November amounted to 101,000 tons, while Belgian exports to France were 133,733 tons.

During November imports of coal to France amounted to 2,300,154 tons as compared with 1,935,821 tons in October. Coke imported was 431,592 tons as compared with 282,805 tons in the previous month. France exported 206,277 tons of coal in November as compared with 121,915 tons in October and 65,048 tons of coke as against 44,082 tons in October.

Export Clearances, Week Ended Jan. 12, 1924

FROM HAMPTON ROADS

For France:	Tons
Amer. SS. El Monte.....	1,896
Amer. SS. El Paso.....	1,791
For Brazil:	
Br. SS. Severnmede.....	5,128
Br. SS. Penthaw.....	6,211
Du. SS. Vredenburg.....	10,142
For Cuba:	
Br. SS. Magdala.....	7,245
Amer. Schr. Margaret Thomas.....	1,599
For Italy:	
Ital. SS. Maria Enrica.....	10,871

FROM BALTIMORE

For France:	
Fr. SS. Joseph Magne.....	6,358
For Chile:	
Amer. SS. Republic.....	2,203
Amer. SS. Republic (Coke).....	1,653
For Porto Rico:	
Amer. SS. Gov. John Lind.....	436
For Italy:	
Ital. SS. Ignazio Florio.....	7,100
For Uruguay:	
GK. SS. Agios Ioannis.....	6,000

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Jan. 3	Jan. 10
Cars on hand.....	1,229	1,274
Tons on hand.....	77,320	69,222
Tons dumped for week.....	134,028	124,464
Tonnage waiting.....	15,000	25,000

Virginian Ry. piers, Sewalls Pt.:

Cars on hand.....	855	774
Tons on hand.....	56,800	52,300
Tons dumped for week.....	37,752	50,275
Tonnage waiting.....	1,455	6,472

C. & O. piers, Newport News:

Cars on hand.....	1,441	1,000
Tons on hand.....	75,500	51,805
Tons dumped for week.....	65,196	75,933
Tonnage waiting.....	635	1,855

Pier and Bunker Prices, Gross Tons

PIERS

	Jan. 5	Jan. 12†
Pool 9, New York.....	\$5.00@ \$5.25	\$5.00@ \$5.25
Pool 10, New York.....	4.75@ 5.00	4.70@ 4.90
Pool 11, New York.....	4.50@ 4.75	4.60@ 4.70
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.85	4.90@ 5.00
Pools 5-6-7 Hamp. Rds....	4.25	4.25@ 4.35
Pool 2, Hamp. Roads.....	4.50@ 4.60	4.75

BUNKERS

Pool 9, New York.....	5.30@ 5.55	5.30@ 5.55
Pool 10, New York.....	5.05@ 5.30	5.00@ 5.20
Pool 11, New York.....	4.80@ 5.05	4.90@ 5.00
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 4.90	4.65@ 4.90
Pool 1, Hamp. Roads.....	4.85	4.90@ 5.00
Pool 2, Hamp. Roads.....	4.50@ 4.60	4.75

Current Quotations British Coal f.o.b. Port, Gross Tons

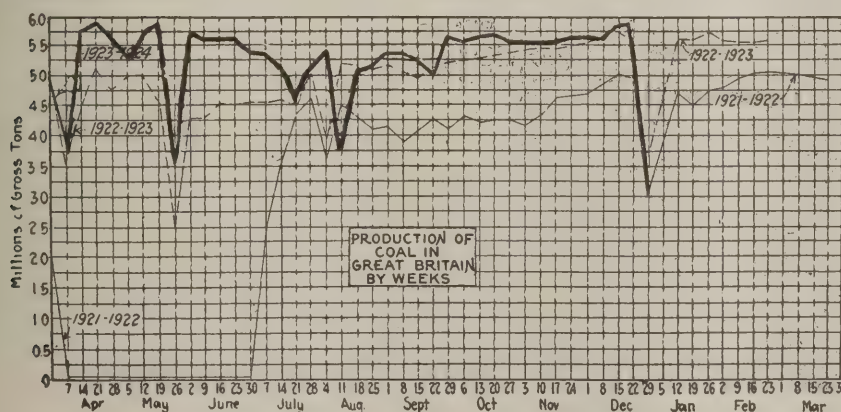
Quotations, by Cable to *Coal Age*

	Jan. 5	Jan. 12†
Admiralty, large.....	29s. @ 30s.	28s. @ 29s.
Steam smalls.....	21s. @ 22s.	20s. @ 21s.

Newcastle:

Best steams.....	24s.3d. @ 25s.6d.	24s. @ 25s.
Best gas.....	24s. @ 25s.	25s.
Best bunkers.....	25s. @ 26s.	24s.6d. @ 25s.

† Advances over previous week shown in **heavy type**, declines in *italics*.



Traffic News

Hearing on Rate Increase

A hearing will be held by the Coal and Coke Committee, Trunk Line territory, in New York City on Jan. 24 on the carrier's proposal to advance rates on pea and smaller sizes of anthracite from mines on the D., L. & W. R.R. and D. & H. R.R. to Donnacona, Que. The proposed rates are \$5.65 for pea coal; \$5.28 for buckwheat No. 1 and \$4.52 for buckwheat No. 2 and smaller sizes, the increases amounting to 6c. on pea coal; 4c. on buckwheat No. 1 and 6c. on buckwheat No. 2 and smaller coals.

Coal Hearings Assigned

Hearings in coal cases have been assigned as follows to the Interstate Commerce Commission: Oklahoma City, Feb. 4, Superior Coal Co. vs. Pittsburgh & West Virginia; Omaha, March 10, Intermont Coal & Iron Corporation vs. Southern Ry.; Washington, March 11, Hood Coal Co. vs. Monongahela Valley Traction Co.; Denver, March 14, Victor American Fuel Co. vs. Denver & Salt Lake.

Calls Rates Unreasonable

Rates applied on coal between Murphysboro, Ill., and Mitchel, S. D., are unreasonable, in the opinion of Examiner Flynn, of the Interstate Commerce Commission. The case was brought by the Consolidated Coal Co., of St. Louis.

No Unjust Discrimination

The failure of the Chesapeake & Ohio Ry. Co. and the Virginia Ry. to make arrangements whereby mines of the Winding Gulf Colliery Co. would be enabled to avail themselves of the services, facilities and rates of either does not subject the coal company to unjust discrimination, in the opinion of Warren H. Wagner, an Interstate Commerce Commission examiner.

The Winding Gulf Co. points out that the railroads refuse to accord its mines the same treatment as is accorded other mines on the Kanawha, Glen Jean & Eastern. The defendants were asked to interchange at Pemberton and to afford facilities equal to those afforded the other mines. The examiner reaches the conclusion, in a report to the commission, that a railroad must be allowed some latitude for the exercise of business judgment and discretion in such a situation. A similar finding was made in the case of the Ragland Coal Co. in its case against the Virginian Ry.

Mines Supply 60 per Cent of Freight Moved

The mining industry contributed more than 60 per cent of all freight moved by railroads of the country during the third quarter of 1923, according to figures just compiled by the Interstate Commerce Commission, which show that all shipments offered aggregated 347,323,119 tons in the quarter review. Of that total, 205,254,449 tons were products of mines.

While the increase in all tonnage over the third quarter of 1922 was 29 per cent, the products of mines tendered in the third quarter of 1923 was 47.84 per cent greater than the movement in the corresponding quarter of the year preceding.

The Eastern district, by contributing 93,568,493 tons, tendered more mineral shipments to the railroads than any other subdivision of the country. The Western district was next with 68,599,074 tons. The South originated 23,180,655 tons, while the Pocahontas district contributed 19,906,227 tons.

Heavy Coal Traffic on N. & W.

The Norfolk & Western Ry. handled over its lines during 1923 30,662,850 tons of coal from the four districts it serves in southern West Virginia and Virginia. According to the records of the road the Pocahontas field produced 15,911,200, or more than half the total, Tug River district 4,399,850 tons, Kenova-Thacker district 8,683,400 tons and Clinch Valley district 1,668,400 tons. According to the records of the Pocahontas Operators Association the output in that field last year amounted to 15,397,038 net tons, as compared with 16,130,974 tons in 1922, 13,043,942 net tons in 1921 and 15,421,288 tons in 1920.

Publications Received

Change Houses in the Lake Superior Region, by Cleve E. Kindall. Bureau of Mines, Washington, D. C. Pp. 31; 6x9 in.; illustrated. Plans and description of a model change house in the Lake Superior region; many of the suggestions, however, can be applied to a change house in any locality.

Proceedings of The Rocky Mountain Coal Mining Institute, held at Salt Lake City, Utah, Aug. 27-29, 1923. Pp. 31, 6x9 in.; illustrated.

Report of the State Tax Commission, New York, 1922. Pp. 530; 6x9 in.; tables.

Report Department of Mines, Kentucky, 1922, Part I, by L. Blenkinsopp, chief inspector of Mines. Pp. 337; 6x9 in.; illustrated.

Report of Department of Mines, West Virginia, for fiscal year ending June 30, 1922; in two sections; by R. M. Lambie, chief of Department of Mines. Pp. 388; 6x9 in.; tables.

Efficiencies in Use of Bituminous Coking Coal as Water-Gas Generator Fuel, by W. W. Odell, Bureau of Mines, Washington, D. C. Technical paper 274. Gives re-

sults of an investigation relating to the manufacture of water gas conducted by the Bureau of Mines, Illinois State Geological Survey Division, and the Engineering Experiment Station of the University of Illinois.

Association Activities

The West Kentucky Coal Bureau Louisville, composed of operators from the two Western Kentucky operators associations, as well as independents, elected these officers at the annual meeting in Louisville on Jan. 8: President, Percy D. Berry, president of the Providence Coal Co., Providence, Ky.; Vice-President, James D. Overall, Reinecke Coal Mining Co., Madisonville; Secretary, C. E. Reed, Louisville; Executive Committee: Chairman F. P. Wright, president of the Crescent Coal Co., Bevier; F. D. Rash, president of the St. Bernard Mining Co., Earlington; Brent Hart, president of the Hart Coal Corporation, Morton's Gap; H. L. Tucker, president of the Rockport Coal Mining Co., Central City; M. B. Lanier, president of the Norton Coal Mining Co., Nortonville, Ky., and Birmingham, Ala.; A. W. Duncan, secretary of the W. G. Duncan Coal Co., Greenville, and C. F. Richardson, president of the West Kentucky Coal Co., Sturgis, Ky. Mr. Richardson was president of the association during the year just closed.

Obituary

George S. Baldwin, 88 years old, of Kenosha, Wis., died at his winter home at Pasadena, Calif., on Jan. 2. He founded the Baldwin Coal Co., which he directed for many years.

William K. Herzog, U. S. Consul at Vitau, Saxony, under Presidents McKinley and Roosevelt, died recently at his home in St. Louis after an illness of five weeks. For the past few years he was a special representative in St. Louis of the West Virginia Coal Co. Born in Basle, Switzerland, educated at Heidelberg and serving the United States for many years in consular work, he was well known to the local trade and was 59 years old. Besides a widow he leaves a grown son and daughter.

Michael W. O'Boyle, coal operator, of West Pittston, Pa., died at Miami, Fla., Jan. 9. He was born in Scranton, Pa., 70 years ago. He organized, with his two sons, the Pittston Coal Mining Co., disposing of his holding in the Alphine Milling Co. to devote his attention to mining interests. He had been a director of the Miners' Savings Bank, Pittston, and of the Citizens Electric Illuminating Co., of the same city.

Joseph Ruchaber, 47, for many years a coal operator in the Rich Hill district in Missouri, was found dead of heart failure recently in his apartments at Rich Hill.

Samuel L. Moore, aged 50 years, a member of the Moore Brothers Coal Co., operating mines at Emeigh, and who was a resident of Emeigh died in the Spangler hospital on Jan. 9 from injuries he received while driving mine cars from the mines. Recently the Moore mines have been working only on part time and the members of the firm were doing some of the outside work. Mr. Moore was born in Hollidaysburg in 1874 and had been connected with the mining industry for many years.

Coming Meetings

Northeast Kentucky Coal Association. Annual meeting Jan. 24, 1924, Ashland, Ky. Secretary, C. J. Neekamp, Ashland, Ky.

Rocky Mountain Coal Mining Institute. Winter meeting, Feb. 13-15, Albany Hotel, Denver, Colo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

Canadian Institute of Mining and Metallurgy. Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

News Items From Field and Trade

ALABAMA

The State Board of Mine Examiners will hold a session in the offices of Chief Mine Inspector C. H. Nesbitt, Lincoln Life Building, Birmingham, Jan. 21 to 24, to examine applicants for positions of mine foreman, first and second class, and fireboss on qualifications necessary to fill such positions in coal mines of the state.

George B. McCormack, prominent coal operator, has instituted suit in the Chancery Court of Walker County, at Jasper, to recover an alleged half interest in the site on which is located the Gorgas steam plant, in which the government recently sold its interest to the Alabama Power Co., the latter having installed and owned the initial units. Mr. McCormack claims that his interest in the power plant site has never been acquired by the power company.

The Pratt Warrior Coal Co. of Jasper has twenty-five new homes under construction at its Ivey Bluff mines on the Warrior River in the southern part of Walker County. The Pratt Warrior recently leased the Ivey Bluff mines to the Gulf States Portland Cement Co., of Demopolis, which has increased the output of the mines to 300 tons of coal daily. With the addition of this housing of more miners, another substantial increase in production will be made. The cement company has installed motor haulage at these mines. Ivey Bluff mines are located near the banks of the Warrior River, several miles from a railroad and all coal is transported down the river in barges.

The U. S. Supreme Court in a decision handed down Jan. 7, refused to order the Court of Claims to assume jurisdiction in a suit against the government by the Corona Coal Co. to collect \$107,431 alleged to be due on a railroad contract while the lines were under federal control, the difference accruing between a rate of \$1.96½ a ton under the contract and \$2.40 per ton fixed by the Government Fuel Administration.

ARKANSAS

The Bernice Coal Co.'s mine at Russellville, has resumed work after having been idle since the tippie was burned October 16. A temporary tippie was erected. A full force of about 400 men works this mine.

COLORADO

The La Veta Coal Co. has been incorporated in Alamosa, with a capital of \$100,000, by P. Fern, A. H. Samuels and L. Jordan.

ILLINOIS

E. L. Stanton, for the past six years sales manager for the Lumaghi Coal Co., of St. Louis, severed his relations with that company Jan. 1, and is succeeded by C. V. Beck, who has been advertising and promotion manager for the Lumaghi Coal Co.

The Taylor Coal Co. of Chicago, has changed its name to the Franklin County Coal Co. during the process of absorbing the Bickett Coal & Coke Co.'s holdings and the consolidation of the Old Taylor properties with those of the Bickett interests. Herbert H. Taylor continues as president of the new concern and C. A. Bickett, after long years as a prominent figure in the Illinois coal industry, retires. Issue of \$2,750,000 first mortgage 7 per cent serial gold bonds of the new company is being offered for sale. The bonds mature \$137,500 annually from Jan. 1, 1925, to 1944, inclusive.

The tippie of the Centralia Coal Co. burned at Mine No. 5 recently at an estimated loss of \$100,000. The mine employed 850 men.

The No. 1 mine of the Bell & Zoller Coal Co., at Zeigler, broke its hoisting record this month by hoisting 7,700 tons in eight hours. This is the mine that ran the famous production race with Orient No. 1 two years ago, winning for the month's output but losing the one-day record which stands at 8,210 tons. Zeigler No. 2 mine has a record standing at 6,699 tons. The total tonnages of these two mines for the year

of 1923 is over 2,000,000 tons, which is rated as the highest tonnage in the world for any two mines. The output for the mines during the year in railroad cars would reach over 300 miles, or if the caboose of such a train was in Zeigler, the engine would be passing through Chicago.

The Chicago Wholesale Coal Shippers' Association on Jan. 9 in annual meeting elected these officers: President, P. H. Holland; vice-president, Roscoe B. Starek; treasurer, T. A. Brahm; secretary, George H. Merryweather; directors, Charles L. Derling, James Anderson, Tom C. Irwin, N. L. Walton, J. H. Weil and W. C. Hill, who is the retiring president.

INDIANA

F. D. Roberts, who has been serving as traffic manager of the Indiana Coal Merchants' Service Bureau, an organization composed of a large number of retail coal merchants of the state, has been appointed manager of the bureau, to succeed R. R. Yeagley, who has resigned.

KANSAS

A consolidation of the Midland Coal Co. and the Jackson-Walker Coal & Mining Co. has been effected by H. G. Kellogg, C. H. Markham and C. P. A. Clough, at Kansas City, Mo. The Midland Coal Co. will hereafter handle the affairs of both concerns. Operating principally in Kansas.

KENTUCKY

Estimates of 1923 coal production in Kentucky show an anticipated output of 36,000,000 tons, as against 42,000,000 in 1922, the peak year, and 38,000,000 in 1920. In 1922 with the national coal strike in effect, Kentucky operated full time, with a large car supply and did a great business. A loss of five to six millions tons over 1922 is predicted, which is quite good in view of steady over production in all fields, and keen competition for business at giveaway prices in the autumn.

Coal interests of Kentucky are all set for the bitterest legislative fight on record, the legislature having convened Jan. 8 after a lay-off since 1922. There has been stiff support for a coal-tonnage tax, which has the backing of the agricultural and land-owning interests. Such bills have been defeated in the past. At the last session a sum was appropriated for a study of the coal-taxing problem, prior to action, this giving the coal interests two years' grace, which, however, has not helped the cause any.

The Elkhorn Collieries Co., Trenton, Ky.; Dudley Coal Co., Backey; Marion Coal Co., Rockhouse; Ajax Coal Co., Lotts Creek; and Himyar Coal Co., at Domino, are planning to resume operations after being down for some time.

Below zero weather on Jan. 5 prevented continued rise of the Ohio after it was about 4 ft. above the danger line, and probably saved business interests of Kentucky, including river coal companies, a good deal of money.

The Little Pond Coal Corp. has been formed and will develop property at McAndrews. H. G. Happersett, the treasurer and construction engineer, is located at Route 3, Ronaoke, Va.

Don D. Walker, for some years in charge of the Jeffersonville and New Albany (Ind.) divisions of the St. Bernard Mining Co., has taken charge at Louisville as well, and will now look after business of the three cities. W. B. Gathright resigned on Jan. 1 as manager of the Louisville office.

Notice has been filed of the dissolution of the Paint Cliff Mines Co., Louisville, claimants being asked to present all claims to Treasurer J. H. Schneider, 715 Inter Southern Building, Louisville, within sixty days.

The Reliance Coal & Coke Co., of Glomawr, is reported to have purchased the Defiance Coal Co., of Defiance, on Carr's Fork.

MISSOURI

Citizens of Moberly are making an effort to revive the old Busy Bee mine, in that city, which has been closed because of an unpaid payroll. More than 150 merchants and others attended a meeting at Moberly and steps were taken to continue operation by some form of public aid to the operating company.

David and John S. Lodwick, of Mystic, Ia., who recently purchased the Mosby mine at Mosby are making extensive improvements on the plant. They have installed much new machinery and have rebuilt the entire plant since purchasing it from the former owners. The mine is now turning out 100 tons of coal a day. This will be increased to 150 tons a day as soon as the plant is under full headway.

NEW YORK

The New York Stock Exchange on Jan. 10 admitted to trading on a "when issued" basis the 1,400,000 shares of capital stock of the Reading Coal & Iron Corporation without par value. Certificates of interest of the same company also were listed. The Exchange's Committee of Securities has ruled that inasmuch as due bills on Reading rights can no longer be transferred with stock certificates, all deliveries, beginning Jan. 10, must be accompanied by due bills for said rights until the respective stocks sell ex rights.

Judge Learned Hand, in the U. S. District Court at New York on Jan. 8 signed an order in the dissolution suit instituted by the government against the Lehigh Valley Railroad Co., appointing four trustees to exercise certain rights specified in the dissolution decree in relation to the capital stock of the Lehigh Valley Coal Co. and Cox Brothers & Co., Inc. The trustees for the Lehigh Valley Coal Co. are William Potter and the Girard Trust Co., of Philadelphia; the trustees for Cox Brothers, Inc., are Thomas R. Marshall of Columbia, Ind., and James Neale, Jr., of Minersville, Pa. The order provides that if there should come any disagreement among the members of the groups in the exercise of the duties imposed upon them as trustees, application for advice shall be made to the court.

Arthur Hamilton and Harry W. Maynard, of the Central Railroad of New Jersey, were elected directors of the Coal & Iron National Bank, of the City of New York, at a meeting of stockholders Jan. 8, 1924.

The Davis Coal & Coke Co. has opened an office in the Singer Building, New York City, with H. C. Pridham as manager and D. W. Bowden, sales agent. Mr. Pridham and Mr. Bowden formerly were connected with B. Nicoll & Co. and are well known to the coal trade.

P. A. Paddock, formerly of Dexter and Carpenter, Inc., is president of the Paddock-Walther Coal Corporation, which has just opened offices in New York City. W. M. Walther is secretary-treasurer of the corporation. Others connected with the new concern are A. Themans, C. G. Appleton and George M. Carpenter, Jr., all formerly associated with Dexter & Carpenter. Mr. Themans will look after the anthracite and domestic bituminous-coal trade. Mr. Appleton after the tidewater, coastwise and transportation business, while Mr. Carpenter will have charge of the Cincinnati (Ohio) office, he having occupied a similar position with the old Dexter & Carpenter firm.

NEW JERSEY

Governor Silzer, in his annual message to the State Legislature, told the members of that body that the anthracite problem must have earnest attention and that some relief must be obtained for the consumer. He advised the following: "Enactment of a statute which would protect the consumers of this state against all unlawful practices and profiteering after the coal gets within the state; an appeal by the state to prevent extortionate and unlawful practices while the coal is in interstate commerce; an appeal to the Governor and Legislature of Pennsylvania for a statute regulating the industry there and for relief from the agencies which raise the price and limit the output."

A bill introduced in the New Jersey State Senate by Senator Woodruff of Camden, provides that 2,240 lb. shall be the legal weight for a ton of anthracite. Assemblyman Powell, of Burlington, has introduced in the House a concurrent resolution which would request Congress at once to direct an investigation of the anthracite industry.

NORTH DAKOTA

The Saskatchewan Government has contributed to the plant of the Dakota Lignite Products Co., at Minot, a gas washer, condenser and exhaust system and fire brick tile for oven use. The Canadian Government is interested in the development of the plant and seeks to aid it in this manner.

OKLAHOMA

Operators in the Henryetta field of Oklahoma having mines on the Frisco R.R. are aroused over that company's determination to enforce ruling No. 9 of the Oklahoma Corporation Commission, governing car distribution. The operators declare that such action, if enforced, will mean the cutting down of the mines' running time, thus causing hardships to hundreds of miners and resulting in the shutdown of several mines. Under the old ruling if a mine's capacity was ten cars a day, for example, and half of this could be loaded as "no bills," the mine could still get its full quota of cars for the next day. Under the new ruling the railroad will charge the "no bills" cars against the quota of cars for the next day.

The Henryetta Coal Mining Co. of Henryetta, established in 1906 and one of the oldest in the Henryetta field, has been forced to abandon its shaft, due to a squeeze.

PENNSYLVANIA

C. E. Leshar has been appointed assistant to the president of the Pittsburgh Coal Co., Pittsburgh. The appointment became effective Jan. 1 and Mr. Leshar's headquarters will be in Pittsburgh, according to an announcement by W. K. Field, president of the company.

James B. Neale, largest independent operator in the Schuylkill field, has returned from Canada with the information that the Canadian Pacific R.R., which substituted the use of oil for anthracite in many departments, has returned to anthracite. Oil did not prove satisfactory and was not always to be had when wanted, he said.

Marcus A. Walker, who for the past eight years has been mechanical engineer for the Hudson Coal Co., has resigned, to accept a position as district manager of the Chance Coal Cleaner Co., with offices in Scranton.

The Jordan Coal Co., composed of a group of Scranton independents, is rushing work on its new colliery between Quakake and Delano. Three eight-hour shifts are employed in the erection of a breaker.

The State Supreme Court on Jan. 8 upheld the constitutionality of the state anthracite tax law in an appeal from the decision of the Dauphin County Court in the case of the Commonwealth vs. the Philadelphia & Reading Coal & Iron Co. and other appellants. It is not known whether there will be any attempt made to get the cases into the federal courts. The cases decided in the Supreme Court will involve the whole Reading, Lehigh & Navigation, Alliance and Cranberry groups. There are several others, but these cases will cover those producing the greatest amount of tax.

The annual banquet of the Coal Club of Philadelphia, will be held in the Bellevue-Stratford Hotel, Philadelphia, Jan. 31. Noah H. Swayne, president of the club, will act as toastmaster. The speakers will be Dr. J. T. Holdsworth, president of the Pennsylvania Joint Stock Land Bank; Ira Jewell Williams, of the Philadelphia Bar, and Charles L. Dering of Chicago, president of the American Wholesale Coal Association. The officers and executive committee of this latter association will be in Philadelphia for their quarterly meeting on Jan. 31 and will attend the banquet in a body. The banquet will be preceded by the annual election of officers.

According to an announcement made in Harrisburg on Jan. 7 by Secretary of Mines Joseph J. Walsh each of the fifty-two anthracite and bituminous mine inspectors in Pennsylvania may be given a month's leave of absence without pay. The action is necessary, press dispatches said, to conserve the department's fund, which would be inadequate were the force to continue on full time for the remainder of the biennium. As announced in Harrisburg Secretary Walsh will lay off the inspectors at the rate of several each month so as to not cripple the inspection work. Under the mine laws of Pennsylvania inspection in the anthracite regions must be made at

least once every thirty days. There is no specific number of inspections for the bituminous coal mines. By leaving off each inspector for one month, \$20,800 will be saved to the department.

Development of hard-coal operations in Quakake Valley, south and west of McAdoo, is being rushed at a rapid pace. The Panther Creek Valley company has opened workings on the mountainside and is employing three eight-hour shifts, as is the Candelmas Coal Co., of Wilkes-Barre, at Silver Brook.

During 1922 and 1923, according to a survey made by the State Geological Survey, approximately 200 new bituminous coal mines were opened in Pennsylvania, James D. Sisler, associate state geologist, has announced at Harrisburg. His report shows that the majority of the openings were in Allegheny, Cambria, Clarion, Clearfield, Fayette, Indiana, Jefferson, Somerset and Westmoreland counties. The report shows that about twenty-five mines in the Monongahela and Pittsburgh district have been reopened and pumped out for the purpose of removing pillars and working thin veins. Many of these mines have not been operated for thirty to fifty years and the increased value of the coal for coking and steam purposes is given as the reason for the reopenings. The Pittsburgh coking coal, the production of which is largely from mines in Westmoreland and Fayette counties, will be exhausted within a comparatively few years, it is said in the report, and the only large remaining area will be in Greene County. It is shown by the survey that the supply of Pittsburgh steam coal is about exhausted. Most of this is coming from the area about Allegheny County. The Morshannon bed, in Clearfield County, also is nearing exhaustion.

The State Department has approved the merger of the Springfield Coal Mining Co., the Bloomington Coal Co. and the Springfield Coal Co. into the Springfield Coal Mining Co. The new company has a capital stock of \$2,000,000 and George E. Metzger, St. Benedict, is the treasurer. The central office of the merged company is at Ebensburg.

Among the State charters issued are the following: Prospect Shaft Mining Co., Ramey, \$50,000 capital; purpose, mining, producing and selling coal and coke; incorporators, W. R. Minds, Ramey, treasurer; John H. Minds, Philadelphia, and George Minds, Ramey. Triangle Coal & Coke Co., Pittsburgh, \$25,000; mining and selling coal and coke; incorporators, William B. Atwood, Dormont; W. C. Maratte, Coraopolis, and George W. Kilpatrick, Pittsburgh. Raymond A. Siedel, of Philadelphia, is treasurer. Junction Coal & Coke Co., Pittsburgh, \$60,000; mining and selling coal and manufacturing coke; incorporators, D. L. Feick, Pittsburgh, treasurer; S. J. Minnick, Bruceton, and R. S. Porter, Broughton. Smutzinger Coal Co., Munson, \$50,000; mining coal and manufacturing coke; incorporators, Annie Smutzinger, Philipsburg, treasurer; Jacob Smutzinger, Philipsburg, and Fred Eisenhauer, Munson.

TEXAS

Dr. J. P. Spark and associates have purchased the mining plant and holdings of the Empire Fuel Products Corp., Inc., at Rockdale, and will operate them.

Charging that workmen's compensation insurance rates in Texas are unjust to lignite mine owners, five Texas coal companies have petitioned the State Insurance Commission to adjust the rates. The Texas operators contend that lignite rates in that state are based on conditions in Kansas, which they maintain, are far different from conditions in Texas. A hearing on the matter was held Dec. 10 at Austin.

UTAH

The U. S. Land office has auctioned a lease of 1,120 acres of land to the Union Coal Co. for a \$30 bonus. The minimum tonnage is to be 20,000 annually after the third year. Investment minimum is to be \$40,000. The royalty per ton is 10c.

WEST VIRGINIA

Frank Costanzo, of Warwood, president of the Wheeling Coal Co., announces that the Wheeling Coal Co. has purchased from the J. C. McKinley interests, of Wheeling, 1,000 acres of coal land near Warwood. The

company will increase its capital stock. Extensive construction work is already in progress and other improvements are contemplated.

Two large coal firms have been launched in Huntington by Captain R. R. Smith. The larger of the two companies—the Agee Coal Co. is capitalized at \$200,000. It will operate mines in the Logan County field, although its headquarters are to be in Huntington. The other company organized by the same people is to be known as the R. R. Smith Coal Co., capitalized at \$100,000. This company will act as a selling company only. Active in effecting the organization of the companies were R. R. Smith, W. P. Neekamp, G. I. Alexander, F. D. Clifford and E. H. Adams.

WISCONSIN

Milwaukee coal companies which operate docks on the upper limits of the Milwaukee River are somewhat disturbed over the fact that the city authorities evince a desire to close the river to large vessels by establishing fixed bridges across the channel in the interest of economy and uninterrupted street traffic. The Board of Harbor Commissioners will make a survey of the situation. In a matter of this nature the federal authorities have the final decision.

The Milwaukee-Western Fuel Co. will spend a large sum of money in improving what is known as Cherry Street dock on the Milwaukee River in Milwaukee. The dock will be straightened by the removal of a 10-ft. angular projection, thus allowing a 14-hold boat to unload without resorting to the use of scrapers to get the coal under the rigs. A new concrete dock will replace the present wooden structure.

WYOMING

The Employee's Magazine of the Union Pacific Coal Co. and the Washington Union Coal Co., published at Rock Springs, is a new publication for coal workers. This neat-looking 16-page paper, full of news and technical departments and illustrated with photographs and home-made cartoons, came into life with the January number. Mrs. Atlanta E. Hecker is the editor. The employees' magazine is the outgrowth of an idea of Eugene McAuliffe, new president of the companies.

CANADA

James B. McLachlan, deposed secretary of the United Mine Workers, District 26, has been denied a new trial by the Supreme Court, at Nova Scotia and may be required to serve the sentence of two years in Dorchester penitentiary, passed upon him following his conviction in October last on the charge of having published a seditious libel.

F. W. Gray, who has been associated with the British Empire Steel Corporation since its formation, and was previously with the Dominion Coal Co., has been appointed assistant to President Roy M. Wolvin.

A. J. T. Taylor, president of the Combustion Engineering Corporation, Ltd., Toronto, recently addressed the Engineering Institute of Canada and the Dominion fuel board, on "Powdered Coal as an Industrial Fuel." "This method of using fuel," said Mr. Taylor, "not only presents a means of improved results with the present available commercial fuels, but makes possible a still greater conservatism of those fuels by replacing them with many of the lower-grade local fuels that are at present unsuited for burning by ordinary means."

After years of experimenting in the production of peat at Alfred, Ont., the Dominion Government has interested private capital and a company has been formed in Montreal to take the plant over and operate it on a commercial basis. Three thousand tons of peat was produced last year and it is stated that peat can be produced at \$3.50 per ton. It cannot be shipped economically more than 100 miles. The total area of peat bogs in Canada is 27,000 square miles. Seven bogs within shipping distance of Toronto are capable of producing 26,500,000 tons.

A coking experiment with Nova Scotia and New Brunswick coal will be conducted at Hamilton, at the new coke ovens constructed by the local gas company, under the auspices of the Dominion Government on Jan. 21. The test will be made under the observation of Charles Stewart, Minister of Mines; Dr. Charles Cammell, Deputy Minister, and experts of the Mines Department.

COAL AGE

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Rid Mines of Convict Labor

NO ONE who has employed prison help in coal mines is an enthusiast for that class of operative. Nowhere is the employee less under observation and control than in a coal mine, yet nowhere, every miner will admit, is discipline more needed for the safety of the individual himself and for the security of everyone else in the mine.

The job of coal miner is one calling for loyalty and willingness to labor. True some miners have neither quality but there is always a fair admixture in any aggregation of men. With prison labor, loyalty and industry are notably absent, though probably even in prison mines, they are not invariably lacking. Unfortunately, convicts usually come into their regrettable condition by reason of the fact that they have neither of those qualities and are at war with the rest of humanity. They often are as insufferable in their own homes as they are to their neighbors.

It is useless to call on the coal industry to rid itself of prison labor. The coal industry is not to blame. Only those who enter into such contracts and such states as permit it are responsible. The appeal must be to the public in states which harbor such institutions.

Mining is not so dangerous inherently as to make the employment of convicts a crime. It is at best an act of folly, but this it certainly is and for that reason it should be condemned.

Is This What Was Meant?

PUZZLING indeed is the attitude of certain inspectors in regard to the disaster in No. 1 mine of the Mount Jessup Coal Co. A big fall of rock occurred in that mine, due, it is said, to the presence of 30 ft. of loose sand in the roof. This loose sand is not uncommonly found in the northern anthracite field. Where it occurs, precautions should be taken against it.

We are not clear that the inspectors were in any way amiss in demanding that workings in coal likely to be covered by such treacherous overburden be provided with unusual safeguards. That they should be drilled and that the areas of sand and its depth should be determined is a reasonable suggestion followed by one company at least. That the inspectors should be informed as to its presence is not a startling proposal. Faults also may have to be taken into consideration as possible causes of sudden roof collapse.

However, so much granted, one cannot understand the advisability of compulsory testing of the roof by boreholes in areas where loose sands and gravels are never found or when found are covered with thicknesses of firm deposits amply adequate to protect the workings.

The greater part of the coal in the State of Pennsylvania, including practically the whole of the bituminous coal field, is free of glacial drift. Only in the first basin are faults found except a few unimportant ones near the coal crop. No safety is to be gained by drilling such measures. We can only assume that the inspectors in making their report referred to areas such as that on which they were reporting and not to the many areas where loose sands and gravels, true faults and extensive fractures are entirely unknown.

Keep Moving

CONTINUITY of operation is the test of machine loading. Many machines already on the market load ample tonnage per minute to satisfy the operators who buy them, but unfortunately they can be expected to maintain that tonnage through the day only when cars are delivered steadily through the whole course of the shift. The question, therefore, is one of transportation. Only one car ordinarily can be delivered in a room at a time.

With a good roof and some cribbing or heavy posting, a trip can be loaded at a longwall or a pillar face, but cribbing and heavy posting is expensive to maintain and remove and may be inadequate in the control of the roof, as it interferes with its prompt collapse and therefore with the relief of pressure consequent thereon. This consideration reduces the length of the trip, and with a short string of cars the efficiency of the machine loader is greatly reduced. A conveyor leading to the roadway is a solution, but with many rooms equipped with many conveyors, congestion in the heading is inevitable. A heading conveyor can be placed on the roadway, as is advocated by the author of the article "Modernize," printed in this issue. Such a conveyor will meet this difficulty.

If there is more than one heading delivering to a single main entry, however, and these headings are close by one another there will be congestion on the entry and more trouble. Another conveyor, one on the entry, is the solution. This conveyor may profitably be extended so as to eliminate the use of cars altogether, except for supplies. Consequently the author of the article, recognizing this fact, makes conveyors serve for the transportation of the coal from the face to the tipple. Who shall say that he is not justified?

The face must be cut and shot, however, and meanwhile the room is not working. By moving the machine loader and its men to another room this difficulty is met at least in part. The loaders and cutters do not have far to go, and only the room conveyor is idle while the face is cut and shot and while cutter and loading machine are maneuvered into place. A machine that cuts as it

loads would enable operations to be continuous, especially if the coal does not have to be shot down.

Large changes are coming. Mines will become smaller and the work in them more concentrated and the expenditure per acre under operation will be increased. At the same time the capital outlay per ton of daily output will be lowered.

Narcotism

STRIKES have restricted output, and car shortages have aided in preventing the shortage of coal from being immediately replenished. Thus prices which have fallen to abnormally low levels have been raised to levels abnormally high. Naturally, companies facing bankruptcy or a severe depletion of resources have not viewed strikes and car shortages with any great degree of regret. One cannot much wonder at that as they present another chance to correct an unfavorable balance. But nothing has done more to bring an excess of new mines than this same condition.

Among these new operations are many so inadequately equipped that they cannot face the pressure of competition when the shortage of coal ceases. The fly-by-nights, or snow-bird, mines promptly close down when the flurry in coal comes to an end.

All new mines, however, are not of this class. Others there are equipped up to the minute and well able to drive the older mines to the wall. Some of these old operations with all their new equipment are so inherently out of date as far as layout is concerned that they cannot be operated in competition with mines designed with all the advantages of modern engineering. Not only are their roadways and airways badly planned and impossible to improve but they are unduly long. The new mines have all the advantage, and the last state is worse than the first. After the flurry conditions are more unbearable than before the strike or car shortage.

In fact the strike is like an opiate. When the drug's effects are expended, nothing but a second shot of the hypodermic will ameliorate the patient's condition. Narcotism is not popular among medical men because it leaves the patient weaker than before the application. Neither is a strike to be advocated as a means of renewing the vigor of the coal industry. Safe and sane business is based on full-time operation, not on spasms of activity followed by months of quiescent slumber.

As the doctor fears the *sequelae* of a drug, so should the coal industry view with apprehension the prospect of becoming victim to the unfortunate evils which follow in the train of an activity artificially created. If anyone would judge the effect of such temporary stimulants, let him view the course of the copper and machinery industries since the war.

"PLEASE BOIL IT DOWN TO ONE PAGE," begs a Congressman of a coal operator who has a plan for remedying some of coal's ills. Not many Congressmen would take the trouble to ask even that. They are just about like the coal operator—whose name is legion—who does not read the Coal Commission's report; they simply will not dig through reams of verbiage to get people's ideas. The wastebasket and the dusty shelf are ever ready for long-winds. Tell your Congressman what, if anything, you think ought to be done about coal; but beware of verbosity and the wastebasket.

Passing of the Hand Shovel

REDUCTION in the number and character of immigrants is assured if the House Immigration Committee's quota bill is enacted into law. The number of immigrants, already reduced, will be further diminished by almost one-half, and the particular sources of labor that have replenished the coal fields will be decreased in even larger proportion, for the number of men of the type that enters the coal mines will be more largely decreased in all probability than the figures of the new and old quota would indicate.

The United States is determined that America shall continue America. The people of this Republic are determined that the country shall no longer be surfeited with unassimilated labor. The immigration quota being based on 1890 instead of 1910, a large percentage of northern Europeans will be admitted and a small percentage of southern Europeans. The former do not take any more kindly than Americans to arduous labor. Few miners will come here and those who do will be unable to understand why they should produce as large a tonnage as has been the custom of American miners. They thoroughly approve of European standards of production and forget that American conditions of seam and system justify larger tonnages.

Consequently we may before long cease to find the coal fields populated beyond the labor demand, as they have been too generally in the past. Incidentally it may be remarked that we shall find it difficult to open new fields. Old fields will draw on the present surplus and perhaps for a while obtain men from other industries surrounding the coal fields, but new regions will have recourse only to transported native labor and to the sparse populations already occupying the neighborhood of the new mines.

Some time back when the loader was still new and portable conveyors fed by hand labor seemed likely to hold for a while the mining field, a superintendent was asked what he thought of these new-fangled devices. He replied that he preferred the "Franz Josef shovel," meaning the hand shovel in the hands of the subjects of the Emperor Francis Joseph. Many were then arriving, and splendid workers most of them proved to be.

Today the "Franz Josef shovel" is decreasingly present. We have to find a substitute, and the mechanical loader promises to serve the purpose. It inevitably must come, for the modern laborer takes but unkindly to arduous toil. The power loader is the only way to meet the problem.

Many an operator does not want to have to employ any more men. They take too many houses. No longer are any single men available or men having wives and children in Europe. Bunk houses accordingly will no longer aid in filling the needs of the operator. Good homes must be built, and with rents what they are—and they do not promise to be increased—the building of houses is unprofitable. The stores no longer pay an exorbitant profit. So the cry is "More coal without more men" or "with less men," for the single men are becoming married or bringing over their families and demanding suitable housing.

For this reason the power loader is becoming essential, and the mines must be worked more and more by machines. The pressure is economic and it cannot fail to be met. Only loading by machine and by face and room conveyors will meet it.



Coal-Strip Enterprises Grow in Western Kentucky

Sunlight Mining Co., of Madisonville Led Field with First Plant Opened About Three Years Ago—Twelve Pits Now Running and Three More About to Open—Operators Face Many Problems

BY A. W. WILLIAMS
Louisville, Ky.

STRIP mining in western Kentucky has made such forward strides of recent years that it is much in the spotlight in the coal industry of that region. Although the first stripping operation is only three years old there are now no less than twelve strip pits operating, three more are actively preparing to run and other companies are interestedly scanning the field for a chance to get into the game. During the month of November a total of 1,800 cars of strip coal were moved out of the field. This represents at least 10 per cent of the production of the western Kentucky field and is therefore already an important factor.

"And the best thing of all that can be said about stripping," says a strip operator who has heard much comment from shaft-mining interests about the doubtful future of stripping, "is that out of 340 underground mines in western Kentucky, including potholes and all, during early December only 150 were active and most of these got only part time, whereas every stripper that is ready to run was running. Coal can be mined more cheaply by the strip method, and naturally strip mines were underselling deep mines."

Development of strip operations in the field during 1923 was especially rapid. It was so rapid, in fact, that prospective operating companies made mistakes. It is always easy to figure on paper that there is a given tonnage of coal underlying a certain acreage, that the cover is of a certain depth and that the cost of removing it will be exactly such and such; but strip-

ping often is fraught with many surprises and much heartbreak.

Companies hastily opening stripping land have found that the overburden was not uniform, that it was spotted with hard formations expensive to move, that the coal seam varied astonishingly in thickness and often turned out to be shot full of "rust" in spots that lowered the uniform quality of the deposit, that drainage became difficult and expensive when the coal didn't lie right, that breakdowns of the few big expensive machine units upon which the pit depended were vexing and expensive, all of which doubled or trebled the paper cost of stripping coal. And finally, market fluctuations upset the roseate preliminary calculations. Some western Kentucky operators struck all of these difficulties.

SPENT \$25,000 YET DID NOT BUY COAL LAND

Some mighty careful studies were made by certain of the prospective stripping companies before any machinery was bought. One concern is reported to have spent \$25,000 in a thorough drilling of every part of a 450-acre tract and then to have declined the lease. It was a costly venture in prospecting, but the cost was nothing compared to what might have been wasted had the first few drill cores been accepted as adequate basis for going ahead. It is an expensive thing to erect a tippie with all the coal-cleaning and sizing equipment necessary to prepare strip coal for the market, and then to buy and assemble a big steam shovel and spend a few months encountering the unforeseen.

The industry being new in western Kentucky, the development companies have a lot to learn. Kentucky's first important stripping plant was opened only about

Cleaning is one of the serious problems of the stripper. The headpiece shows the picking table of the Sunlight Mining Co., near Madisonville, Ky. No less than fourteen men are on duty at one time taking out the refuse. Washers also are employed at some of the properties.



RIPPING THE OVERBURDEN FROM WESTERN KENTUCKY COAL WITH A MAMMOTH SHOVEL

Most of the big shovels in the rapidly spreading stripping movement of that section of Kentucky are steam-operated. Central-station electric service is none too general yet. The cover on this coal varies at most strip plants between 25 and 35 ft., but in spots runs up as high as 50 ft. West Kentucky as a stripping field was only lately discovered.

three years ago by the Sunlight Mining Co., of Madisonville. The Western Collieries Co. and the Magic Collieries Co., at Ilesley, followed closely. Subsidiary organizations of underground mining companies began to appear along with outright stripper outfits. The number of them steadily increased through 1923. During November two new strip pits were opened by the Morrison Coal Co., and the Curshaw Coal Co., both of Centertown. It is reported Birmingham (Ala.), interests are behind the Morrison company.

Within the three years fifteen developments started, including three which have not yet produced coal. These companies are now in the active class: Sunlight Mining Co., of Madisonville; Western Collieries Co., with two plants at Ilesley and Crabtree; Magic Collieries Co., of Ilesley; Hawley McIsaacs Co., of Carbondale; D. B. Gore & Co., of Providence; Harris Coal Co., of Island; Kentucky Washed Coal Co., of Nonell; Midstate Coal Co., of Morton's Gap; Dempster Construction Co., of the same place; Morrison Coal Co., of Centertown, and Curshaw Coal Co., also of Centertown. Strip pits are now being started by the Hawley McIsaacs Co. (No. 2 mine) at Lewisport, by the Dawson Daylight Coal Co., at Dawson Springs, and by Boddie & Powell, of Earlington.

It is known that at least two strip operations are located on properties belonging to the St. Bernard Coal Mining Co., of Earlington, shaft-mine operators.

The new Dawson Daylight Coal Co. is controlled by K. U. Meguire, of Louisville, Ky., and associates. For years they have been active in the eastern Kentucky field, but only recently started their first western Kentucky development. This strip-mine plant is to have a capacity of 5,000 tons daily, with complete washer, crusher and five-track steel tippie with picking tables and loading boom. It is planned as the largest coal-loading plant in the state. It has been delayed through failure of the Illinois Central R.R. to reach the plant with the new branch line that is now under construction.

The plant of the Sunlight Mining Co., the oldest and one of the best stripping plants in the state, is three miles southeast of Madisonville, on the Louisville & Nashville R.R. This location is 160 miles southwest of Louisville, Ky., and 108 miles northwest of Nashville, Tenn. The company has 500 acres of land and has stripped fifty of these. Its coal lies in two beds on a

1-per cent grade, which makes it easy to drain the pit.

Operations started in August, 1920. The property was carefully prospected in advance. The average thickness of its upper seam, the No. 12 bed, is about 5 ft. This seam is separated from the lower seam, No. 11, by a solid limestone stratum of 3 to 5 ft. The lower, or No. 11 seam, is about 6 ft. thick. Coal from both seams is of good quality for steam or domestic use, measured by western Kentucky standards.

The overburden, which averages from 25 to 35 ft. in thickness but runs up to as much as 50 ft. because of the irregularity of the land, consists of clay and shale. The clay is a little difficult to dig when saturated, but for the most part it is easy to handle.

WORK THE BIG SHOVEL NIGHT AND DAY

A big shovel with 85-ft. boom and 6 cu.yd. dipper started stripping in August, 1920, and has been going steadily since that time, operating with three shifts of eight hours, or twenty-four hours per day part of the time, moving about 120,000 cu.yd. of earth each month. It opened the northwest side of the property with a short cut, following an outcrop. Other cuts were made parallel to this in a gradually increasing curve, so that eventually a complete circle was made around the property to such a distance that the haul from the pit to the tippie is now somewhat more than a quarter of a mile long, the cut being about a half mile long and 100 ft. wide.

Other equipment used includes two smaller loading shovels, working one shift of eight hours a day each. Coal is loaded in ten-car trains, all the cars being of five-ton capacity and fitted for side dumping. Four trains are operated, pulled by 18-ton locomotives. A standard gage locomotive also is used in switching standard railroad coal cars back and forth from tippie to main line. It is reported that the company has not found it necessary to use explosives in moving overburden, but some 40 per cent powder is used on the coal parting. Six drills are kept in operation.

The tippie has a capacity of 2,500 tons daily. Coal from the workings is run over shaker screens, which sort out the 3x6-in. egg and 6-in. block for loading direct to cars, while 3-in. stuff is handled by a belt conveyor to the washing plant, where it is washed and elevated to revolving screens and rescreened to 3x2-in.

Loading Out Strip Coal

Small shovels like this are used for most of this work. Generally the coal is loosened by light shots but in some cases it is lifted by the shovel alone. In this particular plant the overburden was removed in long cuts each 100 ft. wide, following around the edge of the outcrop, the depth of the coal below the surface becoming progressively greater.



egg, 2x1½-in. nut, 1½x3 in. and ¾ in. down. Each size passes under the spray and is loaded into railroad cars, the breakage and slack being flumed back to a settling tank or sump. As many as fourteen men are used at the picking tables, for strip coal must be clean to meet competition.

The company maintains its own machine shop, equipped with forge, welding equipment, etc., to take care of breaks in equipment.

Another feature of the plant is a rock crusher with a capacity of 1,000 cu.yd. a day, operated by the Sunlight Crushed Stone Co., an affiliated concern. The limestone blasted from between the two seams of coal, and lifted by the two loading shovels, is prepared in the crusher for road building, concrete work and the like.

Find Good Coal on Peace River Canyon

THE first authentic account of the Peace River Canyon coal field since the completion of any important exploration appears in Part B of the Canadian Geological Survey's Summary Report for 1922, recently published. The account is written by F. H. McLearn, who spent the full season of 1922 in the district.

The coal field is situated at the junction of the 56th parallel with the 122nd meridian, a few miles west of Hudson's Hope. Those who are not acquainted with the location of this field will be interested to know that it lies 125 miles distant in a direct line northward from the Grand Trunk Pacific R.R. between Edmonton and Prince Rupert, and 324 miles, as the crow flies, from the nearest point on the Pacific Coast. It is about 475 miles due north of the United States boundary. Like the productive coal fields on Vancouver Island and southeastern British Columbia it is of Cretaceous origin. The measures over the area of seven square miles which was examined minutely have a thickness of 1,250 ft. and contain fifty known coal seams, ranging from a few inches up to 4 ft. in thickness. Eleven seams are more than 2½ ft. thick, one is more than 3 ft. and three expand in places to more than 4 ft. Several of the smaller seams are close enough together to be worked as one.

The grade of the coal varies, much of it being excel-

lent. Much interest has been manifested in the Sunlight operations due to the fact that the company was the pioneer in western Kentucky, and it has had enough experience to be an authority, while its methods have been steadily improved upon.

One of the big interests of the stripper people today is to clean their coal so as to counteract the strong prejudice against it. In several western Kentucky operations the top surface of the coal is carefully swept by hand after the overburden has been removed and before the coal is shot up. In at least one instance tractors are employed to drag heavy, four-wheeled rotary steel brushes over the coal. Washing plants and well-manned picking tables also are playing their part, so that western Kentucky strip coal can continue to hold its market.

The Milligan seam, from which the best coal is obtained, averages 2 per cent moisture, 22.5 per cent volatile combustible matter, 73 per cent fixed carbon, and 3.5 per cent ash. The Trojan seam averages about 1 per cent moisture, 26 per cent volatile combustible matter, 63 per cent fixed carbon, and 10 per cent ash.

While admitting that as yet insufficient exploration has been done to enable geologists to make an accurate estimate of the coal content of the field, Mr. McLearn says that sufficient evidence exists to suggest the presence of a total reserve of 84,000,000 tons within an area of seven square miles, and that it is possible that the area and tonnage may be doubled by further exploration.

The field, therefore, is undoubtedly an important one, but cannot be exploited until some better form of transportation than now exists has been provided. At present the nearest railway, the terminus of the Edmonton, Dunvagen, & British Columbia Ry., at Spirit River, is 125 miles distant to the east. This line has been graded to the Alberta-British Columbia boundary, which is 75 miles distant, and the Canadian Pacific Ry. Co. is said to be considering the extension of the line to the coal field and possibly to the Pacific coast. A trial shipment of 42 tons was recently sent down the Peace River to Peace River Crossing, a distance of 300 miles, where its steam-raising qualities will be given a practical test on the Canadian Pacific Ry. engines.

Unusual Hoisting Equipment at Huge German Headframe

Guides Independent of Main Structure and Can Be Adjusted in Case of Subsidence—Protection Against Destruction by Overwinds

By W. BENEDICT

Duisburg, Germany

DURING the past months, when the occupation of the Ruhr brought coal production in that district to a complete standstill, advantage has been taken of the opportunity to make necessary alterations to many colliery installations. A remarkable plant and headframe, the latter being the largest in Germany, and perhaps in the world, has been erected by the Orange Iron Works in Gelsenkirchen for shaft No. 9 of the Consolidation Mining Co. (Bergwerks Actien Gesellschaft "Consolidation"). It is arranged for hoisting in two compartments from a depth of 4,920 ft. (1,500 m.). The rope for hoisting from these profound depths has a calculated breaking strength of 380 tons. The superstructure, 173 ft. 10 in. high, is built in gantry form, with two stays placed opposite each other.

The guide frame, standing between the stays, is so arranged at the top of the structure that it is adjustable independently of the rest of the building. Consequently it is not influenced by the tension of the rope or any possible subsidence of the surface. This arrangement of the guide frame, by which it serves only for the guiding of the cages and is independent of the

stays and the top of the structure, offers a further advantage in that the structure cannot be injured should the rope be broken by an overwind. Furthermore, it provides that damages to the guide frame can be quickly repaired.

On the lower part of the guide frame, immediately below the pit mouth, a runway is constructed, on which are two hand-operated overhead traveling cranes, one behind and the other in front of the structure, which provide for the attachment and detachment of the cages. An ascending and descending platform, 13 ft. above the collar, aids in the quick transference of workmen when changing shifts. In case of a fire and when work is being done over the shaft the opening can be closed by fire trapdoors, these being raised and lowered by means of bracket winches arranged laterally on the structure. A large platform is provided above the roof on which the ropes can be spliced together when being renewed. Below the platform, as far down as the collar of the shaft, the structure is closely covered with plates, so that snow and rain cannot be driven in from the sides. Only water which falls vertically can fall into the shaft.

On the upper part of the guide frame, just beneath the bottom sheaves, a girder structure with platform is arranged, from which repairs can be made and the ropes put in place. The sheave parts can be hoisted up to the height of the sheave platform by a 10-ton crane which is placed above each pair of sheaves. By this means they can be rapidly brought to place in the superstructure. In consequence, interruptions of work when placing ropes on the sheaves and hoisting the latter into place, are reduced to a minimum.

Giant Head Frame with Two Back Stays

Standing nearly 175 ft. above the collar, this Consolidation Mining Co.'s No. 9 headframe provides for hoisting from a depth of nearly 5,000 ft. Novel provisions are made for the removal and replacement of the rope and sheaves and for the caging of the men. The guides are independent of the structure, so that in case of subsidence they can be adjusted to line with the guides in the shaft.



Modernize!—Some Revolutionary Suggestions with Practical Possibilities in Actual Practice

System of Mining by Room-and-Pillar Method with Conveyor Belts from Coal Face to Tipple—Tracks Only for Delivery of Supplies on Storage-Battery Trucks or Locomotives

BY WALTER M. DAKE*

New York City

IN ITS release to the public press of Sept. 24, 1923, the U. S. Coal Commission makes this fundamental statement regarding the necessity of the coal industry cleaning house and lowering the cost of coal to the consumer: "The commission realizes that the largest opportunity and the largest responsibility for putting the coal industry in order lies with the industry itself. Self-determination is the ideal."

It also makes the further statement in exemplification of the foregoing: "Not through governmental coercion but through the enlightened self-interest of producers and consumers the real remedy is to be sought. The coal industry can reform itself from within."

This truism is the essence of the final report and to it need only be added the obvious corollary that the coal operator, while receiving a fair return on his investment, should produce a clean product in sufficient quantity and sell it at a price, regulated by normal competition, such as will give the consumer cheap fuel.

The coal industry is reaching the point where improperly financed and poorly equipped properties operating intermittently and at high cost will be succeeded by financially sound organizations mining immense tonnages at low cost, and this will be accomplished only by the application of modern engineering methods.

Modern engineering has done much for the metal industry. Compare the methods of the early placer mines with those of today. In one the mineral was separated by hand panning or by the use of the cradle and sluice. In the other it is collected and concentrated by a powerful, high-tonnage dredge. Compare also the underground methods of earlier days with the more modern methods. In former years narrow seams of high-grade ore were drilled by hand, blasted and the product treated by stamp mills and amalgamation, only a small percentage of the gold content being recovered. In present-day mines the mineralized rock is obtained by stope mining and concentrated by large-tonnage cyanide mills which make high recoveries at low cost.

In like manner the methods of producing copper, lead and zinc have been improved. Steam shovels, caving systems, fine grinding, flotation and modern methods of smelting and electrolytic refining have been developed and put in operation, showing conclusively the effect of engineering management on mining costs.

Nor is this all; the iron ranges have seen equally startling improvements which have decreased the cost per ton mined and increased the daily tonnage. These changes, with all the subsequent steps of the steel-making process, are the direct result of concentrated engineering effort.

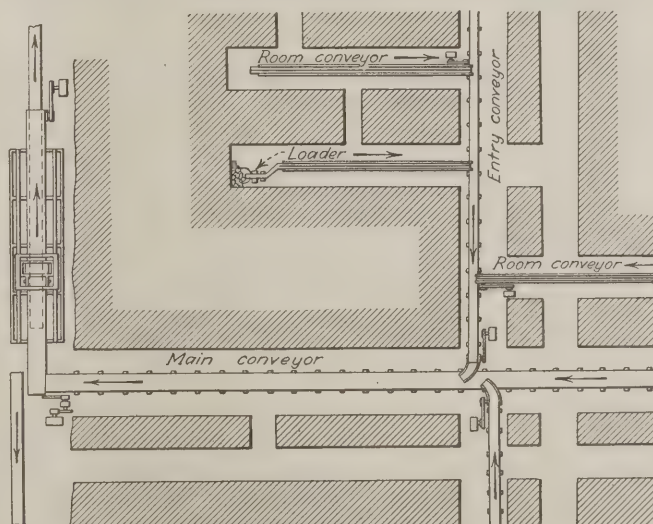
Because an intensive competition is to be anticipated in the coal industry, operators somewhat belatedly are realizing that better engineering is becoming essential in the conduct of their operations. Increased tonnage has lowered the cost of product in industries allied to coal mining and a like increase in output is possible in the production of coal through the extensive use of mechanical labor-saving devices in mining and transportation.

Some such changes already have taken place in coal mines, of which the introduction of coal-loading machinery is among the more recent. These loaders were the subject of an extensive study by the engineering staff of the Coal Commission and observations of performance have been tabulated which show an actual output of 353 tons per eight hours with a loading time of 56 per cent, the remaining 44 per cent being time lost in changing cars, moving loader and incidental delay.

It is understood that one type of loader is being sold under a guarantee of one ton per minute, and this promise of performance is justified by the calculations made from loading records in the field.

Comparing machine and hand loading, an increase of approximately 90 per cent in tons per man per day is noted. This increase is shown with the approximate 44 per cent lost time of machine loading included. The details of these studies were released under the heading, "Underground Management in Bituminous Mines," under date of Oct. 31, 1923.

Taking these facts into consideration, the next improvement in modern coal production must include the loading machine, and its effect on the present system of



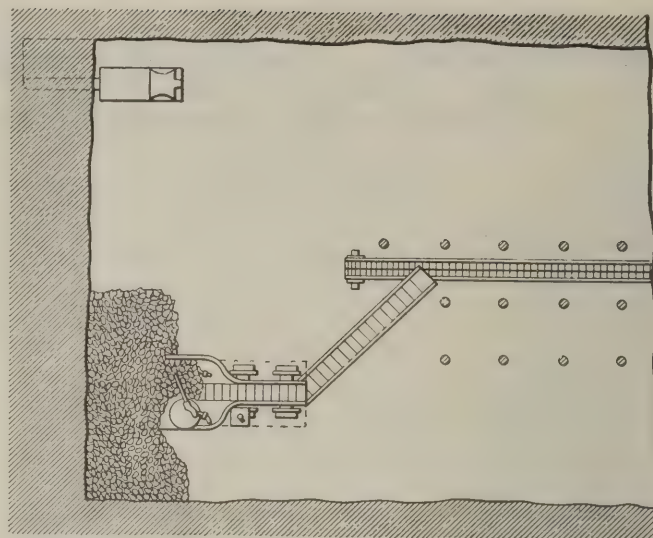
A MINE RUN WITHOUT CARS

Locomotives are used solely for taking in timber and supplies, and sometimes running the conveyor backward will take the lighter material to its destination.

*Engineer associated with Sanford E. Thompson in making report on "Underground Management in Bituminous Mines" for U. S. Coal Commission.

TABLE I—ESTIMATED COST OF INSIDE PLANT AND EQUIPMENT

Cutting		
2 Heading machines.....	\$50,000	
9 Chain shortwall machines.....	34,200	
9 Air drills with steel.....	2,350	
		\$86,550
Loading		
10 Loading machines.....		45,700
Transportation		
6,000 lineal feet room conveyor.....	\$64,900	
3,000 lineal feet auxiliary conveyor.....	45,000	
2,120 lineal feet main-line conveyor.....	42,400	
30 Room drives.....	15,000	
4 Auxiliary drives.....	4,000	
3 Main-line drives.....	5,000	
Control system.....	12,000	
		\$187,400
Drainage		
Pumps, motors and pipe lines.....		12,000
Ventilation		
Fan, motor and house.....		3,000
Power distribution		
Cables and terminals.....	\$30,000	
Transformers.....	5,000	
		\$35,000
Communication		
Telephones installed.....		900
Small tools.....		1,500
Safety		
Lighting.....	\$2,000	
Spray lines.....	7,000	
		\$9,000
Service		
3 Storage-battery locomotives.....	\$18,000	
12 Supply cars.....	3,600	
Supply track.....	15,000	
1 Repair fit.....	7,500	
		\$44,100
Development items		
Preliminary grading.....	\$4,000	
Mine openings.....	5,000	
		9,000
Total.....		\$434,150



CONVEYOR RUNNING STEADILY KEEPS MACHINE BUSY

The conveyor is set in the center of the room so that the machine can the more readily deliver coal to it. Not a moment is lost till the last pound of coal is loaded from the cut.

mining and underground transportation already is the subject of engineering thought and discussion.

At a recent session in a national congress of mining men the chief engineer of a large mining equipment manufacturing concern placed himself on record as follows: "The biggest obstacle in the way of the loading machine is the failure of operators to devise a scheme for getting cars to it fast enough"

This defect has been emphasized wherever the operation of loaders has been studied, and as an efficient system of handling the output of machines calls for drastic departures from recognized procedure and old methods, the operator has been loath to attempt its solution. However, just as the cutting machine, the air and electric drill, permissible explosives, haulage locomotives and rotary car dumps have been gradually adopted as the demand for tonnage has grown so will the loading machine and revised methods of underground haulage come out of an intensification of that demand.

The determining factor of their employment depends on the economic necessity for meeting competitors' lowered cost in the open market. Foreseeing the coming change in underground mining and transportation methods and gathering ideas from both the metal and bituminous fields, a system of mining and transportation for coal production had been devised which indeed embodies nothing new, except in the co-ordination of mechanism already proved effective. This system will increase the tonnage per employee, concentrate the working territory and lower costs to figures unobtainable by present methods.*

Raymond A. Walter, of the Walter Engineering Corporation, has worked out the details of installation and made a primary estimate of costs. The objects of the system may be listed as follows: (1) To adapt a system of cutting, blasting, machine loading and continuous transportation to the type of coal-mining method

now generally employed; (2) to effect the application and co-ordination of already proved equipment to continuous, large tonnage production; (3) to provide automatic control of the continuous system; (4) to provide suitable storage between mine and preparation or loading plant so as to eliminate the usual delays incident to tipple disability and temporary car shortage; (5) to devise equipment installation of sufficient flexibility and durability and at a cost per ton of annual output which will compare favorably with present systems and methods; (6) to effect a saving in cost per ton of output.

In order to accomplish these results the following are necessary in addition to the usual mining equipment, buildings, housing facilities, etc.: Heading machines, undercutters, air or electric drills, loading machines, portable, extensible room conveyors with electric drives, standard conveyor installation, also electrically driven; modern storage bins with reclaiming conveyors and standard tipple or loading equipment.

In order to visualize a continuous operation, the following plan of a mine, opened in a 4-ft. seam under heavy cover, is employed for illustration:

Main and back entries are driven into the seam by heading machines, the product from which is loaded directly onto standard portable extensible conveyors until a sufficient distance has been opened to turn entries to right or left. Portable extensible conveyors are then replaced by standard conveyor belts each mounted on a steel sectionalized base and of sufficient size and speed to carry the desired ultimate output of the mine.

The heading machine then commences operation on the entry and opens sufficient territory to permit seven or eight rooms to be turned on approximately 120-ft.

TABLE II—ESTIMATED COST OF OUTSIDE MINING PLANT AND EQUIPMENT

Tipple and Accessories		
Storage bin with head and tail conveyor (partial).....	\$50,000	
Tipple (temporary).....	50,000	
Railroad yard (partial).....	125,000	
Switch locomotive.....	20,000	
		\$245,000
Other Buildings		
Machinshop and tools (temporary).....	\$50,000	
Cost of supply-line transformers and other purchased power equipment with power house.....	20,000	
Supply house (temporary).....	5,000	
Office and laboratory (temporary).....	12,000	
Supplies.....	40,000	
		\$127,000

*Application for patent was made jointly by the author and R. A. Walter, Aug. 16, 1923.

centers. Portable extensible conveyors in the entry are then replaced by a standard conveyor belt mounted on a steel sectionalized base of sufficient size and speed to carry the desired ultimate output of the entry.

Cutting machines are then used to open rooms 40 ft wide on 120-ft. centers. These are followed by loading machines and standard portable extensible conveyors. With the aid of this equipment the rooms are driven to the desired length.

For illustration, the model mine is operated as follows: Cutting machines are sumped into the coal and a cut is taken across the face. After this cut has been completed, drills are used for placing the holes, which are loaded and shot. Machines mounted on tractors are then moved to the face of the broken coal, and loading commences. The output of the loading machine is continuously discharged onto a portable extensible room conveyor, which in turn delivers to the standard conveyor located in the entry. The entry conveyor in turn delivers the product to the main haulage conveyor, which carries the coal to a distributing conveyor placed above a storage bin of sufficient capacity to receive the entire daily output of the mine.

As each room face is loaded out a cutting machine is moved forward immediately and the operation is carried forward in cycles of cutting, shooting and loading, one cutting machine and one loading machine serving two faces. The conveyors are automatically controlled, so that should the main-line conveyor break down, all others delivering coal from the faces and from the entries are shut down. In case of stoppage of an entry conveyor, only the room conveyors feeding it will be stopped. The stoppage of a room conveyor will affect only that particular operation.

The continuousness of the system is at once apparent, and with a storage bin of sufficient capacity between the mine and tippie there will be no intermittency of mine operation due to delays in preparation and loading disability.

The feasibility of the system can be judged from the performance of cutting machines and mechanical load-

TABLE IV—PRODUCTION AND COST ESTIMATE LOADING MACHINE AND CONVEYOR MINING

For a 4,000-ton daily output in 4-ft. coal

2 Entries working, three shifts each			
1 Entry advancing, three shifts each			
2 Heading machines			
8 Chain shortwall machines 6-ft. cutter bar			
Number 1 Working Entry		Number 2 Working Entry	
4 Chain machines cutting 520 lin.ft. each.		4 Chain machines, cutting 520 lin.ft. each.	
4 Advancing 40-ft. rooms @ 2½ cuts per shift for 3 shifts.....	1,252 tons	4 Advancing 40-ft. rooms @ 2½ cuts per shift for 3 shifts.....	1,252 tons
3 Retreating 80-ft. pillars, @ 1½ cuts, per shift for 3 shifts.....	886 tons	3 Retreating 80-ft. pillars, @ 1½ cuts per shift for 3 shifts.....	886 tons
7 Working faces.....	2,138 tons	7 Working faces.....	2,138 tons
			4,276 tons
2 Heading drivers, heading 12 ft. width @ 20-ft. advance per driver per machine for 3 shifts.....			278 tons
			4,554 tons

ers under the present method of delivering coal to mine cars.

The practicability of continuous conveyor haulage can be estimated from the performance of standard sectionalized steel extensible trough conveyors, which have been in use for a number of years and can be purchased in any desired lengths with complete drive from manufacturers of coal equipment. These conveyors will be used for all entry advance and retreat, for room and crosscut extension and for pillar work

An estimate of the performance of standard conveyor belts may be obtained from the coal properties where installations are in use and from the record of tonnages of a more abrasive material than coal being carried over great distances—in metal mines and mills. The belts will be mounted on standard troughing and return idlers attached to light steel self-aligning foundation frames which will permit the replacing of temporary steel trough conveyors by the addition of the necessary number of foundation frames and of an extra footage of belting and by the moving of the tail pulley to the desired point in the main slope to reach newly opened right or left entries, or in entries to permit the discharge of tonnage from newly opened rooms.

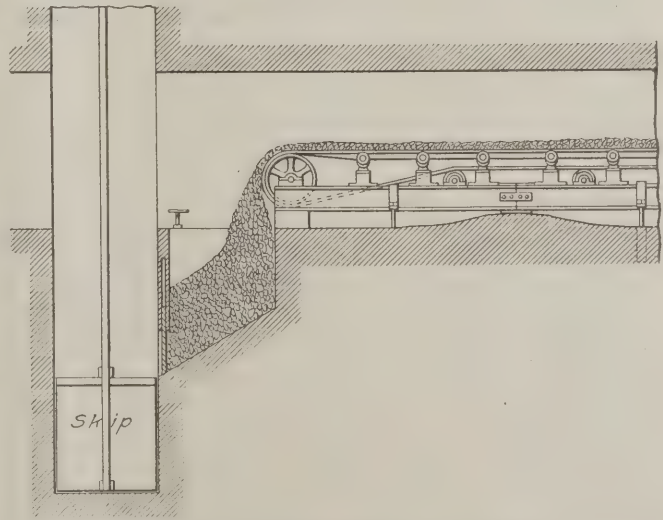
The retreat from destination crosscuts and from room- and chain-pillar operation is accomplished by the reversal of the advancing method of installing conveyors. All semi-permanent conveyors are suitably an-

TABLE III—ESTIMATED COST OF TOWN AND ACCESSORIES

Houses	
100—3 Rooms and bath.....	\$150,000
100—4 Rooms and bath.....	220,000
135—5 Rooms and bath.....	98,000
10—6 rooms and bath.....	33,000
8—7 Rooms and bath.....	36,800
1—8 Rooms and bath.....	12,000
	\$549,800
Other Improvements	
Stable, livestock, harness, wagons.....	\$12,000
Planing and saw mill.....	20,000
Bank and post office (temporary).....	20,000
Hospital (partial).....	20,000
Community building (temporary).....	20,000
Street work (partial).....	10,000
Park.....	0
School houses (temporary).....	20,000
Churches (partial).....	10,000
Store and stock (temporary).....	60,000
Railroad station.....	0
Water supply and sewerage (partial).....	20,000
Lighting system (partial).....	5,000
Hotel (partial).....	40,000
Telephone system (temporary).....	2,000
Laundry.....	0
	\$259,000
Total.....	\$808,800

SUMMARY OF ESTIMATES

Inside plant and equipment.....	\$434,150
Outside plant and equipment.....	372,000
Town and accessories.....	808,800
	\$1,614,950
Total.....	129,045
Add for contingencies.....	
	\$1,743,995
Carrying charge until on operating basis and operating fund.....	250,000
	\$1,993,995



CONVEYOR DISCHARGES TO BIN AT SKIP

The skip, working steadily, lifts the coal almost as rapidly as it arrives. It could be arranged so that, should it stop, it would de-energize the conveyors.

TABLE V—ESTIMATED GENERAL OFFICE ORGANIZATION
SHOWING NUMBER AND EARNINGS

	Per Month
1 General manager.....	\$1,200
1 Chief engineer.....	700
1 General superintendent.....	600
1 Mine superintendent.....	500
1 Outside superintendent.....	400
1 Mechanical superintendent.....	400
1 Auditor.....	350
1 Chief clerk.....	300
1 Supply clerk.....	200
3 Engineers @ \$175.00.....	525
2 Draftsmen @ \$175.00.....	350
3 Payroll clerks @ \$150.00.....	450
6 Clerks @ \$150.00.....	900
2 Supply clerks @ \$150.00.....	300
2 Stenographers @ \$150.00.....	300
1 Janitor.....	150
28.....	\$7,625

chored in slopes and entries. Temporary conveyors are quickly movable, extensible or contractible.

The application of the conveyor system to rolling and pitching seams is obvious, and where shaft openings are necessary to reach the beds, shaft pockets, skips and a surface storage bin are utilized.

Storage bins are used at metal properties throughout the world for stabilizing the delivery of product at the mill and concentrator and will correct irregularities of

TABLE VI—ESTIMATED OUTSIDE ORGANIZATION DAYMEN
SHOWING NUMBER AND EARNINGS

	Per Day	Per Day
1 Tipple conveyor man.....	\$9.00	\$9.00
2 Bin-chute conveyor men.....	7.50	15.00
4 Slate pickers.....	7.50	30.00
1 Tipple oiler.....	7.50	7.50
2 Boom operators.....	9.00	16.00
6 Railroad car droppers.....	7.50	48.00
2 Laborers.....	7.50	15.00
1 Tipple foreman.....	12.00	12.00
1 Locomotive engineer.....	10.00	10.00
1 Locomotive fireman.....	8.00	8.00
2 Railroad brakemen.....	8.00	16.00
1 Railroad weighman.....	10.00	10.00
1 Railroad helper.....	7.50	7.50
1 Railroad yard repairman.....	8.00	8.00
2 Railroad yard laborers.....	7.50	15.00
2 Carpenters.....	8.00	16.00
2 Blacksmiths.....	8.00	16.00
2 Blacksmiths' helpers.....	7.50	15.00
4 Machinists.....	8.00	32.00
4 Machinists' helpers.....	7.50	30.00
3 Electricians.....	8.00	24.00
3 Electricians' helpers.....	7.50	22.50
48.....		\$379.50

operation where either the car or conveyor method of underground transportation is in use.

Through the use of this system of mining the working faces can be concentrated to such a degree that it will be possible thoroughly to supervise their operation.

By the use of this method such speed in advance and retreat is obtainable that it is possible to open and recover a higher percentage of coal from any given area

TABLE VII—ESTIMATED MINE ORGANIZATION DAY MEN
SHOWING NUMBER AND EARNINGS

	Per Day
6 Heading drivers.....@	\$9.50
6 Heading-driver helpers.....	8.00
24 Cutting-machine operators.....	9.00
24 Cutting-machine helpers.....	8.00
12 Drillers and shooters.....	8.00
12 Drillers and shooters' helpers.....	7.50
24 Loading-machine operators.....	10.00
48 Loading-machine helpers.....	7.50
12 Timbermen.....	8.00
12 Timbermen's helpers.....	7.50
24 Room-conveyor men.....	8.00
6 Heading-conveyor men.....	8.50
3 Main-conveyor men.....	9.00
6 Conveyor helpers.....	7.50
1 Electrician.....	9.00
3 Electrician's helpers.....	7.50
3 Supply men.....	7.50
3 Machine repairmen.....	9.50
3 Machine repairmen's helpers.....	7.50
3 Distributing-conveyor men.....	9.00
3 Firebosses.....	10.00
3 Inside foremen.....	12.50
1 Mine foreman.....	15.00
242.....	\$2,014.50

TABLE VIII—ESTIMATED MISCELLANEOUS OUTSIDE ORGANIZATIONS
SHOWING NUMBER AND EARNINGS

	Per Day
Chargeable to Camp Maintenance.....	
1 Camp foreman.....@	\$8.00
1 Carpenter.....	8.00
1 Painter.....	8.00
1 Plumber.....	8.00
4 Laborers.....	7.50
8.....	\$62.00
Chargeable to Health Service.....	
2 Doctors.....@	\$12.00
3 Nurses.....	5.00
1 Janitor.....	7.50
6.....	\$46.50
Chargeable to Commissary Operation.....	
1 Store manager.....@	\$12.00
1 Assistant manager.....	10.00
1 Bookkeeper.....	5.00
1 Butcher.....	7.00
1 Butcher's helper.....	5.00
3 Clerks.....	5.00
2 Delivery men.....	5.00
20.....	\$64.00

than by any other method, thus avoiding the usual sloughing and caving accompanying slower extraction. When the model property used for illustration is opened sufficiently to allow the continued work in seven rooms, four rooms advancing and three pillars retreating on two entries, 666 tons per shift can be delivered from approximately 960 ft. of entry in 4-ft. coal. This gives a total tonnage per lineal foot of entry approximately twice as great per shift as can be produced by the usual method of room-and-pillar mining.

As the system calls for the elimination of all contract labor and the substitution of employees of higher quality for a completely mechanized operation from face to railroad cars, all workmen are placed on a daily wage basis. With this accomplishment it will be possible to operate the property three shifts per day, thereby multiplying the tonnage per lineal foot of entry produced by the usual method of room-and-pillar mining by a factor of approximately six. This also will lower the equipment cost and interest charges per ton of annual output by two-thirds over the present method of single-shift operation.

By the use of the system all car dumps, cars, rails, bonds, switches, ties, electric locomotives, trolley wires and rope haulage are eliminated in the actual transportation of coal from the face. Light track and storage-battery locomotives can be installed for the handling of heavy material or storage-battery trucks can be utilized where conditions are favorable. For light material the room conveyors may be reversed and used for carrying supplies to the face.

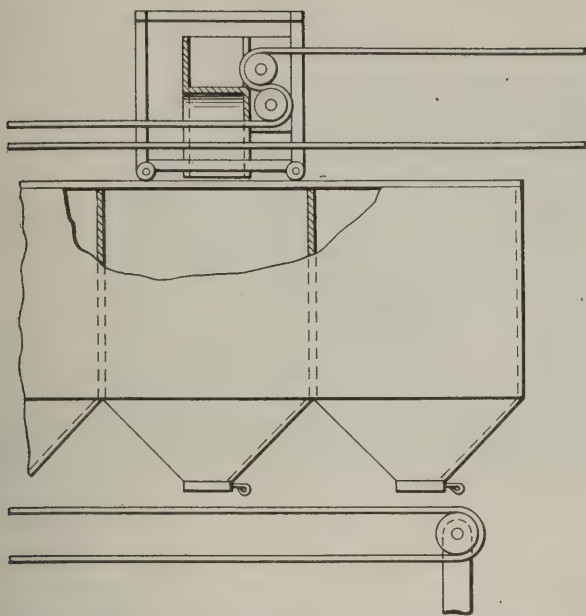
As it will not be necessary to remove cutting and loading machines from a particular section of the mine until rooms have been driven and pillars pulled, the delay caused by the present method of shifting these units almost hourly from one part of the mine to another also will be eliminated.

In order to carry out the comparison of present and

TABLE IX—ESTIMATED TOTAL ORGANIZATION EARNINGS AND
COST PER TON OF 2,000 LB.

	Daily production 4,000 Tons		
	Em- ploy- ees	Earnings per Day	Tons per Employee
Administration and office, salaries.....	28	\$306.00	
Outside organization, day men.....	48	379.50	
Inside organization, daymen.....	242	2,014.50	16.5
Total production.....	318	\$2,699.00	12.5
Other than mining.....	24	172.50	
All employees.....	342	2,871.50	11.7
Absentees estimated 8 per cent.....	26		
Total on roll.....	368		

\$0.0760
0.0948
0.5036
\$0.6744



HOW COAL IS DUMPED INTO STORAGE BINS
Enough storage is provided to satisfy a day's run. At the mines much time is lost because one operation waits on another leading up to it or following from it. The bin smooths out these delays.

proposed systems of mining to a more definite point an estimate of the complete cost of installation for a property producing 4,000 tons daily from a 4-ft. seam of coal is given; see Tables I, II and III.

Provided the property is leased instead of purchased \$2,000,000 will finance its development and operation at a daily output of 4,000 tons. To attain this low investment temporary buildings and equipment are substituted for the permanent ones. Taking the flat figure of \$2,000,000 for total estimate of plant, equipment and carrying charge until full operation and basing the production on a 4,000-ton daily output for 250 days per year, a total annual output of 1,000,000 tons is indicated. This gives a figure of \$2 per ton of annual output, which compares most favorably with the lowest investment cost of the lowest present-day operation.

Estimating further, the detailed cost of operation is given in Table IV.

The commissary should show a profit to absorb the loss on house rentals. Table X is the suggested cost.

The profit from commissary operation is then thrown into the camp fund, Table XI, which is self-explanatory.

Referring to the estimated total organization, it is to be noted that the number of employees on the roll is 368, or approximately one-third the number necessary for present-day operation of the same tonnage output. The inside organization produces 16.5 tons per employee per day, which figure has been equalled, but is decidedly unusual in present-day practice. For total employees on production an output of 12.5 tons is indicated and for total employees 11.7 tons per day.

For the purpose of this estimate it is to be noted that

TABLE X—PROFITS AND COSTS OF OPERATION OF COMMISSARY		
Estimated at \$300,000 gross sales annually.		
Gross profit at 20 per cent.		\$60,000
Less—		
Salaries	\$19,968	
Licenses and taxes	1,600	
Insurance	1,280	
Depreciation	500	
Rental for building	2,400	
Heat and light	1,000	
Interest	1,900	
	\$28,648	
Net profit		\$31,352

TABLE XI—ESTIMATED OPERATIONS OTHER THAN MINING PER ANNUM

Income from:	
Rentals	\$36,000
Collections for medical and hospital service	11,040
Collections for school	3,000
State aid	3,000
Commissary profits	31,352
	\$84,392
Less expense for:	
Camp maintenance	4,464
Medical and hospital service	16,972
Fire insurance	4,000
Taxes	5,000
School expense	12,000
Depreciation	40,000
	\$82,436
Annual profit	\$1,956

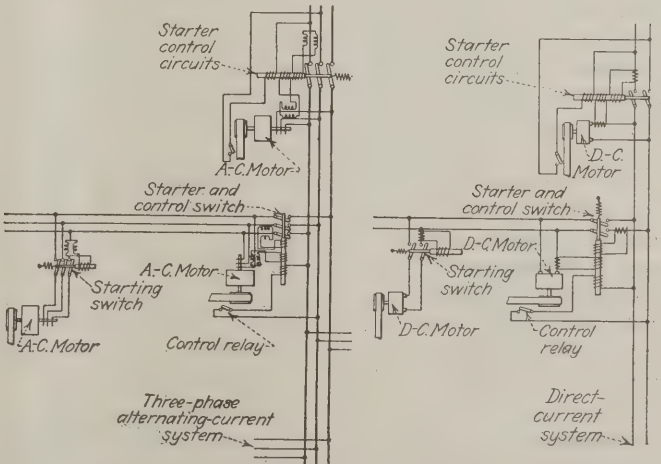
TABLE XII—ESTIMATED COST OF PRODUCTION

Wages and salaries (total mining)	\$0.5984
Supplies	.3000
General Expenses:	
Administration and office	\$0.0760
Insurance (general)	.0025
Insurance (compensation)	.0150
Taxes (excluding Federal)	.1000
Depreciation	.0500
Depletion or royalty	.0550
	.2985
Total cost	\$1.1969

the minimum day wage for mining operative labor is figured at \$7.50 per 8-hour shift, and that salaried employees range from \$1,200 to a minimum of \$150 per month. Computing from these rates, a total mining cost of wages and salaries equals \$0.5984 per ton. Adding to this amount a flat estimate of \$0.30 per ton for supplies, and a total of \$0.2985 per ton for administration, etc., the remarkably low total cost of \$1.1969 per ton is indicated.

With the production of prepared sizes of bituminous coal at \$1.1969 f.o.b. cars and with selling cost added, coal can be delivered to consumers at prices ranging so far below present average cost that the entire annual capacity output could be sold and a stabilized profit realized at a selling figure much lower than could be attained by competitors. This low price would eventually be reflected to the consumer by the increasing use of low-cost production systems, and the general public benefited through engineering management and modern engineering methods

“Not through governmental coercion but through the enlightened self-interest of producers and consumers the real remedy is to be sought. The coal industry can reform itself from within.”



TWO SYSTEMS—ALTERNATING AND DIRECT CURRENT

In any system arrangements must be made that no conveyor will deliver onto a stopped or stalled conveyor. When a conveyor stops, all conveyors feeding it directly or indirectly must be stopped also.

A Tribute to a Notable Editor

BY R. DAWSON HALL
Engineering Editor, *Coal Age*

C. E. LESHER, till recently editor of *Coal Age*, had in the short time he filled that office given evidence of an unusual fitness for the exercise of that function. His resignation to become assistant to the President of the Pittsburgh Coal Co. came as a surprise to his many friends and associates, for they were but little disposed to believe he would cast aside a profession that fitted him so well and was so in accord with his preferences and qualifications.

He came to *Coal Age* with a wide knowledge of the coal industry acquired in many years of statistical and administrative work in the government service. For many years

he was a geologist in charge of coal statistics, in which work he made notable innovations, including the weekly report. He understood the value of speed in the distribution of the data of operation—a quality of inestimable value in his later practice of journalism.

Mr. Leshner is a native of Colorado and obtained his technical education at the Colorado School of Mines, being graduated in 1908. His two years in the work-a-day metal-mining field, of which he had many fond remembrances, freed him from an aloofness of attitude toward operating problems that government employees are supposed to have. Later he was engaged by the American Nitrogen Co. In 1910 he joined the staff of the U. S. Geological Survey, and, strangely enough, aligned his career with coal and not with the metals. For two and a half years he was chairman of the coal board of the Survey making geological investigations into the coal fields of many states.

On E. W. Parker becoming director of the Anthracite Bureau of Information and leaving the Survey, Mr. Leshner succeeded him. Coal problems becoming acute in 1917, he was detailed to the Fuel Administration, being director of its Bureau of Statistics until June, 1919, and in the exercise of his duties became acquainted with the leading coal executives of the country, who admired his good judgment and his stalwart integrity. Returning to the Geological Survey for a short period he later—during the 1919 strike—became a member of the Central Coal Committee. Then followed in 1920 his period of active service for the National Coal Association, in which he organized its Bureau of Economics.

In April of that year, however, he left the association to become editor of *Coal Age*, during which he made important changes in the character of the paper. His tabulations and curves of coal prices, culminating in his index, his orderly presentation of marketing facts, his news-gathering ability, his editorials, redolent rather



C. E. LESHER

of the field than the office, added to the standing of the publication and made him an outstanding figure in the industry. Thus fortified by talent and experience, a restless but well disciplined mind, a marvelous knowledge of the men and the material of the industry and a diplomacy and *savoir faire* only equalled by his integrity of purpose, he brings to the Pittsburgh Coal Co. constructive qualities which that corporation will not fail to find immensely valuable in the handling of its big enterprises. The good wishes of the staff of *Coal Age* accompany him.

Engineers Study Economy in Fuel Use

DESIGNING, operating and fuel engineers of the railroads, public utilities, manufacturing interests, colleges and coal sales companies of the country met Jan. 15 at the Engineers' Club, Philadelphia, Pa., and discussed economy in the use of fuel.

G. M. Basford, consulting engineer, of New York, read a paper entitled "Recent Accomplishments in the Improvement of Power and Efficiency of Steam Locomotives." Other papers and discussions that followed pointed out how large economies could be effected by the use of better designed locomotives. The latest developments along this line have been more scientific design of boilers, adoption of stokers, superheaters, feed-water heaters and boosters. By the use of these improvements it has been possible to generate energy at the rate of 1.8 lb. of coal per horsepower-hour. It was asserted that about one-fourth of the coal supply of the country is used by the railroads, and the losses amount to about 30 per cent of the total quantity used. They said great savings could be effected by reducing idle time and by more careful firing under operation and while standing idle at the roundhouse or terminal.

The afternoon session was devoted to public utilities and manufacturing plants, when the subject was discussed principally by representatives of power plants and metallurgical interests. At this session Morris L. Cooke, consulting engineer, of Philadelphia, outlined the Pennsylvania giant power survey, the purpose of which is to conserve coal, first, by the development of large power-generating stations located at or near the mines and interconnected into a large system; second, by the development of the byproduct industries, and third, by savings effected by serving small producers of power with energy from a large system.

N. G. Reinecker, of the Pennsylvania Power & Light Co., showed how his company had found that interconnection of power plants had materially reduced the investment, operating and fuel costs per kilowatt-hour of energy developed. The load is so distributed that plants capable of generating energy at lowest costs are generally loaded up as near as possible to capacity. Stand-by charges can be materially reduced, and it is not necessary that generators be started and stopped at every slight indication of an increase or decrease of load.

H. O. Loebell, vice president of Henry L. Doherty & Co., discussed the possibilities of large coal savings in domestic use by the greater appreciation of gas as a heating medium. He asserted that by a careful revision of the law it would be possible for companies to produce gas for heating purposes at efficiencies between 70 and 80 per cent as compared with the operation of domestic furnaces at from 5 to 20 per cent.



Too Much Around a Coal Mine Is Left to Chance

Mechanical Weakness, Improper Design and Haulage Delays Lower Output 10 per Cent at Tipple Capable of Handling 7,390 Tons Daily—Rarely Is Supervision Close Enough to Provide for Standardization and Correlation of Activities

CLOSER study at coal mines to develop standard methods of performing operations and to eliminate lost motion and delays would increase output without changing equipment or adding materially to the personnel. Every operation should be given an intensive study both to develop the best method of performing the work involved and to fit its performance into the complete combination of effort by which coal is brought to the surface and dumped into railroad cars for shipment.

Production Losses at Tipple.—Fig. 1 shows the number of pit cars dumped by fifteen-minute periods for one day at one of the larger mines. It is presented as illustrating not so much the time losses at a single mine as the losses that are common in a large number of bituminous mines but which are not appreciated.

Production losses from four causes are shown. Approximately 6,000 tons of coal was hoisted and dumped at this tipple on the day observed, and although this was a relatively high day's production for that particular mine, and considered to be its maximum, it shows the tipple to have been operating at only 81 per cent of its capacity. The loss of 84 cars or 360 tons production due to major mechanical difficulties is a type of loss that cannot be entirely eliminated in any type of machinery subjected to the severe usage that tipple and hoisting equipment undergo, and a certain time loss, therefore, must be anticipated when designing the tipple arrangements.

The loss of 157 cars, or 670 tons of production, was, however, due to a type of mechanical difficulty which occurred over and over again, day after day, viz.: the incomplete discharge of the car at the first dumping. Yet no thought was being given to an improvement in

the mechanical process of dumping that would eliminate this large loss.

It is true that under almost any condition an occasional failure would be possible, but when these failures are identical in character and are sufficiently continuous to cause a loss in production of 670 tons, or over 10 per cent of the whole output, and are allowed to continue, it is evident that the elementary principles of management engineering that are coming to be employed so generally in other industries are not being applied in this instance.

TIPPLE STOPS EVERY TIME LOADER IS DOCKED

A loss of 37 cars, or 160 tons, was due to defective tipple design, it being necessary to stop hoisting whenever a car containing rock was dumped, in order to remove this rock and to dock the miner for loading it. Realizing that the losses from this cause were unnecessary the management were redesigning their tipple so that any such car of coal would be inspected and cleaned automatically on a separate table, leaving the regular tipple operations to be continued without interruption. Though this method was employed in some of the mines with the most advanced management and technical staff it was not found to be in general use.

A further loss of 48 cars, or 200 tons was due to defects in the underground-haulage methods. It represents the loss due to the absence of loaded cars at the shaft bottom at times when the hoist was ready to operate. This loss would have been much larger if the previously mentioned causes had not stopped hoisting and during that time permitted loaded cars to accumulate at the bottom.

Sixth installment of report on "Underground Management in Bituminous Mines," made by Sanford E. Thompson and Associates to the U. S. Coal Commission. Previous installments may be found in Vol. 24, pp. 691, 733, 773, 811 and 845. Other sections of this interesting report will follow later. The introductory paragraph of this section is added to the original to serve as an introduction to what follows.

Supervision Underground.—The relation of the number of assistant foremen or face bosses directly in charge of underground work to the number of men under their control is shown for several mines in Table I. The relation of tonnage, or piece-rate, workers to company men or day workers, differs materially, but

TABLE I—RELATIVE NUMBER OF WORKERS TO BOSSES

Designation of Mine	DS	RZ	TS	RM	TP	HI.
Total number of face bosses or section foremen	2	4	3	6	6	47
Total company men inside	83	190	52	94	205	553
Total tonnage workers (loaders and cutters)	268	450	122	194	153	889
Company men per boss	41	48	17	16	34	12
Miners per boss	134	112	41	32	25	19
Total men underground per boss	175	160	58	48	59	31

that is inevitable because of the difference in the physical condition of the different mines. But the ratio of underground workers to foremen and face bosses is not so readily explained when one stops to consider that in the case of mine DS, for example, the 175 men are scattered over a distance of more than a mile and a half underground, and the several workers separated from each other by distances of from 100 to 300 ft. When it is remembered that one man directly supervises their work it is easy to comprehend one of the reasons why the work is not standardized and correlated.

The standardization of a miner's work, as will be discussed later, involves two things: (1) The standardization of the method and time of the individual items of his work, and (2) the correlation of these items in such a way that the lost time both to himself and those other men whom his work affects will be reduced to a minimum.

The solution of the problem, as has been indicated already, is not necessarily more foremen of the present type, but more thorough training of these men such as is being given them in a few mines, and above all an organization based on modern industrial lines with functional supervision, not limiting the officials to the executive function but including as officials men trained to handle certain other principal elements such as haulage, planning the work of the men, and standards of production.

IN A MINE, WORK OF ONE SETS PACE FOR ALL

Correlation of Mining Operations.—The correlation of haulage with the work of the miner has been discussed in previous articles. Similar principles apply to other mining operations.

The work of all classes of men in a coal mine is interdependent. If a machine cutter fails to cut a loader's place the loader may be forced to stop work. If a tracklayer is behind in laying a switch it delays the opening of a room. If a timberman fails to set timbers quickly enough when needed at a certain place, and a fall occurs, it may disorganize the work of all the men in that section for several hours. The failure of a shotfirer to shoot a place at the proper time stops or delays the loaders and slows up the haulage.

When the loader in turn quits and goes home early without cleaning up his coal, it affects not only himself but the machine cutter, tracklayers and drivers, whose work is disorganized.

A loader's work covers in general other things besides the actual loading of coal. In some cases he lays his track (ties and rails), pushes his car to the face, sets timbers, loads or gobs slate, drills, snubs, loads and fires shots and loads his coal. In other cases he does almost nothing but load coal, everything else being done for him. The majority of cases lie somewhere between these two. No one has taken the trouble to ascertain the relative proportion of the miner's time necessary under normal conditions to perform the varied parts of this work.

All of these things and their variety show the need

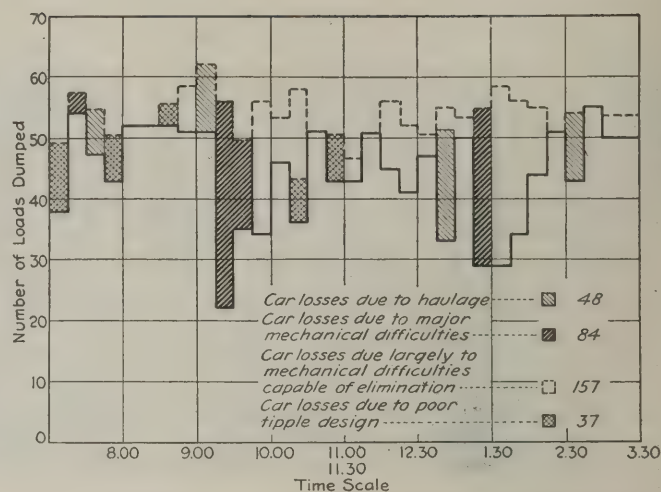


FIG. 1—NUMBER OF MINE CARS DUMPED AT TIPPLE BY 15-MINUTE PERIODS

Car losses have been figured by pro-rating the time lost on a basis of 54 cars per 15-minute period. The cars dumped in 15-minute periods were actually 1,402 cars. Averaging 4.28 tons capacity without delays 1,728 cars would have been dumped. The tippie was operating at only 81.2 per cent of the hoisting capacity.

for a modification of the scheme of management in line with that toward which some of the most up-to-date mines are already tending and which are exemplified still further in certain metal mines.

At present this definite control of the work of the loaders and company men is made impracticable by lack of knowledge of the time that it should take to do different classes of work. It is recognized that physical conditions present greater variety and affect operation much more definitely than in most manufacturing industries, the standards of production of which have been determined. As will be shown later, however, this division of the subject can be treated in detail, for it must be remembered that in metal mines, where operations are equally varied, they have been carefully standardized. This fact shows the possibilities of determining standards of production which will make possible a more scientific control of operations, thereby saving in operating costs and affording benefits to the workers.

In many of the mines visited, the foremen, superintendent and general manager were asked for estimates as to the time necessary to perform various types of work. Their replies varied from 10 to 45 minutes for the same operation. A member of the pit committee estimated that this same operation could be completed in two hours. They were all guessing and in the replies given favored their side of the matter. This was quite natural, but the point that should be emphasized is that the actual facts were unknown.

The same conditions exist with respect to the work of the company men, the tracklayers, timbermen, etc. Differences in estimates of the time required for any given piece of work generally varied more than 50 per cent.

FULL INFORMATION regarding the chemical composition of coal of the Twentymile Park district of Colorado and its heating value as determined by the U. S. Bureau of Mines is given in Bulletin 748 of the Geological Survey. This value is compared with the heating values of competing, or possibly competing, coals, so that the consumer, if he cares to do so, may balance one coal against another and thus be able to select that which will give the greatest return for his money.

Mine-Rescue Communication System of the Future

Results of Actual Mine Experiments—High- and Low-Frequency Penetration—Modified Wired Radio Seems to Hold Greatest Possibilities

BY J. J. JAKOSKY
U. S. Bureau of Mines

FOR ordinary purposes, the present mine telephone, although somewhat costly in initial installation and maintenance, is giving satisfaction in most mines. In case of a disaster, such as an explosion, fire, fall of rock, flooding, etc., the telephone is one of the first instruments that usually is put out of commission, and at the time when it is most urgently needed. On this account the mining industry as a whole is interested in any system of communication—phone in preference to code—that can be relied upon in an emergency, and many requests have been received by the Bureau of Mines to devise such a system.

The solution of the mine-communication problem is dependent mainly upon the working out of a practical portable mine apparatus of sufficient sensitivity for receiving and transmitting at effective ranges. It is well known that signals can be transmitted considerable distances through the earth if sufficient power and a receiving set of sufficient sensitivity be used.

REQUIREMENTS FOR MINE-RESCUE RADIO

The ideal system for mine-rescue work and general underground communication would be one where voice transmission and reception is possible. This is the ultimate end as a solution; but if such a system is not immediately possible or conveniently portable, then a simpler system where a telegraphic code or prearranged signals may be employed is desired. The transmission of code cannot be considered as a general solution to the problem of underground communication. Code, however, has advantages as regards transmission of information, over the geophone.

A practical type of apparatus for underground communication will have to be simple in operation. If high frequencies are used, requiring tuning to produce resonance, some fixed wave-length should be used. Vacuum tubes are the only practical method for the successful modulation and transmission of voice signals. For the transmission of code signals many different instruments can be used.

The apparatus will have to be safe to use in an explosive gaseous atmosphere. During mine disasters, and especially when barricades are erected, there is great probability of danger from a gas explosion if unsafe electrical apparatus be used. All mine-signal apparatus should be of an approved and permissible type.

CONSTRUCTION AND DETAILS

For satisfactory and practical use in mining and rescue operations, an underground signal apparatus probably would have to be designed to incorporate the following points:

(1) The apparatus must be moisture- and waterproof—that is, it should be unaffected by dampness

and continuous standing in wet mines. In this connection it may be stated that practically none of the radio or high-frequency apparatus being sold today would be suitable for such work. The condensation of moisture on the surfaces of dielectric and non-waterproofed insulating materials, unprotected windings, condensers, etc., causes large current leakages. In one of our tests a radio receiving set which had been left underground for about six hours became very inefficient.

(2) The apparatus must be durable, rugged and fool-proof. The entire equipment should be enclosed in a strong case, and all delicate apparatus such as vacuum tubes, controller knobs, etc., should be protected.

(3) A practical mine apparatus should be easy to maintain in good working order. Depreciation of the apparatus itself is of importance, and also care must be given to any batteries which may be used. Batteries should be given regular inspection.

(4) The receiving apparatus will have to be simple to operate and probably will have to be very sensitive. In practically all types of underground communication, whether by direct ground, induction currents, radio, and to a much less extent wired wireless, there is high absorption of the transmitting current. The energy picked up by the receiving apparatus is only an infinitely small part of the energy transmitted, thus requiring a very sensitive receiving apparatus.

(5) The last and probably most important point to be considered is the weight and shape of the signal apparatus. The weight must be kept below about 40 lb. if the apparatus is to be sufficiently portable for underground use. It is possible that a satisfactory design will be worked out wherein the transmitting and receiving apparatus is contained in one cabinet, and the power supply, whether batteries or hand-cranked generator, contained in another cabinet. A suitable non-reversible plug, safe in explosive gaseous atmospheres, could be used for connecting the power supply to the apparatus when in use. The general shape of the enclosing case and carrying straps or handles must be such as to allow the apparatus to be readily moved should it be necessary to crawl or keep one hand free.

METHODS BEING INVESTIGATED

The present investigation being conducted by the Bureau of Mines includes studies of the following systems: (1) The T.P.S., or ground-conduction, method; (2) induction signaling, both high and low frequencies; (3) wired radio over underground mine power and telephone lines, trolley wires, rails, and through piping for water and compressed air; (4) radio; and (5) electrical geophone and auxiliary signal equipment. These investigations include studies of the effects of rock falls, mine flooding, and similar conditions encountered during disaster, as well as general underground conditions existing in the ordinary operations of metal and coal mines.

SUMMARY OF INVESTIGATIONS BY BUREAU OF MINES

Little difficulty was encountered in transmitting T.P.S. signals to distances of 1,200 ft. over compressed-air piping, car rails, or other conductors to any part of the Bureau's Experimental Mine. In these tests a short direct connection is made with the rails or pipes. There is a decrease in audibility with the distance between stations. In the transmission along mine tracks, mud and water over the tracks, switches and breaks in

the tracks, did not prevent exchange of signals. In two places, 8-in. wooden rails had been inserted as a protection against lightning, and the T.P.S. signals carried through the wooden rails, which were moist, without any great decrease in audibility.

In order to determine the effects of mine cars on the track, a mule was hitched to two pit cars and a truck. The transmitting set was placed at the rear of the mine, about 1,200 ft. from the entry where the receiving set was placed. Signals could be transmitted without difficulty, and it is interesting to note that the audibility of the received signals was low when the mine cars are near either the transmitting or receiving sets, but as the distance between these sets and the cars is increased, the audibility rises considerably. In vertical transmission tests the T.P.S. set was placed in the mine 600 ft. from the entry. Ground leads extending 100 ft. each way from the set were used, one lead going to ground 500 ft. from the entry and the other lead placed 700 ft. from the entry. Because of the narrowness of the entry, the ground plates, which were laid upon the mine floor, were placed within 3 ft. of the car rails.

UNDERGROUND TESTS CARRIED OUT SUCCESSFULLY

The Bureau's mine is a drift mine having about 160 ft. of overburden at the end of the drift, which is 1,300 ft. long. The receiving set was placed on the surface as near over the T.P.S. set as possible to estimate, the ground leads extending approximately parallel to the leads within the mine. Little difficulty was had in transmitting signals from within the mine to the surface, and signals could still be transmitted when the surface receiving set had been moved—still keeping ground leads parallel—to a point more than 800 ft. away from a point on the surface directly above the transmitting station.

Similar tests were carried out at the Pittsburgh Terminal Coal Co.'s Mine No. 3. This mine is a shaft mine about 250 ft. deep. Little difficulty was met in transmitting T.P.S. signals from the mine to the surface. A heavy rain fell during the first part of these tests and the receiving apparatus was not removed from the automobile. Two 100-ft. ground leads were run in opposite directions to the side of the road and code messages easily were received from the mine. The heavy rain and water covering the road did not prevent the T.P.S. set from working.

During the second day of the tests the ground was covered with about 3 in. of snow, and as before, code messages could be readily received. These tests were made with the surface ground terminals approximately parallel to those underground. Later tests, where the terminals were placed approximately at right angles, showed a marked decrease in signal strength, indicating, as had been found in the tests at our Experimental Mine, that the two ground terminals should be approximately parallel for maximum signal strength. In the track transmission tests, an abandoned section of track was used. The track was covered with roof falls practically its entire length and water varying in depth from a few inches to a foot covered many portions of the track. The dirt and water covering the rails did not appreciably affect the transmission of code, and results practically similar to those at our Experimental Mine were obtained.

The code T.P.S. set, while rugged in construction and extremely simple to operate, cannot be considered as a practical solution of the underground-communication

problem because of its being limited to the use of code alone. Present investigation being conducted by the Bureau of Mines is on a method of changing from the present T.P.S. code set to a similar type of apparatus capable of transmitting directly voice communication. These experiments are in progress at the present time.

Preliminary radio field work at the Bureau's Experimental Mine was done during the summer of 1922 by C. L. Colburn, C. M. Bouton and H. B. Freeman in conjunction with engineers from the Westinghouse Electric & Manufacturing Co. For this work a Westinghouse 20-watt transmitter and a single-circuit regenerative receiver was used.

WAVES PENETRATE HEAVY STRATA

Recent tests made at the Bureau's Experimental Mine may be of interest as they indicate the great attenuation of waves in penetrating the earth. In these tests a special 3-step radio frequency detector and 2-step audio-frequency set, with a 14-in. loop aerial was used. At the mine entry signals from KDKA and WCAN (about 10 miles away) could be heard over 100 ft. from the phones. The set was mounted on a mine car and audibility readings taken every 100 ft. as the car was pushed into the mine. The audibility dropped very rapidly the first 50 ft. and decreased more slowly thereafter until the signals faded out at a distance of 700 ft. from the entry. The directional property of the loop was maintained underground. The loop also has advantages in minimizing ground currents and induction effects.

While unsuccessful in indicating any practical method of using wireless for underground communication, these experiments, nevertheless, indicate clearly that electro-magnetic waves may be made to travel through solid strata. The absorption or loss of intensity with distance was very great for the high frequencies (short wave lengths) used in these experiments. It is known, however, that lower frequencies suffer less attenuation and absorption, and these may possibly be found effective under certain conditions.

SHORT WAVE LENGTHS SEEM BEST

The energy radiated from the antenna decreases, however, with the use of low frequencies. For general underground use, a large antenna is impracticable. The shorter the antenna, the higher must be the frequency in order to operate the antenna somewhere near its fundamental—at which point maximum radiation, for a given power input, is obtained. A compromise probably will have to be reached between wave length and the distance to be transmitted in order to obtain the maximum efficiency from the apparatus for mine communication service.

As a summary the present available data indicate that the most practical type of mine-communication apparatus will be a modification of wired radio utilizing compressed air or water piping, car rails, etc., as the conducting medium. Dirt and water over such conductors, and numerous breaks in the metallic circuit, do not appear to prevent the transmission of signals. In such a system, much simpler transmitting and receiving apparatus can be used. As to whether a voice-modulated high-voltage direct-current transmitting set or a high-frequency voice-modulated carrier wave set is to be used will depend upon future experiments.

Induction and Synchronous Features in New Motor

Design Embodying Best Characteristics of Both Types
Combines High Efficiency, High Torque, Constant Speed and High Power Factor

THE induction motor is one of the simplest types of electric motors, possessing characteristics that are highly desirable for many different types of drive. Its speed control, torque, size and ease of repair are important advantages in its favor, but it has the disadvantage of inherently operating at a poor power factor; in fact, on light loads the power factor often is as low as 20 per cent, and as most drives do not always operate at full load, the average power factor of many induction motors may often be as low as 50 or 60 per cent.

During and since the war changes in power schedules have revolved around the subject of power factor. Many power schedules have been put into effect penalizing the consumer for operating at low power factor. When we consider the large investment that the power company must make in generating and transmitting equipment to furnish loads with poor power factor, the justification of such penalties must be admitted. If the consumer is generating power for himself he is confronted with the same problems. Therefore it is important that the user of power operate at as high a power factor as possible.

One of the biggest problems of the manufacturers of electric motors has been to design a motor which would have the good characteristics of the induction motor and also the good characteristics of the synchronous motor. The squirrel-cage type induction motor develops a very high torque if the resistance of its rotor winding is high, but under these conditions the motor operates at low efficiency. It is possible to raise the efficiency of the motor by lowering the rotor resistance, but when this is done a low starting torque results. Synchronous motors have the advantage of operating at constant speed but usually have low starting torque and low pull-in torque.

To combine high efficiency, high torque characteristics, constant speed and high power factor, the Wagner Electric Corporation of St. Louis, Mo., has developed the Fynn-Weichsel motor. This motor is essentially a combination of the induction motor and synchronous motor. The usual rotor winding of an induction motor is placed on the frame and called the stator. The usual stator winding is placed on the revolving member, commonly known as the rotor. In addition, the revolving member has a winding which is essentially a synchronous-motor exciting field. These two windings

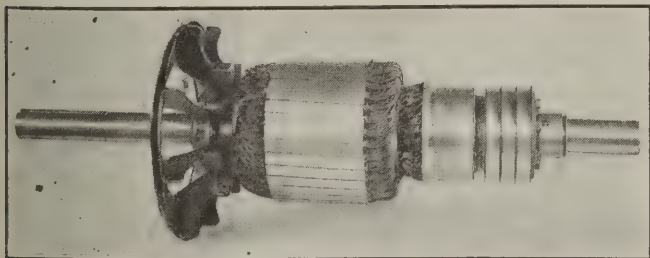


FIG. 1—ROTOR WITH STATOR AND EXCITING FIELD WINDING

The stator winding gives induction-motor characteristics and the exciting field winding gives synchronous-motor characteristics.

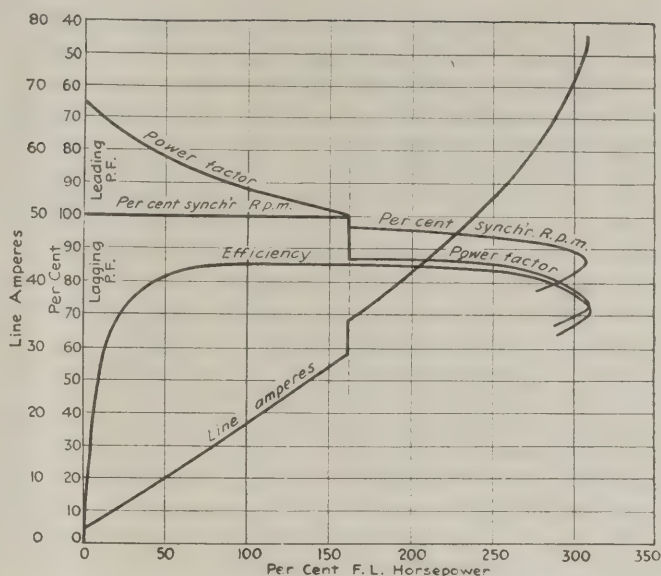


FIG. 2—CHARACTERISTIC CURVES OF NEW MOTOR

are respectively connected to slip rings and a commutator mounted on the rotor shaft. Power is applied to the slip rings of the revolving member, and resistance is placed in the stator winding to regulate the speed. This is quite similar to the wound-rotor type of induction motor, excepting that the power is supplied to the rotor and the control resistance is in the stator winding.

The operation of the motor is such that it starts out as an induction motor and, therefore, has induction motor characteristics, comes up to synchronous speed and operates as a synchronous motor, and under very heavy loads pulls out of synchronism and again automatically becomes an induction motor with high pull-out torque. During starting, when the motor operates as a regular slip-ring induction motor, it will develop 150 per cent full-load torque and still increase in speed up to synchronous speed and may be started in this manner under load, as the usual slip-ring induction motor, by cutting out resistance in the secondary circuit. The motor can speed up to synchronous speed with as much as 150 per cent of rated load. At synchronous speed it becomes a self-excited synchronous motor by the functioning of its exciting field winding mounted on the revolving member. If loaded beyond 160 per cent full load the motor is again pulled out of step and continues to operate as a slip-ring induction motor until the load exceeds 300 per cent full load rating, when the motor pulls out and stalls.

It will be noticed from the characteristic curve diagram that the power factor of this motor after being brought up to synchronous speed, is 65 per cent leading at no-load and continues to lead until the load has been increased to 160 per cent. Here it suddenly drops to a lagging power factor and is similar to the induction-motor power-factor curve from this point up to about 300 per cent full load. The speed is constant from no-load up to 160 per cent load and then drops off slightly until 300 per cent load is reached. The line current at 160 per cent load suddenly increases, as we would expect, because the power factor has suddenly changed from unity to lagging. An important point, however, is the fact that the efficiency curve is high over the whole range of load from 0 up to the point where the motor actually stalls; even at 25 per cent load the efficiency is about 72 per cent.

The application of this motor to correct lagging power

factor on lines having heavy induction motor loads is very important, but more important is the fact that it can be applied to loads requiring a motor with induction-motor characteristics and at the same time correct power factor or maintain the power factor very close to unity. Under these conditions it is far better than any other power factor corrective equipment because it maintains high power factors on all lines to which it is applied instead of letting the power factor become very bad and then correcting it somewhere back on the line where the advantage is only passed on to the power company or the local generator power station.

The installation costs of heavy lines, switches and transformer equipment, which are considerably increased in size in order to carry heavy wattless currents, can be materially reduced by maintaining power factors nearer unity. There also is another important item which is not always considered and that is the cost of circulating this high wattless current through the lines and its resulting high power losses.

Ohio Uses as Much Coal as It Mines

The most important coal bed in Ohio, according to Technical Paper 344, "Analyses of Ohio Coals," just issued by the Bureau of Mines, doubtless is the Middle Kittanning, which because of the quality of its coal has made the Hocking Valley famous throughout the country. The Pittsburgh coal bed probably is a close second and is mined extensively in Belmont and Jefferson counties. Other beds have attained prominence in local fields, but the two mentioned above must be regarded as furnishing the bulk of the coal produced in Ohio.

In a chapter on "Mining and Transportation of Ohio Coals," by J. W. Paul, chief coal-mining engineer of the Bureau of Mines, it is stated that the methods of mining the different beds of coal in Ohio are, in general, the same throughout the different coal-producing counties, consisting mainly of the room-and-pillar plan. In a few mines the rooms are driven in panels.

Because of the practice of not removing the room pillars the percentage of recovery of coal in Ohio has not been much over 50 to 60 per cent. The practice has been to leave the pillars as long wedges, widest near the mouths of the rooms and gradually narrowing toward their faces. In the Steubenville district the Freeport bed has been successfully mined by longwall.

The coal fields of Ohio are well served by a number of railroads. The Ohio River affords water transportation for some mines along its course, but the quantity thus shipped is only a small part of the output of the state. There are two principal fields in Ohio—the northern, which produces about 65 to 70 per cent, and the southern, producing 30 to 35 per cent of the state's total.

About 40 to 43 per cent of the total output of the mines is consumed within the state limits, 5 to 9 per cent is shipped to other states and 48 to 55 per cent embraces the tonnage delivered to railroads, exported by rail, or shipped to tidewater and to the Great Lakes for cargo.

Although the mines ship a large tonnage to other states, Ohio receives so much coal from beyond its borders that the consumption within the state, exclusive of railroad fuel, is equal to the annual production.

Technical paper 344 is the third of a series of papers issued by the Bureau of Mines, No. 269 referring to Iowa and No. 307 to the Kentucky coals.

The Miner's Torch

Is He the Absolute Boss?

YEARs ago, while I was a coal-mine superintendent, I was once a guest at a Chamber of Commerce dinner in a near-by city, and I was the only coal-mining man present. In introducing me the toastmaster remarked rather felicitously that I probably was the only "absolute boss" present. Of course, he had in mind company dwellings, commissaries, etc.

I first recalled that introduction in 1918. The government was moving heaven and earth in an endeavor to get the miners to speed up and dig more coal, because all of the essential industries were rapidly approaching a point where further increases in production were directly dependent on more coal. By way of doing "my bit" I attempted a series of articles appealing to the patriotism of the miners. As I was not in direct touch with miners or mines at that time I made several trips to mining camps in search of inspiration for the articles.

On one of these visits I met a superintendent who had a son in the trenches overseas, from whom he had had no word in over a month, and in consequence was on the verge of nervous collapse. "If only I could do something to help win the war I would not feel so bad," he said to me, "but in spite of all of my pleading with my men I cannot get them to work every day and on the days they do work they refuse to speed up. And most of these men know my son too."

And last week it came back to me again that remark about the "absolute boss." Once more I was at a mining camp and this time a superintendent was telling me of the Christmas plans of his men. "We have been working only two and three days a week lately and our miners are having about all they can do to keep the wolf from the door, but they can't think of disappointing the kids nevertheless," was the way he put it.

"Do you know, Thompson," he said to me, "I have only recently begun to realize how little authority a coal-mine superintendent really has. Every day the men report for work and one time they are met with the notice 'No work today' and again the notice says 'Work today.' Now how much do I have to do with the wording on that notice? Absolutely nothing. The city office checks up orders and gives us our instructions just as promptly as possible, and we in turn pass the information on down the line.

"With this desire to give the kids all they are looking for, it's pretty hard for the ones who have large families to make the best of present conditions and it's touching to see the disappointment registered on their faces when the notice points to an idle day. When I am around they come up to me and tell me all their troubles and it's plain to see that they think that I might change conditions if only I'd try hard enough.

"Of course, last year the shoe was pinching on the other foot and the city office was wondering why in thunder I couldn't get out more coal, considering all of the money I had spent for new equipment and that I didn't have a vacant house in my camp."

Yes, the coal-mine superintendent is an absolute boss.(?)

News Of the Industry

Renewal of Present Agreement Seen as Probable Program of Union

In Message to Indianapolis Convention Lewis Declares for Contract Running "a Term of Years"—"Reds" in Minority—Union in Sound Financial Condition

(Special Dispatch to Coal Age)

INDIANAPOLIS, Ind., Jan. 22.—A loud radical noise, but not much radical action, is expected out of the biennial convention of the United Mine Workers of America, now in session here. The session, which may run two weeks, gave evidence as it opened today, of framing a union program that will call for a continuance of the present scale and working conditions "for a term of years." It is entirely likely such demands as the five-day week and six-hour day will be put into convention resolutions, as usual, but that the scale committee, when it goes to Jacksonville, Fla., to meet the operators Feb. 11, will forget about them.

The advocates of nationalization and recognition of Soviet Russia were reasonably numerous in the convention as it assembled its 1,500 delegates in old Tomlinson Hall, but they appeared to be decidedly in the minority. Also Alex Howat, of Kansas, who is trying still to fight his way back into the organization after having been booted out for calling a long ago unauthorized strike in the Southwest, is here; but without the strong support of Frank Farrington's full Illinois strength, which backed Howat in vain at the last convention.

Farrington Heads Scale Committee

Frank Farrington was appointed chairman of the scale committee to meet the operators Feb. 11. The remainder of the committee will comprise district presidents and national officers, as usual.

The vast bulk of proposed convention resolutions sent in from district conventions called for a variety of things, but not many of them favored a demand for a marked increase in miners' wages, except one from Ohio, which asked 25 per cent increase. Most of them were said to be aimed to obtain better working time, instead of better pay; however, none of the districts proposed any cures for low market or any of the other factors contributing to short running time.

President John L. Lewis, in his mes-

sage, declared for a contract running "a term of years" in the following words:

"The industry needs breathing spell for purposes of readjustment to present day conditions. The laws of supply and demand have not operated within the industry for a period of six or seven years. A wage agreement for a term of years, effectuated without a strike or suspension of production would be of constructive help in restoring stability to the industry and would indeed be a boon to the coal-weary public.

"Were such an arrangement possible, it would demonstrate to the coal-consuming public that the industry itself was making a sincere attempt to put its house in order. Such a policy, if carried out, would eliminate the necessity for coal legislation by the federal Congress or the various state legislatures. I am not one of those who believe that the enactment of arbitrary legislation will prove a panacea for every maladministration of the industry, or that economic laws can be set aside by the sweep of a legislative pen."

Mr. Lewis pointed out that during 1923 the country produced 545,000,000 tons of soft coal and worked but half time. This indicates the industry has development, investment, equipment, and man-power to produce a billion tons a year. "Such a situation," he said, "is unsound from every moral and economic standpoint, and constitutes a crying need for adjustment." He did not, however, propose any method of adjustment beyond implying that if the present scale is continued for "a term of years," the workings of economic law will remedy both overdevelopment and overmanning of mines. Mines which cannot stand the gaff will fall.

Mr. Lewis made much talk about the strength and unity of the organization, asserting that internal differences had been composed. Reviewing 1922-23 he said the record of victorious achievement of the union is "without parallel in the history of our organization."

Vice-president Philip Murray, in racy language, paid his respects to the Reds within the organization, but declared that "in this country there is too much soap, too many Gillettes and not enough whiskers to accept the bearded philosophy of Russianized revolution." He said the whole coal industry ought to be unionized because there would be very little friction in the industry were it not for them, for there could then be no exploitation of mine labor, no stealing of markets by low-cost coal, and many benefits to the public as well as the mine workers.

Union Finances Improve

Financially the union is in better shape than it was at the outset of the 1922 strike, it appears from the report of Secretary-Treasurer William Green. Whereas the union went into the 1922 strike with only about \$250,000 it now has on hand \$1,177,000. During the 1922 strike \$848,000 was borrowed, \$350,000 from the Indiana National Bank, of Indiana; \$150,000 from the Harriman National Bank, of New York; \$50,000 from the Bank of the United States, another \$50,000 from the Brotherhood of Locomotive Firemen and Enginemen and the rest from Districts 2, 6, 9, 11, 13 and 23 of the United Mine Workers. A total of \$116,000 was given the organization by friendly labor groups. During the two years and four months ending last November income from all sources was \$8,747,000. The heaviest expenditures for union work went out as follows: District 17, \$1,428,000; District 16, \$649,000; Coke Region, \$495,000; District 10, \$442,000.

Indicative of the amount which the union can raise from its own membership, Mr. Green reports that the special assessment of November and December, 1922, of \$2 per month per member brought in about \$1,760,000; the membership figures of the union for recent years show the following: 1920, 376,447; 1921, 442,000; 1922, 285,900; 1923, 445,734.

A REGRETTABLE ERROR was made in the table showing average spot prices of bituminous coal, f.o.b. mines, and the accompanying table showing relative prices of bituminous coal, on p. 110 of last week's issue of *Coal Age*. In the column showing prices for 1922 that for June was given as \$2.56 when it should have been \$3.31, and in the corresponding month and year in the table showing relative prices the figures for June should read 274 instead of 212.

Navy Opens Bids for Steaming Coal

The Bureau of Supplies and Accounts, Navy Department, received the following bids Jan. 20 for supplying 10,000 tons of steaming coal for delivery at New York between the date of contract and June 30 next:

For delivery f.o.b. vessels or barges under chutes at piers: W. H. Bradford & Co., Philadelphia, \$6.26 per ton; Coleman & Co., Philadelphia, \$6.25; Consolidation Coal Co., New York, \$6.57; Dexter-Carpenter Coal Co., New York, \$6.46; Morrisdale Coal Co., Philadelphia, \$5.59; Pattison & Bowns, Inc., New York, \$5.99; Titan Fuel Corporation, New York, \$6.39, and J. H. Weaver & Co., Philadelphia, \$6.06.

For delivery f.o.b. lighters or barges alongside vessels: W. H. Bradford & Co., \$6.49 per ton; Coleman & Co., \$6.45; Consolidation Coal Co., \$6.75; Dexter-Carpenter Coal Co., \$6.81; Morrisdale Coal Co., \$5.83; Titan Fuel Corporation, \$6.63; J. H. Weaver & Co., \$6.30.

For delivery in harbor, in lighters, coal to be unloaded, stowed and trimmed: Coleman & Co., \$7.15 per ton; Dexter-Carpenter Coal Co., \$7.99 and \$8.19; Morrisdale Coal Co., \$6.70; Titan Fuel Corporation, \$7.34; J. H. Weaver & Co., \$7.20.

An informal bid was received from Cosgrove & Co., Johnstown, Pa.

Rice to Tell A.I.M.E. of His Observations in Europe

George S. Rice, chief mining engineer, Bureau of Mines, will report the result of his discussions with foreign technical societies regarding the collection and interchange of data on ground movement and subsidence at the 129th meeting of the American Institute of Mining and Metallurgical Engineers, which begins Feb. 18 in New York City. Mr. Rice's report will be read at the afternoon session of the first day of the meeting.

Howard N. Eavenson, of Pittsburgh, Pa., will preside over the joint session on coal and coke, ground movement and subsidence, which begins in the morning of the first day, and will welcome to the meeting Dr. R. V. Wheeler, director, British Safety-in-Mines Station at Eskmeals, and Henry Walker, Deputy Chief Inspector of Mines. They will reply to Chairman Eavenson, and Dr. Rice, who was in Europe last summer, will give an illustrated talk on the mining methods he observed in Europe during his recent trip and on the methods used in restoring the coal mines in northern France.

At the session devoted to industrial relations on the same day sub-committees will report on safety, employment and industrial organization, education, and the physical and mental factors in industry.

The session devoted to coal will be held on the afternoon of Feb. 19 with Mr. Eavenson presiding. The speakers

Man the Pumps!

A new method of handling peat out of bogs has just been patented in the name of the late Captain Alexander McDougall, of Duluth, Minn. Rotary pumps mounted on scows in the bogs would be expected to pump the peat through flexible piping to a drying plant, the process of which is not described. The pumping process is intended to replace the draining of peat swamps and the cutting of the material by hand or machine.

will include Mr. Eavenson, Ray W. Arms, contracting engineer, Roberts & Schaefer Co., Chicago, and G. B. Southward, chief engineer, West Virginia Coal & Coke Co., Elkins, W. Va.

Charles H. MacDowell will preside at the meeting devoted to timber requirements and reforestation, and at the session on iron and steel and refractories, P. H. Royster, assistant metallurgist, Bureau of Mines, Minneapolis, and T. L. Joseph, assistant metallurgist will present a joint paper on the effect of coke combustibility on stock descent in the blast furnace.

Industrial relations will be discussed at two sessions to be held on Feb. 20, the last day of the meeting, one to be held in the morning under the direction of Arthur L. Notman and the other in the afternoon. Of the latter Sidney Rolle will be chairman.

The annual business session will take place on the morning of Feb. 19, when the election of officers will take place.

During the sessions several committees will hold dinners and the annual banquet will be held at the Waldorf-Astoria at 7:15 p.m., Feb. 20. The following day the members of the society will visit the Bethlehem Steel Works. A program of entertainment has been arranged for those women who accompany the members to the city during the meeting.

Trade Commission Accuses California Dealers

Suppression of competition is charged by the Federal Trade Commission in a complaint against coal dealers allied with the California Retail Dealers' Association, its eight local organizations and thirteen wholesale or producing corporations in the coal business in California and Utah. The complaint charges the companies and persons named with having fixed prices and attempting to shut off the supply of coal to co-operative purchasing enterprises or to non-member retail dealers in the trade.

The hearings scheduled before the Federal Trade Commission Jan. 17 in the matter of the complaint against the Northwestern Coal and Dock Operators' Association have been postponed until the latter part of the month, the commission announced.

Premium Anthracite Sales Continue to Decrease

Reports of wholesale dealers in anthracite for the two weeks ended Dec. 15, covering only premium coal of domestic and pea sizes, show a marked decrease in the proportion on which a gross profit of 50c. or more was obtained, according to the Federal Trade Commission. Continued use of coke, bituminous coal and other substitutes for anthracite, especially for stove and nut sizes, which appear to be in the greatest demand, the commission says, will hasten the elimination of premium anthracite from the market and establish the entire trade on a healthier basis.

Although gross profits ranging up to \$1.75 per ton are still being realized by some wholesalers on a small part of the tonnage handled, and the passing of anthracite through the hands of two or more wholesalers still tends to enhance the prices of a part of the anthracite handled by wholesalers, the main cause of high prices charged the consumer continues to be the premium exacted at the mine by producers of a comparatively small proportion of the total anthracite output.

The wide range in the gross profits reported by wholesalers is gradually disappearing, the report says. During the two weeks ended Dec. 15 gross profits were reported ranging from \$1.75 per ton on anthracite sold at \$12.50 to a loss of \$1.05 per ton on coal sold at \$8.95 per ton f.o.b. mine.

For the two week period ended Dec. 15, 77 per cent of all the reported tonnage of wholesalers of premium anthracite was purchased from the producers and sold to a retailer or consumer, thereby passing through the hands of but one wholesaler; 19 per cent passed through the hands of at least two wholesalers, and 3 per cent through the hands of at least three wholesalers. For domestic sizes sold at premium prices 74 per cent of the tonnage reported passed through the hands of but one wholesaler; 24 per cent through the hands of at least two wholesalers and 1 per cent through the hands of at least three wholesalers.

During the two weeks ending Dec. 15 80 per cent of the carloads of high-prices domestic sizes of anthracite reported as sold by wholesalers was purchased directly from the producer.

Morrow in Loader Business

J. D. A. Morrow, formerly executive vice-president of the National Coal Association and for the last year president of the Morrow Callahan Coal Co. and the John Morrow Coal Co., has just been elected vice-president and general manager of the Joy Machine Co. with headquarters in Pittsburgh. It is understood that the Joy company is about to bring out a new and larger model of its mechanical loader. Mr. Morrow will continue his connection with his coal companies.

Symposium by Scientists in Washington Reflects Growing Interest in Coal

Sovereignty of American People at Stake, Says G. O. Smith—Tryon Cites Illegality of Plans for Birth Control of Mines—Hood's Paper a Feature

An indication of the increased interest in coal was had last week when the Washington Academy of Sciences—a body which rarely considers economic questions—devoted a session to a discussion of that subject.

In opening the discussion, Dr. George Otis Smith, Director of the U. S. Geological Survey, declared that the real issue today "concerns the sovereignty of the American people in their relation to those who own coal mines and to those who work in coal mines." In leading up to that conclusion, Dr. Smith cited as the outstanding cause of the difficulties in the bituminous industry the uncertainty of its labor supply. "The present monopoly of mine labor," he said, "has followed in the trail of the union's necessary, beneficial work in behalf of the mine worker, but that labor monopoly is no less injurious to the general public, and its power needs to be curbed. Each and all of the reforms advocated by the Coal Commission will fail to stabilize the industry if periodic suspensions of mining are to continue. The open threat of tying up the commerce of the nation and shutting down its industries is the menace of economic chaos."

Charles P. Neill, a member of the Harding Coal Commission, called attention to the tendency of unionization to break down the spread between the fixed wages paid skilled and unskilled workers. He cited examples to show that skill adds very materially to earning power among piece workers. He made the statement that the public had no right to anthracite now at the prices paid prior to 1910. The price was not sufficient to allow the men adequate pay for the work they did and the risks they necessarily must run in winning the coal. To hear operators talk, said Mr. Neill, one would judge that all mine workers have an annual wage of \$5,000. When union leaders discuss it, the impression is that no mine worker gets more than \$500 a year. The inequality in wage payments in the coal industry, he declared, is between the man who works 300 days a year and the man who works only 70 days.

In the course of discussing the relation of the cost of production to prices of coal, David L. Wing made the point that relatively few persons realize the wide ranges of costs even in the same field. He explained how coal companies operating side by side and selling in the same market may have such varying costs that the relationship is three to one. If the mines are under separate managements, a wide range of efficiency might exist in the conduct of the property.

The thickness of the seam, its pitch,

the purity of the coal, presence of faults, the drainage and ventilation problems, the amount of timbering necessary, the age of the mine, character of the mining, he said, indicate physical conditions which might cause great differences in cost. One of the mines might lose time because of accidents, because of car shortage or because of labor trouble. Other factors which contribute to differences in costs are royalties, depletion, depreciation charges and officers' salaries.

H. Foster Bain, Director of the Bureau of Mines, discussed the cost in lives of mining coal. The whole trend now, he said, is toward greater mechanization, with its increased hazards, the greatest of which is the more general use of electricity in mines.

F. G. Tryon, coal statistician for the Geological Survey, reviewed the various proposals to check the birth rate among bituminous coal mines and pointed out that not one of these proposals was free from serious doubt as to legality or practicability.

George S. Rice, chief mining engineer of the Bureau of Mines, reviewed the British coal agreement of 1921, pointing out that the present demand for its suspension by labor did not mean repudiation of the principle of profit sharing but is simply a dispute as to the terms of division.

E. W. Parker, of the Anthracite Bureau of Information, admitted that the prices of the domestic sizes of anthracite are too high but he asserted that this is due to the fact that the price of the steam sizes is too low. He said all authorities agree that the small sizes constitute just as valuable a fuel. He believes the public will benefit materially by the educational campaign now being conducted by the anthracite operators in an effort to teach domestic consumers how small sizes may be burned as easily as the coal which they have been accustomed to buy.

A feature of the meeting was a paper on "Consumers' Economies," read by O. P. Hood, chief mechanical engineer of the Bureau of Mines.

"The domestic consumer handles about a sixth of our fuel," said Mr. Hood. "His influence on conserving the general supply cannot be so great as that of the other main users, but his attitude of mind toward coal problems is of great importance and out of proportion to his tonnage interest. He buys the highest priced coal, costing two or three times as much per ton as the industries pay, so that his financial interest is not represented by his tonnage interest. The art of burning coal he must pick up by himself. It is not

No Law Agin It

Two miners working in a mine of the Kaw Valley Mining Co., near LaCygne, Kan., stood on their constitutional rights to smoke in the mine the other day. Both were taken to a hospital. They were carrying a damaged keg of powder when they lighted up.

"You should have known better than to smoke while carrying powder," a deputy mine inspector reminded Clarity, a negro, one of the men.

"But, boss," Clarity replied, "they ain't no law agin smokin' in a mine."

taught with his arithmetic, nor does it go with his athletics. He sometimes makes a sorry mess of it, and at best it is a dirty, dusty and unwelcome job.

"Anthracite has been a nearly fool-proof coal. While it can be misused and give low efficiency, it is surprising how highly efficient it is with the most ordinary care and attention. It is a mistake to consider the average efficiency low. From 60 to 80 per cent of the heat probably gets into the house if one half tries. It is for this reason that it is so hard to displace with substitutes, for each substitute requires the application of a little more thinking and a little more labor, two items we are loath to give.

"In fact, this condition has produced an opposite effect to that of money economy. Instead of reducing the cost of this item of household economy, many are frankly facing an increased item in the budget for the winter's heat and using oil or gas, but requiring a superior type of service that no other fuel supplies. The cleanliness possible with oil or gas makes the basement a totally different place in the home, and allows its use for purposes not thought possible before.

"One of the most practical economies is to use the steam sizes of anthracite, which must sell in competition with bituminous coal. Equally good service can be had if means are provided to maintain a thin and uniform fire bed or to supply artificial draft. The economy adopted by most people will ultimately be the use of bituminous coal. In this district it will be the so-called smokeless coals which we must learn to use.

"They will require more care and attention in firing and a frequent cleaning of furnace heating surfaces. When we are willing to do this in moderate amount the smokeless coal will replace anthracite ton for ton. When we are ready to give really careful attention to the problem we can get along with less tons, for the potential heat is 10 to 15 per cent more per ton. If we are not willing to do more than we do with anthracite at present, we may make up our minds to thoroughly dislike the dirty stuff and let it go at that, which is, of course, quite unreasonable."

Nova Scotia Strike Affects 12,000 Coal Miners

The mines of the Dominion Coal Co., a subsidiary of the British Empire Steel Corporation, are idle once more. The company ordered a 20-per cent reduction in wages on Jan. 15, and the members of the United Mine Workers for the eastern Canada district refused to work under the reduction. While the reduction was to affect only the miners employed in the Cape Breton collieries, many of the miners employed in other sections have refused to work, as a sympathetic move, and it is declared they will not resume work until the trouble in the Cape Breton mines is amicably adjusted. About 12,000 men are affected.

Negotiations for a new wage agreement between the British Empire Steel Corporation and the officials of the district union had been in progress at Sydney, N. S., for several weeks. The miners asked for the rates of 1921, which was refused, the company proposing a 20 per cent reduction. The company on the same day posted notices of a 20-per cent cut in all the mines. Following a mass meeting of the miners a strike of miners at the Thorburn and Stellarton workings on the Nova Scotia mainland fields was ordered.

The company maintains the reduction is necessary and that a lockout was not intended. The provisional executive has ordered all the miners to remain away from the mines until further notice. In the meantime, President Wolvin, of the British Empire Steel Corporation, has sought an interview with President John L. Lewis. Thus far no disturbances have arisen in the strike zone, and no request has been made for troops or provincial police. Government authorities say the maintenance men must be kept in the mines during the strike.

Engineers' Report on Storage Ready About Feb. 1

Dean J. F. Walker of the University of Kansas, chairman of the American Engineering Council's committee on coal storage, announced at a recent meeting of the Executive Board of the council that the report of the committee is in preparation and will be made public about Feb. 1. Dean Walker said that considerable data bearing upon methods and cost of storage, practice in storing and handling of coal, production and transportation, and lost time and overdevelopment in the bituminous-coal producing industry had been collected.

In dealing with the data it has been decided to treat of the conditions in different sections of the country separately. Requirements and the conditions influencing distribution differ so radically in various sections, he said, that no single remedy for existing ills can be devised. Local needs must be fully understood before remedial action



W. P. Jennings

As general superintendent of the Pennsylvania Coal Co. Mr. Jennings is a firm advocate of modern colliery equipment. It was only after a thorough modernization of machinery and processes that the outputs mentioned elsewhere in this issue were made possible.

can be considered. The aim is to give reliable answers to certain questions which those concerned with coal supply will ask when confronted with the problem of adjusting coal demands to a more uniform rate of production.

"There is no specific remedy or cure-all for the coal industry's ills," declared Dean Walker in commenting upon the committee's work. "Anyone who is looking for some act, legislative or executive, which will revolutionize practices and create Utopian conditions, is doomed to disappointment. Certain trends in the economic world have brought about the present situation. Changes will come about gradually in response to adjustments which are in accord with sound business principles, not by creating an artificial superstructure."

VICTOR MURDOCK, chairman of the Federal Trade Commission, has resigned, effective Feb. 1, and will return to his newspaper business in Kansas. His term would not have expired until September, 1925. It is expected that George B. Christian, former secretary to President Harding, will be appointed on the commission.

Ships 21,431 Tons in a Day

The collieries of the Upper District of the Pennsylvania Coal Co., under the supervision of W. P. Jennings, general superintendent, made a wonderful record for a day's tonnage on Dec. 15, 1923, when the district shipped a total of 21,431 tons in one day. No. 1 Colliery shipped 7,557 tons in 170 railroad cars and Underwood Colliery shipped 5,658 tons in 129 railroad cars.

Mt. Jessup Mine Probers Urge Protective Legislation

A recommendation has been made by the anthracite mine inspectors of Lackawanna County that the Pennsylvania Legislature enact a law compelling every coal company or operator in the state to furnish mine inspectors with borehole records to each seam and maps showing the nature and irregularities of the stratum overlying every seam of coal about to be mined.

This recommendation, with others, was made as the result of an investigation into the cause of the accident at the Mount Jessup mine of the Mount Jessup Coal Co., near Jermyn, Pa., on Dec. 8, which resulted in the deaths of five men, including the mine foreman, Eben Jones.

The inspectors, Augustus McDade, L. M. Evans, D. T. Williams and S. J. Phillips, made their report public on Feb. 15 and say that the disaster, like many others, carries with it a lesson that all persons interested in the safe operation of coal mines should learn that too much emphasis cannot be placed on having a thorough knowledge of the strata over all seams of coal that are being mined. Borehole records to each seam and cross-sections of the stratum overlying the seams should show faults, dislocations or discontinuities in the strata, clearly defining and indicating the area of overburden affected and especially the area to be robbed, and no robbing should be permitted except by written permission of the mine inspector. The report says the quantity of coal mined from a central point where dislocations or discontinuities of stratum are shown should be determined in advance of final mining.

In asking that their recommendations be embodied in an act the inspectors say that if a law such as this had been on the statute books many sad tragedies might have been averted and many coal properties that have been practically ruined might be safe and profitable properties at present.

Illinois-Wisconsin Retailers Deny Boycott Charges

The Illinois & Wisconsin Retail Coal Dealers' Association denies charges made by the Federal Trade Commission that it used various methods to enforce an alleged co-operative scheme to boycott so-called "irregular" or "illegitimate" dealers and attempted to have certain producers and wholesalers of coal confine the distribution of fuel in respondents' so-called regular channels. The denial was contained in an answer filed Jan. 21 through Stanley B. Houck, of Minneapolis, attorney for the association.

The association asserts that its acts tend to provide "a higher quality of coal, a more dependable supply, freedom from misrepresentation and fraud in respect to coal, full weight, low prices and generally better coal and better service."

Lewis to Sponsor Coal-Mediation Plan?

Washington Report Is That He Has Scheme to Initiate Public Inquiry Into Labor Conditions in Non-Union Fields—Recalls Hoover Plan of 1919

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

Washington is indulging in considerable speculation concerning a report that John L. Lewis is about to present for introduction the draft of a bill providing for some type of mediation in the coal industry. No definite information is available but if the report should be correct, it is assumed that Mr. Lewis has hit upon some plan for the creation of a tribunal to which non-union labor could appeal.

It is hardly to be supposed that Mr. Lewis will recommend a coal labor board, along the lines of the Railway Labor Board, in view of the opposition to that body which has been voiced by the American Federation of Labor and from the fact that the Mine Workers have been accustomed to cite it as a horrible example of what may occur when wage regulation is attempted.

The unions have been so hostile to everything with a savor of wage regulation that it is difficult to believe that they will put forward any suggestion for the setting up of an agency which might be in a position to exercise such control. At the same time there is possibility, it is admitted, that the Mine Workers will be in such straits because of the low rate of employment among union workers as compared with non-union workers that they may be willing to take a surprising step.

Mr. Lewis may have in mind some

such plan as was put forward by Secretary Hoover's industrial conference in 1919. That plan provided the machinery for voluntary arbitration for the country as a whole. There were to be regional boards of adjustment to which either or both parties to a dispute could carry their case. If mediation was sought by either party to the dispute, the regional board would investigate and make a report on the situation even if one party did not agree to the submission of the question to the board. If, under any conditions, the contending parties did not accept the findings of the regional board, it could be carried to a national board—a sort of Supreme Court of industry. There was no thought of compulsion other than that which could be exercised by bringing public opinion to bear.

Such a plan would result in a public inquiry into labor situations in non-union territory. Unquestionably the union would like very much to see it operative there, but if it were operative in the non-union fields it necessarily would have to be set up in the union fields, a thing which they would not like.

What seems more probable is that Mr. Lewis has some plan which will forward his scheme for establishing a minimum wage.

Mines Appropriations Pared From Estimates

The Interior Department appropriation bill for the fiscal year beginning July 1 next, as reported to the House, provides \$1,890,700 for the Bureau of Mines, an increase of \$121,000 over the allowance for the current year but a decrease of \$18,873 from the estimates. Detailed appropriations for next year are as follows:

Investigating mine accidents, \$350,000 (decrease, \$43,000); operating mine-rescue cars, \$262,300 (increase \$51,300); purchase of an additional mine-rescue car, \$40,000; testing fuel, \$138,280 (increase \$2,280); mineral-mining investigations including silver investigations, \$128,360 (increase \$3,360); petroleum and natural-gas investigations, \$500,000 (increase \$95,000); oil, oil shale and gas work, \$91,360 (increase \$11,360); maintenance of mining experiment stations, \$200,000 (increase \$25,000); care of buildings and grounds at Pittsburgh, \$57,400 (increase \$2,400); mining station and mine inspection in Alaska, \$35,000. Payments to the states next year under the leasing act are estimated at \$2,500,000. For the Geological Survey \$1,642,-

760 is provided, a decrease of \$27,430 from the current year and of \$162,512 from the estimates. The detailed appropriations are: Topographic surveys, \$500,000; geologic surveys, \$300,000; chemical and physical researches, \$40,000; report of mineral resources, \$125,000; investigation of mineral resources of Alaska, \$75,000; gaging streams, \$170,000; geologic maps, \$110,000, and classification of lands, \$250,000, the latter being \$30,000 less than the current year.

Urges Federal Mine Operation In "Emergency"

The President is authorized to declare a national emergency in case of cessation or threatened cessation of a steady supply of coal and to take over and operate the coal mines during such emergency by the provisions of a bill—H.R. 5263—introduced in the House by Representative Treadway, of Massachusetts. The measure authorizes payment to operators for the taking over of their property, and appeals from unsatisfactory payments would be made to the Court of Claims. The bill also authorizes the President to fix coal prices during such an emergency.

Oddie Defends Mines Bureau

A recommendation by the Institute for Government Research that the Bureau of Mines be abolished is sharply resented by Senator Oddie, chairman of the Committee on Mines and Mining, who characterizes it as a reflection on the mining industry. The institute's recommendation is made in a report by W. F. Willoughby on proposed reorganization of federal administrative departments. Herbert Hoover, Secretary of Commerce, and Chief Justice Taft are among the members of the institute. In recommending abolition of the Bureau of Mines the institute report says:

"Abolition of the Bureau of Mines is recommended since careful study of its activities shows that there is nothing done by it which cannot be done by other services and particularly by the Bureau of Standards and the Geological Survey. This being so, it is believed to be in the interest of economy and efficiency that it be discontinued and the duties taken over by the other services mentioned."

Notwithstanding this attack Senator Oddie announced that he would press his bill to create a Department of Mines. "Those advocating abolition of the Bureau of Mines do not know the mining industry," declared Senator Oddie. "The mining industry should be dignified by a department of its own." The Senator explained that it would be possible to reduce the number of mine strikes, if not eliminate them entirely, through the continuing activities of a Department of Mines.

Another Anthracite Exhibit In Washington

An exhibit designed to educate the consumers in the proper use of small sizes of anthracite, in order to relieve the demand for domestic sizes and thus tend to reduce prices, has been arranged by the General Policy Committee of the Anthracite Operators at 1328 F Street, N.W., Washington.

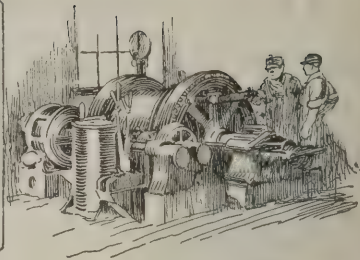
The exhibit, located in the heart of the retail business district, contains samples of the various sizes of coal, together with charts and descriptive matter on the walls. Moving pictures of mining operations and of proper methods of firing anthracite are displayed at frequent intervals. Literature on the subject is distributed to callers. The exhibit is similar to the one conducted in Philadelphia.

Borah to Present Pinchot Bill

Senator Pepper, of Pennsylvania, having declined to introduce Governor Pinchot's anthracite bill, the Governor has turned it over to Senator Borah, chairman of the Labor Committee, who will sponsor it in the Senate. Senator Pepper said he did not desire to introduce the measure, as he might not be able to give it his wholehearted support. Mr. Borah is expected to present the bill this week.



Practical Pointers For Electrical And Mechanical Men



Simple Attachment Insures Effective Method of Lubricating Trolley Wheel

Men in charge of mines are always looking for, and eager to take advantage of, any improvement or new device that may be profitably applied to operating machines in and around their mines. Many machines in mining have reached such a point of perfection that continuous operation would obtain but for a defective accessory. The lubricat-

the result of applying lubrications for reducing solid friction to a minimum. Therefore the substitution is a cost reducer and can be made practically complete by efficient lubrication, thereby reducing frictional resistance to the lowest possible minimum on bearing surfaces. If lubrication is deficient either in quantity or quality solid friction becomes excessive and the bearings will be continually roughened by the sliding contact, which creates an ideal condition for increasing frictional losses and quick wearing out of parts. Such deficiencies are not so much the fault of the lubricant as the lack of proper application of the lubricant.

COST ITEM IMPORTANT

Even though a device or improvement may be small the item of cost is ever present in the mine operator's mind, and if comparative costs are in favor of the new device or improvement, he immediately tries and often adopts such an improvement. In the ordinary trolley-wheel frame it is customary to oil the trolley wheel by dashing black oil over the trolley harp, with the result that little of the oil reaches the parts to be lubricated. This is an accessory requiring considerable expense for upkeep, and in addition is at times a source of much trouble in causing delays, and this fact is particularly noticeable on long hauls.

A trolley-wheel frame has recently been evolved which provides for effective lubrication of the rubbing parts. This frame is designed for oiling the trolley wheel and axle with cup grease. The method of lubrication is best understood by referring to the accompanying sketch: The brackets (a) and (b) are the same as those used in the make-up of the ordinary trolley harp. The replaceable brass plate (c) is $\frac{1}{8}$ in. thick and pivoted to the base at the rear by a countersunk-head bolt. The shoulder (d) is hollowed and threaded on the inside full length and has an inside diameter of $\frac{1}{8}$ in. A cap-screw (e) of the same fit ($\frac{1}{8}$ in.) and $\frac{5}{8}$ in. long forces the grease up through a $\frac{1}{8}$ -in. opening into the hollow axle (f), thence through the ports (g) to the outer surface of the axle and inner surface of the hub of the trolley wheel. The axle is made of steel and fixed to avoid rotation by a slotted cotter key at each end, as shown in the sketch. It is esti-

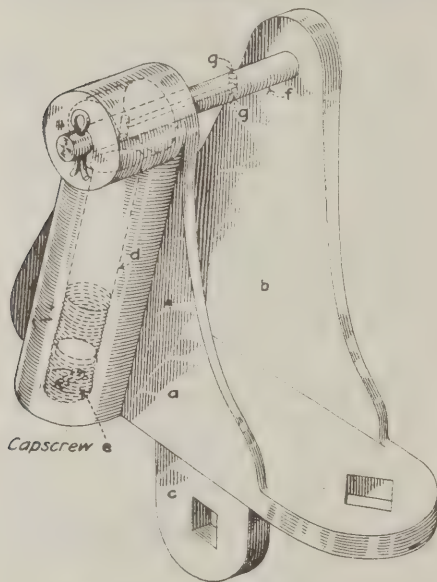
mated that two turns of the cap screw will force enough grease to supply ample lubrication throughout a shift of work.

Pineville, Ky.

HOMER COTÉ,
Mining Engineer.

Danger Lurks in Using 2,200-Volt Transformers On 4,000-Volt Lines

No doubt many 4,000-volt lines around the collieries and mines of the country originally were 2,200-volt lines which have been raised to 4,000 volt in order to transmit larger amounts of power to certain districts. When this is done there is frequently a considerable amount of apparatus wound for 2,200 volts which must either be



LUBRICATING ATTACHMENT FOR
TROLLEY WHEEL

By screwing up the cap screw into a chamber which is connected to the wheel spindle the trolley wheel is efficiently greased.

ing system of a trolley-wheel is defective and is a source of loss of time and expensive delays in haulage.

Comparative data from one mine that once used the system of dashing black oil on the trolley-wheel shows that twenty-five bronze graphite bushings were required to wear out one trolley-wheel at a cost of 22c. per bushing. The trolley harp with the grease oiling system was installed on each motor, with the favorable result that only one bushing was needed to wear out one trolley wheel. The trolley wheels were of the same diameter. Many other advantages no doubt have resulted from this installation. This is omitting the inestimable cost of delayed haulage.

In the operation of machinery two kinds of friction have to be overcome: Solid friction, which results from contact of rubbing parts, and fluid friction,

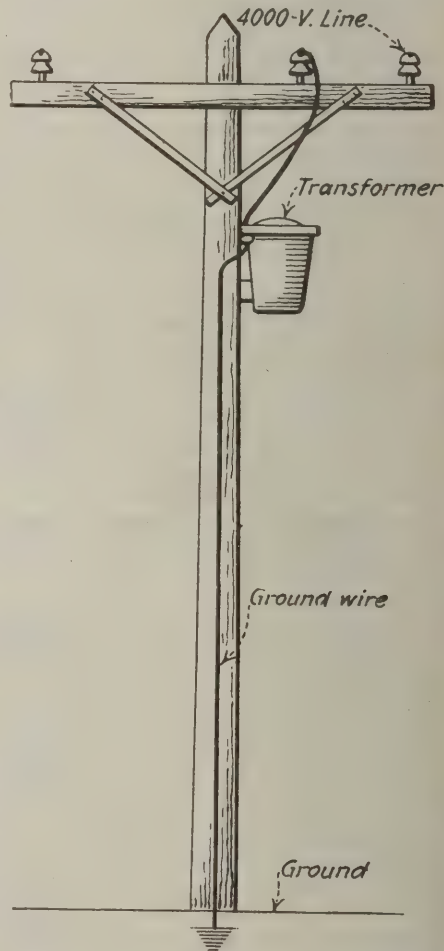


FIG. 1—USUAL CONNECTION FROM
LINE TO GROUND

On a 4,000-volt grounded neutral system the voltage from a line wire to ground is about 2,300, so it is possible to use a 2,200-volt transformer in this way.

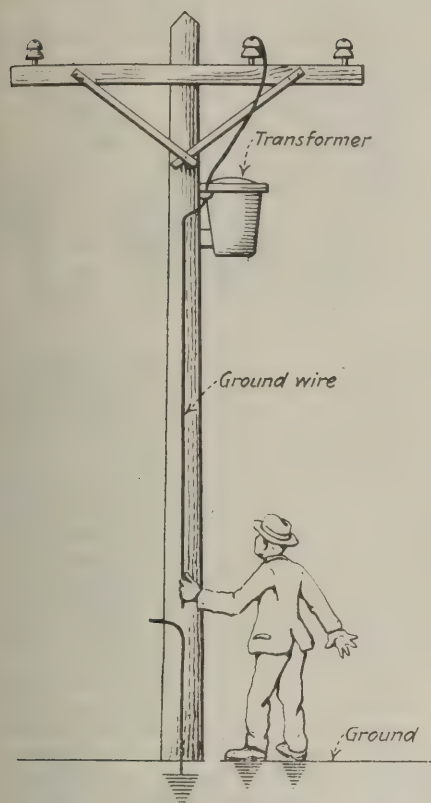


FIG. 2.—HOW THE BLACKSMITH WAS SHOCKED

By placing his body in the circuit from the line wire to ground the man received a bad shock. The reason he was not killed was that his contact to ground was not perfect and he did not get the full force of the 2,200-volt pressure.

used on the new line operating at 4,000 volts or be transferred to some other location where it is again used on 2,200 volt-circuits.

Under these conditions lighting transformers built for 2,200-volt circuits may easily be used between one line wire and ground wherever the 4,000-volt line is operated with a grounded neutral.

This, however, introduces liabilities to accidents, one of which happened at a mine near our town. A lighting transformer was connected in the usual way, one side of the primary winding being connected to a line wire and the other side of the primary winding running down the side of the pole to a ground connection.

One day a wagon delivering supplies to the mine grazed the side of this pole, and the hub of the wagon wheel cut the ground wire. Immediately the lighting around the colliery went out, and a small forge fan motor working on the same circuit stopped. The blacksmith went out to see what the trouble was and knowing something about electricity immediately noticed that the ground wire from the transformer was broken off.

He had previously heard the electrician say that touching a ground wire would not harm anyone, and this was very often demonstrated to him, so he saw no reason why he could not make the repair to the ground connection of the transformer without any danger. He therefore touched the up-

per end of the ground wire and soon found himself curled up on the ground. This was quite a surprise to him and it was a fortunate thing that the ground on which he was standing and the shoes which he was wearing prevented him from receiving the full force of the voltage.

Many electricians have a false idea of ground wires and this is one instance where a ground wire was really dangerous, for in effect the blacksmith touched a line wire and got a bad shock because the circuit was complete from the line through the transformer primary to ground.

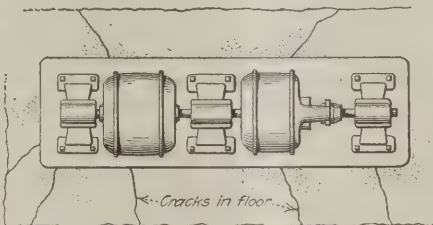
Another Motor Generator Set Without a Ground Wire

The stories which I have recently read in *Coal Age* referring to motor-generator sets which were not supplied with a ground wire until a serious accident almost occurred prompts me to tell you about an experience along the same lines which I once had.

The machine in question was set up as usual on a concrete floor and when a breakdown occurred in the motor winding the high a.-c. voltage sought various ways to reach ground. Cracks in the floor around the machine, although very small, had been filled up with coal dust from sweepings of the floor and a slight amount of moisture occasionally was noticeable along the cracks.

When this machine broke down the operator had the scare of his life. He closed the starting switch and saw streaks of fire along every crack leading from the motor-generator set, some of these streaks of fire running out from the sides of the machine along the cracks as much as 2 ft.

We took no more chances with there



FIRE CAME OUT OF THE CRACKS

The leakage from the machine was along the cracks, which became luminous when the power was applied to the machine.

not being a good ground on this machine by taking the insulation off the negative stud of the generator and connecting our negative lead to the track return from the mine and a nearby ground located in moist earth. This may be done with most machines and I offer it as a suggestion because ground wires ordinarily put on machines are of rather small diameter and may be burned off or broken and yet not be noticed. There is not much chance of a heavy return wire from the mine being broken and not noticed, because it probably is the only source through which the circuit from the mine is completed back to the negative side of the generator.

ELECTRICAL INSPECTOR.

Electrician Helps Himself By Helping Others

Unfortunately for mine locomotives as well as the power house there is entirely too much parallel operation of the locomotive motors. Strange as it may seem, some motormen go through years of actual operation without really knowing the locomotive with which they work.

The blame for this condition does not lie entirely with the motorman but rather with the electrician in charge, for it is the latter's failure to impart a small portion of the knowledge he possesses concerning certain things having to do with the operation of the locomotive that makes certain details of the equipment forever a mystery to some motormen. It is unfortunate that this condition should exist, but it will persist until electricians in general are more liberal with the knowledge they possess and pass it on to others less fortunate than they in being placed in positions of advantage.

One has only to look back at the time of one's own apprenticeship to appreciate the real force of this statement. Many sad chapters could be written of some motormen, eager for knowledge but afraid to ask for it because of the ridicule of some of their fellows, thus they remain motormen to the end of their days, and all because electricians in general remain blind to the harm they are doing themselves, their company and their fellow-worker in withholding information which would help make the work easier, safer and more efficient. The fact that there is always less trouble with a locomotive operated by a capable motorman is sufficient proof that it pays to have the electrician pass on his knowledge of the intricate parts of a locomotive to the man who runs it. M. S. BEDDOW.

One heat-unit per square foot per minute equals:

0.1220 watt per square inch.
0.01757 kw. per square foot.
0.02356 hp. per square foot.

One heat-unit equals:

1,054.2 watt seconds.
777.54 ft. lb.
107.5 kilogram meters.
0.0002928 kw.-hr.
0.0003927 hp.-hr.
0.000685 lb. carbon oxidized.
0.001030 lb. water evaporated from and at 212 deg. F.

One watt equals:

1 joule per second.
0.001341 hp.
3.415 heat units per hour.
0.73756 ft.-lb. per second.
0.0035 lb. water evaporated per hour.
44.254 ft.-lb. per minute.

One joule equals:

1 watt second.
0.000000278 kw.-hr.
0.102 kilogram meters.
0.0009486 heat unit.
0.73756 ft.-lb.

Discussion

Wants Are Due to Erosion

BY GEORGE A. SCHULTZ
Superintendent, Liberty Fuel Co.,
Latuda, Utah.

On p. 783 of the Nov. 22 issue of *Coal Age* Charles E. Lawall, of the University of West Virginia, has an article on what he terms "faults of erosion." The article deals with a subject of great importance to many of the mining companies in Utah and, I have no doubt, in other districts also.

In the Utah coal fields "faults of erosion," as Mr. Lawall terms them, are known as "wants," but I feel sure that neither term should be applied to many of these unusual occurrences. There is no question but that wherever these "wants" extend continuously for a number of miles their origin is easily explained. No doubt they are, as Mr. Lawall states, the result of coal being eroded by a stream, the stream bed in turn being filled with material which eventually forms rock.

I have mapped, however, a number of coalless areas after the coal had been extracted around them and have found that their lack of uniformity in outline always is striking. I have known them to vary in area from one-half acre to forty acres and in outline from the shape of a cigar to that of a side view of a duck. Some of them are separated from each other by 200 ft. of coal and others by about a mile.

Geologists have tried to explain these occurrences by saying that the larger ones are caused by stream erosion and the smaller ones by the eroding action of whirlpools in the stream, but their shapes are so irregular that these theories are unsatisfactory. My experience has been that the roof of the coal usually comes down over these wants, though with varying angles.

Sometimes the coal will gradually become thin from roof to floor, the change taking place in a distance of several hundred feet. On the other hand, in some instances the coal will become thin in a few feet, proving to me beyond a doubt that such wants are not due either to the erosion of the seam or to the formation of islands in the swamp or bog while the coal-forming material grew or was deposited.

One theory that has been advanced seems to me quite feasible. This is that the coal-forming material while still of a mudlike consistency was covered with sand or other material, the distribution of this overburden not being uniform. Wherever the greatest weight of material was deposited it settled, displacing the soft peat. The fact that the coal seam surrounding the "want" usually is thicker than the normal thickness of the seam seems to substantiate this theory. Many impos-

sible causes such as intrusions of volcanic origin have been advanced to explain the formation of these "wants," but I am disposed to believe that in most cases they are the result of an unequal deposition of material and of the extrusion of the almost liquid peat in response to unequal pressure.

United Mine Workers and Reds

For several months the publicity department of the United Mine Workers of America has been giving statements to the Associated Press affirming that they have discovered that all of the murders and disorders which have been charged against the miners' union since the war can be traced to the activities of "Reds," who are not in sympathy with the union and who are only using that organization for their own ends.

As bearing on the above statement I have taken a few facts from a brief of the Alabama Mining Institute submitted to the U. S. Coal Commission.

The United Mine Workers called a strike in Alabama in May, 1920, and in September, 1920, that organization sent Van A. Bittner from the International headquarters to take charge of the strike. He was sent as the direct representative of the national officers, and he is still being used on important assignments by the same organization.

The strike was called off in March, 1921, after both sides had submitted their case to Governor Kilby to arbitrate and he had ruled against the demands of the miners. The Governor handed down his decision March 19, 1921. On March 30, 1921, more than a week after the strike had been lost, Van Bittner made a speech at Blocton, Ala., to union men, most of whom had been refused re-employment. The speech was taken down in shorthand by a court reporter and the transcript from his notes sworn to.

Here are a few extracts:

"There has not been any strike yet. We are just going to start. We are going to hold this Governor and these coal operators responsible for that decision. They thought that because the decision was as rotten as it was, as ungodly as it was, the mine workers' union would say, 'Well, we are not going to comply with that decision.'

"It is going to make them fight. That is what it is going to do. If there are any scabs left here in Blocton in thirty days from now, you men ought to be chased out of the state. That is the thing for you to do."

"They may have a right to work, but by the eternal gods, they haven't any right to your jobs. It has been entirely too healthy for scabs around Blocton. That has been the trouble



Wide World Photos

Bathhouse at a Dutch Mine

The roof decorations are, of course, suspended clothes. Apparently four men are employed in keeping the floor clean. Seats are not provided as in American bathhouses. The clothes are suspended by chains and locked in place, each man carrying his own key.

with you. What would you do with a rattlesnake if one of them would start crawling into this meeting now?

A Voice: "Kill him."

Mr. Bittner: "A rattlesnake never did you half as much harm as a scab."

"If they had ever started to drive the organizers out of Alabama there are a lot of coal operators who would never have lived to read about it in the newspapers the next morning. We would have got a few of them in the fight. We are going to stay here just as long as you want us to stay. I think there are enough good, strong, union men to make the weak fellows fight whether they want to or not. I think we have reached that stage here in Blocton and everywhere else."

"We want you to make the mines 100 per cent union. We are going to give you until March 13, 1922, to do this. If you don't do it, we are going to build a fence around this infernal state and let you fellows down here scab and live in slavery all the rest of your days."

Were those remarks inflammatory? What is a "Red" anyway?

Birmingham, Ala. H. S. GEISMER.

Speaking of Queer Names

A small mine located at the junction of the Black and Little Warrior rivers, in the northwestern part of Jefferson County near the Walker County line in Alabama, is known as "Toadvine," which is the name of the small village that was there long before the mine was opened.

A mine known as "Who'd 'A' Thought It" is even more distinguished as a leader in the list of coal mines with queer names. This mine is northwest of Wylam, Ala., and located near Dolomite in Jefferson County. If any one can beat these two names, let him come forward.

P. W. GOOCH,
Superintendent, Coal River Collieries,
Prestonsburg, Ky.



Production And the Market



Strike Rumors and Drop in Temperature Cause Upward Swing in Soft-Coal Sales

Sales in the soft-coal industry, as in some other fields, are showing an upward tendency, possibly owing partly to the prospect of a suspension of work in April. Those having small stocks seem to be anxious. However, the weather in most sections of the country has not been without result. Consumers are showing more interest, inquiries have increased and the sales in January have exceeded those made in December. Some operators report sufficient business ahead to keep their mines going during the month and well into February. The possibility of a strike in England and the railroad dispute are matters much discussed, but so far they have had no general effect on the market. There has been more inquiry regarding contracts. The anthracite situation shows practically no change.

Though spot quotations for soft coal show slight changes in various districts the general result indicates comparatively little shifting from last week. *Coal Age* Index as of Jan. 21 registers the same as it did last week, 182, but the average price is \$2.25, an increase of 5c.

Markets Active in Middle West

The Midwest markets are reasonably active and dealers are kept busy. Moreover, the railroads have been slow to make deliveries, thus preventing an excess of coal from arriving. With the exception of smokeless coals, however, prices remain firm. Business at St. Louis is on the upgrade, the demand for bituminous coal and coke being fair, though slow for anthracite and smokeless coals. Western Kentucky prepared coals are moving better, including a fair tonnage to Chicago. Smokeless coals are not in good demand in the Northwest, but dealers at Milwaukee are having some good business because of the real winter temperatures.

A marked improvement for domestic coals is noted in the Ohio markets. Buying at Columbus is general

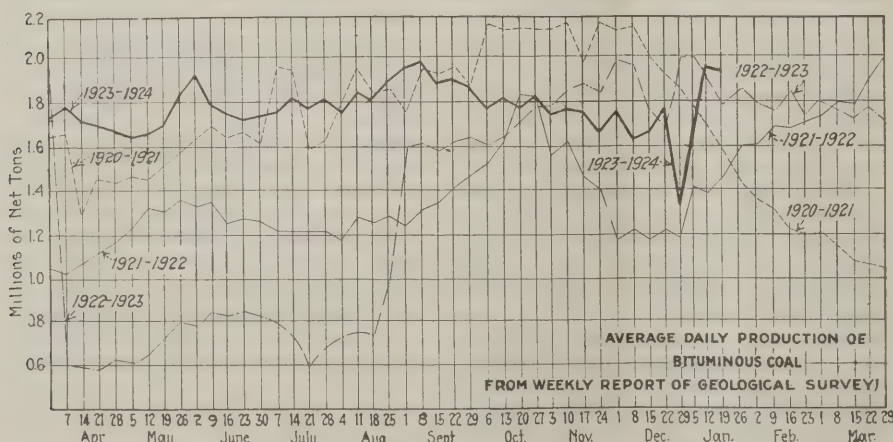
and dealers are placing more orders. Distress coal is practically cleaned up and a much better tone has developed. Steam coals are in much steadier demand and generally there is less shading of prices to force sales. At Cincinnati the demand for domestic coals is strong. Retail dealers whose stocks have been depleted are calling for prompt shipments. Retail demand at Cleveland is showing more activity, though operators and jobbers say that the demand from the steel mills is very quiet. Other industrial plants continue to buy for current needs. Steadiness is noted in the Pittsburgh market with a moderate demand for domestic coals. There is a feeling that there will be a suspension of mining on April 1. Demand for steam coal in New England is unchanged from last week; textiles are at low ebb. Trade along the Atlantic seaboard for domestic consumption is quiet, but there is a fair volume of spot coal moving, while at Baltimore interest centers in the export situation.

Soft-coal production during the second week of 1924 is estimated by the Geological Survey to have been 11,921,000 net tons, an increase of 2,853,000 tons when compared with the previous week. This also was the largest weekly output since December, 1920. Output of hard coal for the same week totalled 1,840,000 net tons, as compared with 1,436,000 tons the previous week.

Production of beehive coke during the week ended Jan. 12 was 248,000 net tons, as compared with 236,000 tons in the previous week and 323,000 tons in the corresponding week of last year.

Midwest Prices Firm

Continued cold has kept the Midwest markets reasonably active during the past week. There has been just enough slowness of railroad movement to check a too rapid flow of coal to market, with the result that prices all around have held firm. There have been few increases, however, except a slight upward tendency on the part of smokeless



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Dec. 29	10,495,000	6,713,000
Jan. 5 (b)	10,529,000	9,068,000
Jan. 12 (a)	10,993,000	11,921,000
Daily average	2,074,000	1,987,000
Coal year	303,419,000	425,199,000
Daily average coal year	1,260,000	1,774,000

ANTHRACITE

Dec. 29	1,560,000	1,236,000
Jan. 5 (b)	1,725,000	1,436,000
Jan. 12 (a)	2,113,000	1,840,000
Coal year	34,546,000	72,605,000

COKE

Jan. 5 (b)	309,000	236,000
Jan. 12 (a)	323,000	248,000
Calendar year	581,000	445,000

(a) Subject to revision. (b) Revised from last report.

coals from a field which is already partly shut down. Smokeless lump and egg pushed up to about \$3.50 and mine-run was strong at \$2.25, running up to \$2.50 in some cases. One or two instances of premiums were reported.

An effort on the part of western Kentucky to advance lump prices a little was not greeted with much encouragement. Quotations for delivery up to May 15 from that field at favorable prices indicate that the field does not hope for a sudden rise in the market even if there is a strike April 1, but what would happen after May 15 or thereabouts might be a different story.

Throughout the Illinois and Indiana fields domestic demand has been sufficient to reopen a number of mines that have not worked lately, and has generally improved conditions. Central Illinois, for instance, has been able to sell about all its domestic sizes at \$3@3.25 and screenings have not dragged heavily at \$1.50@1.60. Domestic production in southern Illinois and in the Standard district, however, has been heavy enough to slow down the steam sizes. The Standard field's production is great enough to cause a good deal of backing up of coal there. The Mt. Olive field as

well as the DuQuoin and Jackson Country regions have all been doing fairly good business.

St. Louis Trade on Upgrade

Cold weather has put the St. Louis coal business on the upgrade and the dealers report that demand is fairly good and all yards are active, principally with middle and cheaper grade coals. Coke has shown considerable improvement in the past week, while anthracite and smokeless lag. Franklin County is not selling as readily as the cheaper grades.

Wagonload steam is good, but carload steam is easing off on everything. Business conditions are not as good as they might be and there seems to be an overproduction that is forcing the market. Country steam is active in spots for nut sizes only, while country domestic continues good for the cheaper grades. There has been no change in local retail prices.

Operators in the western Kentucky field have found demand for prepared sizes somewhat better since cold weather created better movement to the Southern markets along

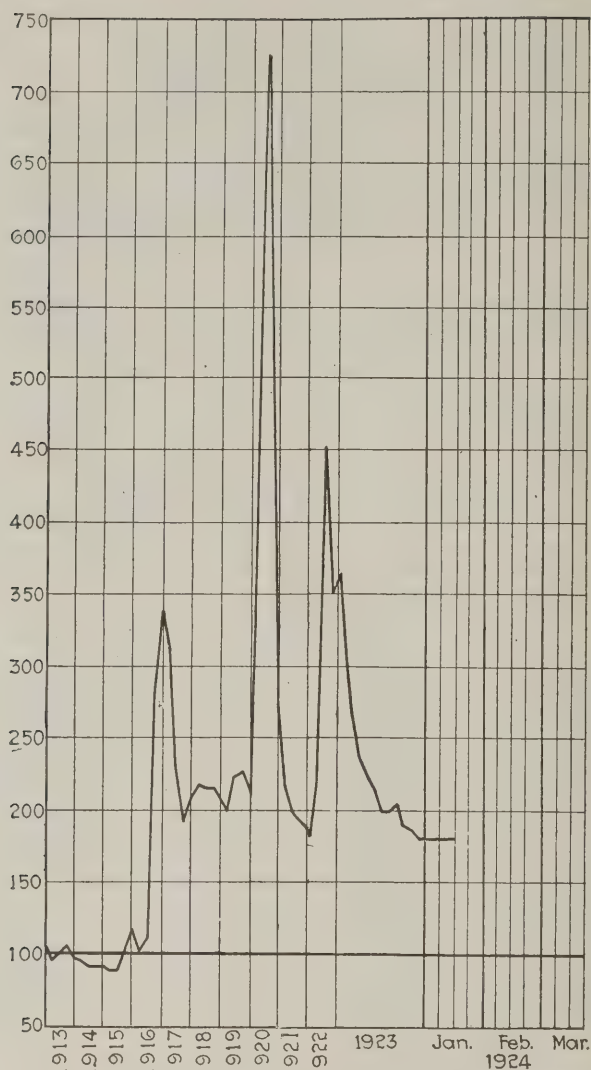
Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest						
Market Quoted	Jan. 22 1923	Jan. 7 1924	Jan. 14 1924	Jan. 21 1924†	Market Quoted	Jan. 22 1923	Jan. 7 1924	Jan. 14 1924	Jan. 21 1924†		
Smokeless lump.....	Columbus....	\$7.25	\$3.35	\$3.35	\$3.15@3.50	Franklin, Ill. lump.....	Chicago.....	\$5.35	\$3.60	\$3.50	\$3.25@3.75
Smokeless mine run.....	Columbus....	6.60	1.85	1.85	2.00@2.25	Franklin, Ill. mine run....	Chicago.....	3.85	2.35	2.35	2.25@2.50
Smokeless screenings.....	Columbus....	6.00	1.25	1.30	1.40@1.65	Franklin, Ill. screenings...	Chicago.....	2.65	2.05	1.95	1.90@2.00
Smokeless lump.....	Chicago.....	7.75	3.10	3.10	3.00@3.50	Central, Ill. lump.....	Chicago.....	4.10	3.10	3.10	3.00@3.25
Smokeless mine run.....	Chicago.....	6.35	2.10	2.10	2.00@2.50	Central, Ill. mine run....	Chicago.....	2.85	2.10	2.10	2.00@2.25
Smokeless lump.....	Cincinnati...	7.50	3.00	3.10	3.00@3.50	Central, Ill. screenings...	Chicago.....	1.70	1.75	1.65	1.60@1.60
Smokeless mine run.....	Cincinnati...	6.00	2.00	2.25	2.00@2.25	Ind. 4th Vein lump.....	Chicago.....	4.85	3.10	3.10	3.00@3.25
Smokeless screenings.....	Cincinnati...	6.00	1.75	1.75	1.65@1.75	Ind. 4th Vein mine run....	Chicago.....	3.60	2.60	2.60	2.50@2.75
*Smokeless mine run.....	Boston.....	4.75	4.65	4.80	4.65@4.75	Ind. 4th Vein screenings...	Chicago.....	2.30	1.85	1.85	1.75@2.00
Clearfield mine run.....	Boston.....	5.25	2.50	2.50	2.25@2.85	Ind. 5th Vein lump.....	Chicago.....	4.10	2.50	2.60	2.50@2.75
Cambria mine run.....	Boston.....	5.00	2.10	2.10	1.75@2.50	Ind. 5th Vein mine run....	Chicago.....	3.10	2.10	2.10	2.00@2.25
Somerset mine run.....	Boston.....	5.75	3.00	3.00	2.75@3.25	Ind. 5th Vein screenings...	Chicago.....	1.80	1.70	1.70	1.60@1.65
Pool 1 (Navy Standard)...	New York....	5.75	3.00	3.00	2.75@3.25	Mt. Olive lump.....	St. Louis....	.....	3.10	3.10	3.00@3.25
Pool 1 (Navy Standard)...	Philadelphia..	5.75	3.00	3.00	2.75@3.25	Mt. Olive mine run....	St. Louis....	.....	2.50	2.50	2.50
Pool 1 (Navy Standard)...	Baltimore....	5.50	.....	.....	.....	Mt. Olive screenings...	St. Louis....	.....	1.85	1.55	1.50@1.60
Pool 9 (Super. Low Vol.)...	New York....	5.25	2.25	2.25	2.00@2.50	Standard lump.....	St. Louis....	4.10	2.90	2.90	2.85@3.00
Pool 9 (Super. Low Vol.)...	Philadelphia..	5.55	2.30	2.30	2.10@2.50	Standard mine run....	St. Louis....	2.60	1.95	1.95	1.90@2.00
Pool 9 (Super. Low Vol.)...	Baltimore....	5.10	1.85	1.85	1.75@2.00	Standard screenings...	St. Louis....	1.85	1.55	1.30	1.00@1.85
Pool 10 (H.Gr. Low Vol.)...	New York....	5.50	1.85	1.95	1.75@2.10	West Ky. lump.....	Louisville...	4.10	2.85	2.85	2.75@3.00
Pool 10 (H.Gr. Low Vol.)...	Philadelphia..	4.20	1.85	1.85	1.70@2.00	West Ky. mine run....	Louisville...	2.60	1.65	1.65	1.40@1.75
Pool 10 (H.Gr. Low Vol.)...	Baltimore....	4.35	1.80	1.80	1.75@1.90	West Ky. screenings...	Louisville...	2.30	1.40	1.40	1.25@1.60
Pool 11 (Low Vol.).....	New York....	3.35	1.60	1.65	1.50@1.75	West Ky. lump.....	Chicago.....	4.25	2.85	2.85	2.75@3.00
Pool 11 (Low Vol.).....	Philadelphia..	4.20	1.65	1.65	1.55@1.75	West Ky. mine run....	Chicago.....	1.85	1.75	1.75	1.50@1.75
Pool 11 (Low Vol.).....	Baltimore....	3.75	1.65	1.65	1.65						
High-Volatile, Eastern					South and Southwest						
Pool 54-64 (Gas and St.)...	New York....	3.35	1.60	1.65	1.60@1.75	Big Seam lump.....	Birmingham..	3.95	3.85	3.85	3.75@4.00
Pool 54-64 (Gas and St.)...	Philadelphia..	3.65	1.70	1.70	1.60@1.80	Big Seam mine run....	Birmingham..	2.35	1.95	1.95	1.75@1.85
Pool 54-64 (Gas and St.)...	Baltimore....	3.25	1.50	1.50	1.50	Big Seam (washed)....	Birmingham..	2.60	2.35	2.35	2.00@2.25
Pittsburgh se'd gas.....	Pittsburgh...	5.35	2.40	2.40	2.35@2.50	S. E. Ky. lump.....	Chicago.....	6.25	3.10	3.00	2.75@3.25
Pittsburgh gas mine run...	Pittsburgh...	.....	2.30	2.30	2.25@2.35	S. E. Ky. mine run....	Chicago.....	3.25	1.85	1.85	1.75@2.00
Pittsburgh mine run (St.)...	Pittsburgh...	3.50	2.10	2.00	1.90@2.10	S. E. Ky. lump.....	Louisville...	6.50	3.00	3.00	2.75@3.25
Pittsburgh slack (Gas)...	Pittsburgh...	3.40	1.60	1.60	1.50@1.75	S. E. Ky. mine run....	Louisville...	3.10	1.70	1.65	1.65@2.00
Kanawha lump.....	Columbus....	6.25	2.60	2.60	2.50@2.75	S. E. Ky. screenings...	Louisville...	3.25	1.60	1.60	1.85@1.60
Kanawha mine run.....	Columbus....	3.35	1.60	1.60	1.50@1.75	S. E. Ky. lump.....	Cincinnati...	5.60	2.60	2.75	2.50@3.25
Kanawha screenings.....	Columbus....	3.10	1.10	1.10	1.25@1.50	S. E. Ky. mine run....	Cincinnati...	3.35	1.50	1.60	1.85@1.75
W. Va. lump.....	Cincinnati...	6.00	2.60	2.60	2.50@3.25	S. E. Ky. screenings...	Cincinnati...	3.00	1.30	1.25	1.00@1.15
W. Va. Gas mine run....	Cincinnati...	3.50	1.65	1.65	1.50@1.75	Kansas lump.....	Kansas City..	5.50	5.00	5.00	5.00
W. Va. Steam mine run....	Cincinnati...	3.05	1.65	1.65	1.50@1.75	Kansas mine run....	Kansas City..	3.60	3.25	3.25	3.50
W. Va. screenings.....	Cincinnati...	3.00	1.30	1.30	1.10@1.15	Kansas screenings...	Kansas City..	2.50	2.00	2.25	2.25
Hocking lump.....	Columbus....	5.10	2.60	2.75	2.50@3.00	* Gross tons, f.o.b. vessel, Hampton Roads.					
Hocking mine run....	Columbus....	2.85	1.80	1.80	1.75@2.00	† Advances over previous week shown in heavy type, declines in italics.					
Hocking screenings...	Columbus....	2.60	1.30	1.30	1.35@1.50						
Pitts. No. 8 lump.....	Cleveland....	5.10	2.45	2.45	2.25@3.00						
Pitts. No. 8 mine run....	Cleveland....	3.60	1.95	1.85	1.85@2.00						
Pitts. No. 8 screenings...	Cleveland....	3.25	1.55	1.65	1.55@1.65						

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

Market Quoted		Freight Rates	Jan. 22, 1923		Jan. 14, 1924		Jan. 21, 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken.....	New York....	\$2.34	\$9.00	\$7.75@8.25	\$8.00@9.25	\$8.00@9.25	.....	\$8.00@9.25
Broken.....	Philadelphia..	2.39	.....	7.90@8.10	.....	.....	.....	.....
Egg.....	New York....	2.34	9.25@12.00	8.00@8.35	8.75@9.50	8.75@9.25	8.50@9.25	8.75@9.25
Egg.....	Philadelphia..	2.39	9.25@11.00	8.10@8.35	9.50@10.00	8.75@9.25	9.00@10.00	8.75@9.25
Egg.....	Chicago.....	5.06	12.00@12.50	7.20@8.25	9.60@12.50	8.00@8.35	7.60@8.80	8.00@8.35
Stove.....	New York....	2.34	9.25@12.00	8.00@8.35	9.85@10.50	8.75@9.25	9.75@10.60	8.75@9.25
Stove.....	Philadelphia..	2.39	9.25@11.00	8.15@8.35	9.85@11.00	8.90@9.25	9.85@11.00	8.90@9.25
Stove.....	Chicago.....	5.06	12.00@12.50	7.35@8.25	9.60@12.50	8.00@8.35	7.95@9.25	8.00@8.35
Chestnut.....	New York....	2.34	9.25@12.00	8.00@8.35	9.85@10.50	8.75@9.25	9.75@10.60	8.75@9.25
Chestnut.....	Philadelphia..	2.39	9.25@11.00	8.15@8.35	9.85@11.50	8.90@9.25	9.85@11.50	8.90@9.25
Chestnut.....	Chicago.....	5.06	12.00@12.50	7.35@8.35	9.60@12.50	8.00@8.35	7.95@9.25	8.00@8.35
Range.....	New York....	2.34	.....	8.25	.....	9.00	.....	9.00
Pea.....	New York....	2.22	7.50@11.00	6.15@6.30	5.50@6.25	6.15@6.65	4.75@6.25	6.15@6.65
Pea.....	Philadelphia..	2.14	7.00@9.50	6.15@6.20	6.00@7.25	6.35@6.60	6.60@7.25	6.35@6.60
Pea.....	Chicago.....	4.79	7.00@8.00	5.49@6.03	6.00@6.75	5.40@6.05	4.60@6.60	5.40@6.05
Buckwheat No. 1.....	New York....	2.22	5.25@6.00	4.00@4.10	2.50@3.25	3.50	2.85@3.60	3.50
Buckwheat No. 1.....	Philadelphia..	2.22	5.00@5.50	2.75@3.00	1.75@2.50	2.50	1.75@2.50	2.50
Rice.....	New York....	2.14	2.40@2.75	2.75@3.00	1.50@2.50	2.50	1.50@2.50	2.50
Rice.....	Philadelphia..	2.22	2.75@3.00	2.75@3.00	1.25@1.50	1.50	1.25@1.50	1.50
Barley.....	New York....	2.14	1.50@2.50	1.50@2.00	1.00@1.50	1.50	1.00@1.50	1.50
Barley.....	Philadelphia..	2.14	1.50@2.00	2.00	1.50	1.60	.....	1.60
Birdseye.....	New York....	2.22	.....	2.10	.....	.....	.....	.....

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

Index	1924				1923
	Jan. 21	Jan. 14	Jan. 7	Jan. 22	
Weighted average price	\$2.25	\$2.20	\$2.20	\$4.43	

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally, shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

with the Central and Western districts. A fair tonnage has been moving into the Chicago district and to Michigan. Screenings are in larger production, but are being moved fairly well and prices are holding. Prepared sizes are firmer, and not much price cutting is reported.

Car supply continues quite good in all fields of the state, but loadings are heavier and cars on long hauls are not making as good time as they were, but there is less coal standing unsold on cars than for some time past, which helps the situation a little.

Movement of prepared sizes from the mines from both ends of Kentucky is improving, and while screenings are in larger production, there are more consumers in the market, with the result that prices are holding firmly, in spite of some talk of \$1.10@ \$1.15 offerings, made largely by brokers in an effort to break down the market. As a matter of fact it is impossible to trace any screenings moving at under \$1.25 to the consumer; good stock sells as high as \$1.60.

Northwest Trade Quiets Down

Smokeless coals dropped off during the past week, due to the anxiety of dock men to encourage householders to use them as substitutes for hard coal. Prices are as follows for those coals which have changed price: Kentucky

lump, \$7.25; run of pile, \$6.50; screenings, \$4.25; splint lump, \$6.75; run of pile, \$5.75; screenings, \$4; Pocahontas lump, \$9; run of pile, \$6.50; screenings, \$5.50. Screenings are strong all along the line. All other coals are firm.

The spurt in buying so evident the first part of the month was lost last week. Everyone is still buying from hand to mouth. Stocks of bituminous on docks are now estimated at 5,000,000 tons, and unless a strike occurs an oversupply on the opening of navigation is likely. It looks as if at least 3,000,000 tons will be on the docks at the opening of navigation. If there is no strike a reduction is certain.

The anthracite market is a puzzle. No accurate estimate of stocks is available, but it seems certain that not more than 150,000 tons can be on the Head-of-the-Lakes docks, and this mostly off sizes. A small amount of stove and nut remains in hiding, and the docks are delivering one ton of either stove or nut, but the buyer must also take an equal amount of egg or pea.

Real winter weather keeps the Milwaukee coal market lively, and everybody is busy. There is a good supply of everything in the way of coal, but jobbers report a tightening in the supply of Western screenings. Prices of coal and coke remain unchanged.

Western Markets Busy

There is considerable activity in coal trading throughout nearly every section in the West. In Utah some of the mines are working full six-day weeks for the first time in months though the average is still about 4½ days. Domestic call is steady and industrial demand is strong enough to firm up the price of slack a little. The quotations are \$1.25 for straight slack and \$1.75 for screened steam coal. In Colorado the market continues to rise slowly, so that there is only a little time lost nowadays because of "no market." Real winter weather spreads over the entire West.

With mines throughout the Southwestern district working full time as a result of continued cold weather and strong demand, the prices of Kansas nut and screenings were advanced 25c. Jan. 14.

Ohio Markets Show Improvement

With colder weather prevailing there has been a marked improvement in the demand for domestic coals in the Ohio markets. While buying is not as active at Columbus as in some former corresponding periods, orders from dealers are much better and distress coal has been cleaned up. The bulk of the demand is for the better grades of Kentucky and West Virginia coals although there is a good demand for Ohio mined coals. Retail quotations are stronger at some points and there is no inclination on the part of dealers to make concessions. There is more steadiness showing in demand for steam coals. While reserves are large there is a tendency to guard against a suspension and railroads are coming into the market for storage purposes. There is also good buying by the utilities, while iron and steel plants are buying a fair tonnage.

The Cincinnati market is feeling the effects of cold weather and there is a good demand for domestic coals. Quotations for these coals show an upward movement while the lower grades of slack and screenings have been softening. Reports at Cincinnati are that trouble is brewing in the New River district because of the attempt to cut wages. A cut in wages to the 1917 scale is reported from some parts of Kentucky. Dealers are calling for prompt shipments. The retail situation is slightly stronger. Advertised coals are quoted on a range of \$3 to \$4 for lump, \$2.50@ \$3.25 for egg, and \$1.75@ \$2.25 for mine-run.

The only noticeable change in the Cleveland market from last week is that prices on slack have eased off 5c. to 10c. per ton and demand from retail dealers is showing greater activity. Retail dealers have been busy since the first of the year and are replenishing their stocks. With transportation in good condition there is no anxiety among steam-coal users.

Weather conditions have so far failed to help the Pittsburgh market. There is a moderate demand for domestic coal from the mines, but nothing like the normal for the

first month of the year. Industrial operations have increased somewhat. In all business circles in Pittsburgh it is considered a foregone conclusion that there will be a suspension, the only question being its duration. Production in the Pittsburgh district has been running somewhat heavier since Jan. 1, but by no means more than enough to make up for the very light production during Christmas week. In the central Pennsylvania district car loadings amounted to 15,558 cars during the week ended Jan. 12, as compared with 12,878 cars in the previous week. During the same week there were 373 mines idle. The Buffalo trade is not hopeful.

New England Continues Dull

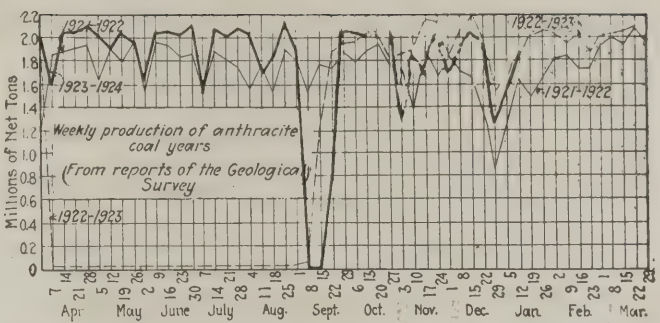
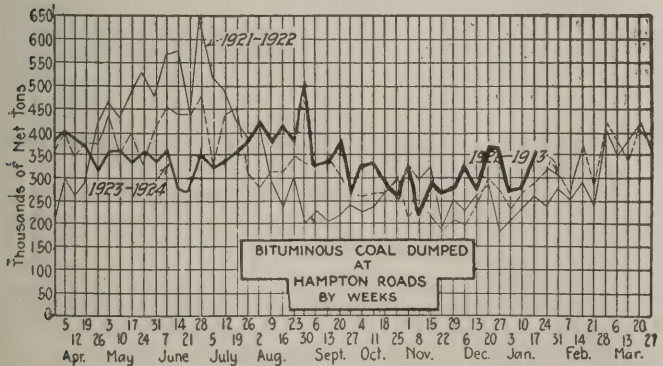
In New England the market for steam coals continues its December status. There is no appreciable change in prices, although tonnages available for shipment diminish steadily as mining is curtailed. The textile industry in general seems to be at low ebb, even though in certain special lines goods are being made in fair volume. Shoe manufacturers have much to contend with, the tire industry is dull, and in fact most industries in this territory have no prospect sufficiently good to warrant larger reserves of coal than are now carried. Among operators there is a feeling that the drastic restriction of output will gradually make itself felt, although the trade realizes it will take a reasonably long period under present conditions to make any substantial gain in prices.

At Hampton Roads there are several agencies with practically no coal at the piers, but even with minimum receipts at the piers there is no advance on No. 1 Navy standard coals as compared with a week ago. About the utmost figure that spot coal will command is \$4.75 per gross ton f.o.b. vessel, and at Boston for delivery inland there are no comprehensive sales at anything above \$6 on cars. The latter is an upset quotation and is realized only now and then as scattering inquiry develops.

For Pennsylvania coals buyers here are as scarce as hen's teeth. Selling agents are given no encouragement, and not even the lowest range of price is attractive. High volatiles of good repute have been offered at as low as \$1.50 per net ton at the mines, but transportation charges are all against them in this section. Steamers at low rates get practically all the cargoes that are dumped at any of the piers and while there is a surplus of this kind of tonnage it is unlikely that the fleets of barges owned by railroad companies will share the traffic to any considerable extent. A few seasonal arrangements doubtless are being renewed, as in the case of railroads, but probably only on a month-to-month basis, and a close canvass of the whole situation discloses no developments of any significance in the Northeastern section.

Increased Inquiries Along Seaboard

Some increase in inquiries was noted in the New York market and indications are brighter, but there has been practically no change in quotations. Buying is ordinary and there are no indications at either New York or Philadelphia that buyers are inclined to assume any different attitude. Consumers are not disposed to discuss any possible labor trouble. There is comparatively little contracting going on,



neither operators nor consumers showing any decided disposition to tie themselves up for any period. At Baltimore the trade's interest is principally centered in the export demand. January so far has been a disappointment to both shippers and producers. Demand has not increased and quotations continue at low figures.

Notices have been posted at some fifteen mines in the New River district in West Virginia that these mines will be shut down until such time as market conditions improve sufficiently to justify their reopening. Larger shipments have been made from the Pocahontas fields to the Western market because of the colder weather. There is a better demand for the prepared coals as well as mine-run. The market at Birmingham continues draggy and unsatisfactory. There is a slight demand for commercial coals in the spot trade, but the orders are small. The domestic situation looks somewhat better due to weather conditions, which have enabled retail dealers to reduce stocks materially.

Quiet Prevails in Anthracite Market

The anthracite trade remains quiet. Demand for egg and pea coals is not lively, while stove and chestnut are in good call in both New York and Philadelphia markets. Most retail dealers are fairly well stocked with all sizes and independent producers in some instances find it difficult to dispose of their coals at more than company prices. In some instances straight lots of stove and chestnut coals bring slight premiums over company price lists. Steam coals are in fair condition, with barley in best demand. Baltimore dealers are kept fairly busy but some dealers are advertising for business. Most dealers hesitate to put in too heavy supplies as they do not want to be caught with heavy stocks on hand should there be a reduction in mine prices this spring. Sufficient anthracite is being received by the Toronto trade to keep them busy.

Judge Says Kansas Mines Are Hard Put

Incidental to recent charges that retail coal prices in Kansas towns were too high, Judge John H. Crawford, of the Industrial Court, on Jan. 16 issued a statement of operating conditions in Kansas, based on a survey made in 1923 by the Industrial Court, a special representative of the Governor and an official of the U. S. Coal Commission, and on information which subsequently came to him. Southwestern operators say Judge Crawford's statement is a true picture of their predicament.

"Unless the cost of production can be lowered in Kansas, and a freight-rate adjustment be effected as favorable to Missouri River points as that granted Illinois, few Kansas and Oklahoma coal mines will be in operation in two years," he declared.

Lake head coal, seeking a market as winter closes its normal outlet, and that produced by non-union mines of southeastern Kentucky and West Virginia, force Illinois to seek a western market, Judge Crawford said. "With a preferential rate to Missouri River points, Franklin County (Ill.) lump coal is sold delivered in the two Kansas cities f.o.b. 50c. a ton less than Kansas coal. This condition has practically driven Kansas coal from Missouri River points.

"There was a time when the railroads took practically 80 per cent of the coal produced in the Pittsburg field. However, this is the day of fuel oil and electricity. The Santa Fe is using oil almost entirely."

Foreign Market And Export News

British Coals in Better Demand; Production Rebounds

Demand for British coals increased greatly during the last few days of the rail wage negotiations. Inquiries were more numerous both for domestic purposes and from the Continent. There has been considerable booking reported in anticipation of the miners' strike, as well as speeding up of deliveries previous to the railway men quitting their places on Jan. 19.

The South Wales markets show much improvement. Orders have increased, but prices show comparatively little change from the previous week. Demand for Newcastle coals is heavier.

The output of the British mines was 4,475,000 tons during the week ended Jan. 5 as compared with 3,383,000 tons the previous week and 5,886,000 tons during the week ended Dec. 22.

Tyne ports bunkering dues have been reduced to pre-war levels as of Jan. 1, making them the cheapest bunkering ports in Great Britain.

The Welsh coal market opened the new year slowly. Just before Christmas there was a rush of orders and the greater part of these have been filled. The output declined so that in many instances delivery was held over until it increased. It is expected that the miners' decision to end the wages agreement will embarrass the trade.

The German State Railways are negotiating for tonnages ranging to about 150,000 tons, contracts for 40,000 tons having been placed. The Norwegian State Railways are in the market for 40,000 tons of steam coal.

Demand at Hampton Roads Dull

Dullness again featured the market at Hampton Roads last week with lack of demand reported from all sides of the trade. The supply of coal on hand dwindled, but there was no scarcity because of the lack of orders.

Coastwise trade was slumping and bunkers held their own. Practically no new foreign business was being reported. Some coal moved overseas on

old contracts. Inquiries dropped off, and shippers continued to make little effort to get business at the present prices.

Conditions on the Virginian Ry. have about reached normal, though the supply of coal for movement to tidewater was reduced. The tone of the market was weak and the outlook not promising.

French Coal Production

Demand for the French industrial and domestic coals eased off early in the new year. The Nord and Pas-de-Calais collieries have increased their prices for the various grades of coal effective Jan. 1, according to the following schedule: Fat coals—raw smalls, 4 fr.; screened coals, 6 fr.; and 5 fr. on other screened coals. Dry coals—raw smalls, 7 fr.; washed peas, 8 fr.; other grades, 4 to 5 fr. Coke, metallurgical, 10 fr.; foundry, 5 fr.; and semi-bituminous and quarter-bituminous coals, 5 to 10 fr.

The high rates for British coals are preventing increased sales, but a decline is expected during January.

During November production of coal from French mines amounted to 3,432,000 tons as compared with 3,609,878 tons, while there were 182,974 tons of coke manufactured as against 190,223 tons in the previous month. Production in the Nord and Pas-de-Calais mines during November was 1,965,771 tons of coal and 129,222 tons of coke as compared with 2,024,097 tons of coal and 131,126 tons of coke in October.

Coal and Coke Exports From Baltimore

During 1923 1,459,482 tons of coal was dumped at Baltimore for shipment to foreign countries, as compared with 101,323 tons in the previous year and surpassing 1921 by 8,339 tons. Welsh coal to the amount of 14,620 tons was received at the port during the year while during the previous twelve months receipts were 113,184 tons. The export

tation of coke from Baltimore during the year ended Dec. 31 amounted to 178,361 tons, while during the previous twelve months no coke was sent abroad. The four nations leading in the purchase of coke during the year were Belgium, France, Chile, and Germany, other shipments going to Cuba, Costa Rica, Italy, Porto Rico and Venezuela. Coal was sent to twenty-four countries, France leading with 463,584 tons of cargo coal, followed by Italy with 316,321 tons to her credit, and Germany third on the list, having received 196,358 tons. During the year twenty-one vessels left for Canada carrying 114,108 tons of coal.

Export Clearances, Week Ended Jan. 19, 1924

FROM HAMPTON ROADS

For Argentine:	Tons
Ital. SS. Mincio, for Buenos Aires.....	5,871
For Algeria:	
Gk. SS. Andreas, for Algiers.....	7,950
For Brazil:	
Br. SS. W. I. Radcliffe, for Rio Janeiro.....	7,480
Pr. SS. Exmouth, for Rio Janeiro.....	5,305
For Cuba:	
Br. SS. Berwindmoor, for Havana.....	9,306
For Canada:	
Dan. SS. Bornholm, for Halifax.....	1,141
For Italy:	
Ital. SS. Bampton, for Porto Ferrajo.....	5,809
For West Indies:	
Nor. SS. Halse, for Curacao.....	3,138

FROM BALTIMORE

For Cuba:	
Br. SS. Berwindale.....	\$,290

FROM PHILADELPHIA

For Cuba:	
Dan. SS. Stal, for Havana.....	

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Jan. 10	Jan. 17
Cars on hand.....	1,274	1,038
Tons on hand.....	69,222	69,403
Tons dumped for week.....	124,464	171,740
Tonnage waiting.....	25,000	12,000

Virginian Ry. piers, Newalls Pt.:		
Cars on hand.....	774	651
Tons on hand.....	52,300	42,050
Tons dumped for week.....	50,275	77,359
Tonnage waiting.....	6,472	3,018

C. & O. piers, Newport News:		
Cars on hand.....	1,000	1,031
Tons on hand.....	51,805	52,710
Tons dumped for week.....	73,933	76,100
Tonnage waiting.....	1,855	2,290

Pier and Bunker Prices, Gross Tons

PIERS			
	Jan. 12	Jan. 19†	
Pool 9, New York.....	\$5.00@ \$5.25	\$5.00@ \$5.25	
Pool 10, New York.....	4.70@ 4.90	4.60@ 5.00	
Pool 11, New York.....	4.60@ 4.70	4.50@ 4.70	
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20	
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90	
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60	
Pool 1, Hamp. Roads.....	4.90@ 5.00	4.75	
Pools 5-6-7 Hamp. Rds....	4.25@ 4.35	4.25@ 4.35	
Pool 2, Hamp. Roads.....	4.75	4.50@ 4.65	

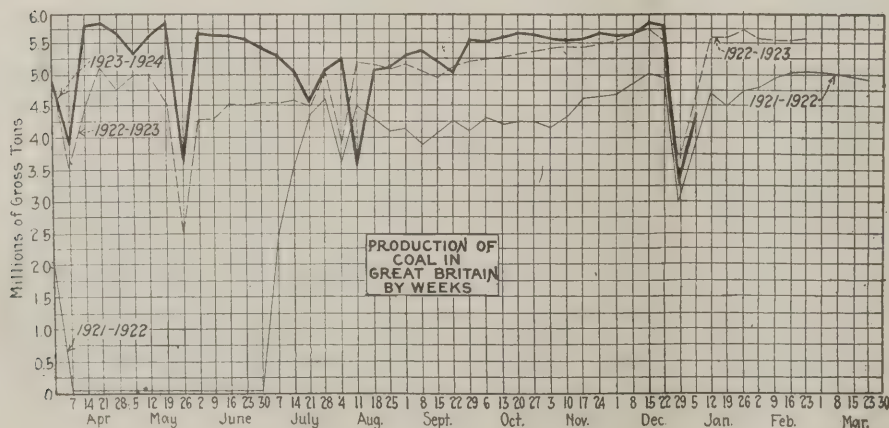
BUNKERS

Pool 9, New York.....	5.30@	5.55	5.30@	5.55
Pool 10, New York.....	5.00@	5.20	4.90@	5.30
Pool 11, New York.....	4.90@	5.00	4.80@	5.00
Pool 9, Philadelphia.....	5.15@	5.55	5.15@	5.55
Pool 10, Philadelphia.....	4.90@	5.20	4.90@	5.20
Pool 11, Philadelphia.....	4.65@	4.90	4.65@	4.90
Pool 1, Hamp. Roads.....	4.90@	5.00	4.75	
Pool 2, Hamp. Roads.....	4.75		4.50@	4.65

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to <i>Coal Age</i>			
	Jan. 12	Jan. 19†	
Admiralty, large.....	28s.@ 29s.	28s.@ 29s.	
Steam smalls.....	20s.@ 21s.	22s.	
Newcastle:			
Best steams.....	24s.@ 25s.	24s.6d.@ 25s.	
Best gas.....	25s.	24s.6d.@ 25s.	
Best bunkers.....	24s.6d.@ 25s.	25s.	

† Advances over previous week shown in heavy type, declines in italics.



Traffic News

Aver New England Rates Hamper West Virginia Fields

In connection with the hearings before the Interstate Commerce Commission on the petition to lower freight rates on bituminous coal to New England, the point was stressed by attorneys representing the West Virginia operators that if the Winding Gulf and New River fields were to get a rate on a basis similar to that for anthracite, coal production in those fields would be increased 15 to 20 per cent. It is asserted by representatives of the southern West Virginia operators that the rates to New England are unfair and prohibit competition with anthracite on an equal basis. It is pointed out by the southern West Virginia operators that the rates to Chicago or an equal distance west from West Virginia are in some instances one dollar per ton less than the rate for an equal distance to the East.

Joint Hard-Coal Rate Hearing On in Minneapolis

The first hearing in the opposition to withdrawing the joint rate on hard coal from Buffalo to the Twin Cities opened Jan. 17 in Minneapolis. The opposition is headed by the Twin City Coal Exchange, composed of independent dealers, who see in the move a step toward forcing them to buy from the docks and probably to pay more money for dock coal. County Attorney Olson, of Minneapolis, also is participating in the hearing. He has recently conducted an investigation of the coal situation which involved some phases of the dock trade and the independents. He threatens to institute prosecutions if there appears to be any ground for such action, and he has hinted that he believes there is ample ground.

New England Asks Lower Rates

Speakers representing New England urged the Interstate Commerce Commission on Jan. 14 to require railroads to make lower joint rates on coal from West Virginia to New England cities in order to give New England consumers a substitute for anthracite. Edward A. Goss, appearing for Governor Templeton of Connecticut, said the West Virginia coals of the low-volatile type were adequate substitutes for anthracite and with a reasonable rail rate would be taken in quantities throughout New England.

At Odds on Differential

Utah and Wyoming operators were in conflict before Examiner M. A. Patison of the Interstate Commerce Com-

mission at Salt Lake City last week over the differential of 50c. allowed the Wyoming operators some time ago over their Utah competitors. The Utah companies declared the differential of 50c. was unjustified, and asked that it be reduced to 25c. Wyoming asks 90c. Attorneys for the Utah operators said fundamental conditions will always close Eastern markets to Utah coal but that the Wyoming fields are adjacent to the large Middle West market and can profit by it. It was contended that the 50c. differential favors Wyoming in competing for the Pacific Northwest market, a market naturally belonging to Utah. Briefs must be filed by Feb. 29.

12 Per Cent Gain on L. & N.

J. J. Elder, assistant to Wible L. Mapother, president of the Louisville & Nashville R.R., in a recent statement said that the road in 1923 carried 12 per cent more tonnage than in the preceding year.

Industrial Notes

Orders received by the General Electric Co., for the year ending Dec. 31, 1923, amounted to \$304,199,746, compared to a total of \$242,739,527 for the year 1922, or a gain of 25 per cent, according to a recent announcement by Gerard Swope, president of the company. For the fourth quarter of 1923 orders totalled \$74,452,442, as compared with a total of \$66,568,333 for the corresponding quarter in the year 1922, or a gain of 12 per cent. Coal Age estimates that during 1923 the coal industry expended \$74,610,000 for electrical machinery, equipment and supplies.

An important precedent in the granting of patents was established in the District of Columbia Court of Appeals recently when the Court ruled that inventions that have been developed to practical, workable condition should be given preference in the Patent Office over devices involving similar ideas but that have not been so perfected as to be ready for use. Joseph F. Joy, of the Joy Machine Co., Pittsburgh, obtained a patent on his loading machine in 1916, but E. C. Morgan alleged interference, and the Commissioner of Patents held that he was entitled to the patent on a prior claim, as he had applied for a patent on a similar machine in 1910. Witnesses testified, however, that the Joy machine is in practical use by a number of coal companies, whereas Mr. Morgan filed papers on the idea before it had been fully developed. In rendering a decision in favor of Mr. Joy the court said: "This court has commended the course of those who refuse to rush to the Patent Office before the merits of their inventions have been tested. Morgan filed as soon as he conceived the invention, while Joy waited until he was certain that he had a device that would satisfy the demands of the coal mining industry and advance the public interest. We think his course should be approved, and feel constrained to reverse the Commissioner of Patents."

The Automatic Mine Door Co. of Beckley, W. Va., has been organized with a capital of \$200,000, and the following officers have been elected: Dr. W. W. Hume, president; W. T. Ferguson, vice president; W. C. Canterberry, president; S. C. Ballengee, treasurer and manager. This company will manufacture and sell automatic mine doors and is erecting a factory building of frame and sheet iron at Beckley Junction. The new door was patented by W.

W. Ferguson and has been given a number of trials at the Amigo mine, in the Winding Gulf region. All machinery and door castings necessary to begin construction work have been ordered and will be ready for delivery as soon as the building is ready for occupancy.

Association Activities

The Monongahela Coal Association, composed of operators having mines along the Monongahela Ry. between Pittsburgh and Fairmont, held its annual meeting at Pittsburgh, Jan. 17, discussing members' problems confronting the industry in general and particularly those on the Monongahela River and transacted routine business. Officers were elected as follows: Samuel Purselove, of Cleveland, president; R. M. Davis, vice-president, and J. B. Hanford, treasurer. On the board of directors elected in addition to the above officers are: E. F. Miller, George S. Connell, W. R. Mither, B. M. Chaplin, W. E. Watson, Samuel D. Brady, James H. McGrew, E. H. Gilbert, Whitney Warren, W. H. Soper and Stephen Arkwright. The directors at a meeting to be held later will select a secretary.

At the regular meeting of the Columbus Coal Exchange held Jan. 9 it was voted to change the weekly meetings from Wednesdays to Mondays in order to accommodate a larger proportion of the membership.

The Michigan-Ohio-Indiana Coal Association, of which B. F. Nigh is secretary and H. A. Bauknecht, of Muskegon, Mich., is president, has abandoned its usual mid-winter directors' meetings and there are no immediate meetings planned, according to the secretary. The time and place for the annual convention will be taken up by correspondence shortly after the winter season is over. According to Mr. Nigh the collection bureau has been unusually busy during the winter months and many thousands of dollars in claims against railroads have been collected for its members.

Obituary

David Hammond Parker, superintendent of the Clarkson Coal Co., died of heart failure at his home in Wheeling, W. Va., Jan. 16. He was 44 years old. A native of Carlisle, Pa., Mr. Clarkson began his mining experience as a civil engineer. He was for a time connected with the Pittsburgh-Buffalo Coal Co. and also with the Hilton Coal & Coke Co. His wife and two children survive him.

W. W. Harmon, aged 62, a widely known coal man of southern West Virginia and southwest Virginia, died at Tazewell, Va., Jan. 15, after an illness lasting only a few hours. In addition to being extensively interested in coal lands and in active mining properties in southwest Virginia and in southern West Virginia he also was a director of the Bank of Clinch Valley and of the Bluefield National Bank and was extensively interested in stock raising. His wife and two sons, C. Henry Harmon and Sayers Harmon, survive.

William M. Brinker, of Wilkinsburg, Pa., formerly a well-known coal operator, died in St. Petersburg, Fla., Jan. 15, at the age of 80 years.

William T. Grier, former New Jersey State Fuel Administrator and one-time freight traffic manager for the Lehigh Valley Railroad Co., died Jan. 16. He lived at Plainfield, N. J.

Coming Meetings

Rocky Mountain Coal Mining Institute, Winter meeting, Feb. 13-15, Albany Hotel, Denver, Colo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

American Institute of Mining and Metallurgical Engineers. Annual meeting Feb. 18-21, 29 West 39th Street, New York City. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

Northern West Virginia Coal Operators Association. Annual meeting Feb. 12, Fairmont, W. Va. Secretary, J. O. Caldwell, Fairmont, W. Va.

News Items From Field and Trade

ALABAMA

Negotiations are said to be under way for the consolidation of the Alabama Company and the properties of the Bush interests, large producers of commercial coal and coke. The Alabama Company has extensive ore and coal properties, operating coal mines at Mary Lee, Jefferson County, and at Searles and Brookwood, Tuscaloosa County, with large batteries of coke ovens at the latter two points, and also operates several furnaces in the Gadsden district. The Bush and Hammond interests are owners of the Alabama By-Product Corporation, large producers of coke and by-products and have several active coal mines in Jefferson County, besides being pipe manufacturers. The Hammond-Byrd Iron Co. conducts a large sales agency in Birmingham for the distribution of pipe, coal, coke, iron and coke byproducts. The amalgamation, if it is brought about, probably will involve a capitalization of \$12,000,000 to \$15,000,000.

Warren, Knight & Davis, architects, have been designated to prepare plans and specifications for the **Erskine Ramsay Engineering Hall**, to be erected on the campus of the Alabama Polytechnic Institute, at Auburn. Mr. Ramsay, widely known mining engineer, coal operator and capitalist, contributed \$100,000 in initiating the movement to erect the hall, which is to cost about \$250,000 and is expected to be ready for occupancy for the fall term of 1924.

The Manchester Coal Co., of Manchester, Walker County, will construct about twenty new houses for its employees and also add a new steam shovel to its stripping equipment at an early date. The Jefferson seam of coal is being mined by the stripping process, two shovels now being in use. John M. Kilgore, of Jasper, and associates are developing the property.

CALIFORNIA

A group of Oakland men have opened a mine in the Mendocino field with the expectation of successfully selling domestic sizes in competition with every other coal that reaches the San Francisco district because their product will enjoy a \$4 advantage over the nearest other coal, and they expect it to produce coke for the southern California steel industry. A mine has been opened in Mendocino County on the new extension of the Northwestern Pacific R.R., which runs from San Francisco to Eureka.

ILLINOIS

The Kolb Coal Co. receivership has been lifted. On Jan. 12 the U. S. Circuit Court of Appeals at Chicago issued an order ousting Edwin J. Schubkegel, the receiver appointed nearly two months ago upon the petition of P. H. Sauter, of St. Louis, Mo., who alleged that as a stockholder he had not received his share of the company's earnings. The Kolb Coal Co. operates mines in St. Clair County.

Figures compiled by Scotts Coal Bureau will show that 50 per cent of the coal mined in Illinois in 1923 was mined at a loss, on account of the high overhead and wage scales and poor market conditions.

Joseph Hartley, of Du Quoin has been elected to fill the vacancy of William Hutton as member of the executive board of the United Mine Workers. Hutton is now acting as commissioner for the Illinois Coal Operators' Association.

Robert M. Medill, former director of the state Department of Mines and Minerals of Illinois, has been appointed as receiver for the **Dodds Coal Co.**, at Carriers Mills. The company recently failed to pay its employees the regular semi-monthly payroll. The company is incorporated at \$90,000 and is said to owe \$50,000 in debts.

The Mitchell & Dillon Coal Co. of Chicago is celebrating its golden anniversary this year. In 1874 the concern was organized by Abe Mitchell at Burlington, Iowa. Shortly afterward the company moved to Chicago.

The mine at Braidwood has been idle for some time on account of being flooded, supposedly from seepage from a nearby stream where the workings are 65 ft. below the surface. The water came in during the night and drowned the mules. It is an old mine and pretty well worked out.

The Bartels Coal Co. of Carlinville, will be reopened. The mine is now being cleaned and rehabilitated, preparatory to hoisting coal. The mine is conducted on the co-operative plan and consumption is largely local.

A suit to foreclose a mortgage on the **West Bethalto Coal Co.'s** mine has been filed in the Circuit Court at Alton, because, it is alleged, of failure to pay interest on the mortgage. The mine is working steadily.

Work has been resumed at the St. Clair Coal Co. mine near Belleville, after a shut down which started Nov. 1 last. The "Radium" mine, also located near Belleville, which was flooded Dec. 6 when a hole was cut through into the workings of an abandoned mine nearby and in which several employees lost their lives, also has been reopened. Only a portion of the mine is being worked until the water can be pumped from all the working places.

Approximately half a million tons of coal will be stored in the next two months by the **Missouri Pacific R.R.** near Gorham, in Jackson County, on 100 acres of land leased for the purpose. This is being done in anticipation of a miners' strike in the spring. The coal probably will be shipped from mines on the company's line in Jackson or Williamson county.

Water has flooded the mine of the **Lebanon Coal Co.** at Lebanon. It is thought to have seeped in through quicksand. The mine was re-opened only a few weeks ago after being shut down for some time. It was taken over by a number of the miners employed and was operated as a co-operative company.

Two important mines reopened this month are No. 8 of the **O'Gara Coal Co.** at Eldorado, and No. 2 of the **Wasson Coal Co.** at Carrier Mills.

The Taylor Springs mine of the Indiana and Illinois Coal Corporation, which has been idle two months, has recently been inspected by Hillsboro and outside capital with a view of buying it.

KENTUCKY

James D. Rash, of the St. Bernard Mining Co. interests, Madisonville, Ky., as State Senator from that district, has been appointed on the Senate Rules Committee.

W. F. Bradshaw, coal operator of Paducah, interested in mines in western Kentucky, as well as being a banker, insurance agent and capitalist, has just been elected president of the First National Bank of that city.

The Kentucky Legislature has spent ten days in argument relative to committees, etc., and in getting ready for its session, but so far hasn't passed any bills, or really gotten down to business. This further indicates that a legislative meeting every four years, instead of every two years, as is demanded by some interests, would be an improvement over the present two-year plan. A good many bills opposing the coal industry are to be introduced, chief of which will be the coal-tonnage tax bill.

Heavy rains, followed by a mud slide caused a heavy slide of rock on the Stony Fork branch of the Louisville & Nashville R.R., near Middlesboro, on Jan. 15, one rock being reported so large that dynamite had to be used in breaking it up. The slide blocked the line and put the Crystal and lower Hignite mines out of commission temporarily.

Dan D. Walker, Jeffersonville, has been appointed manager of the **St. Bernard Mining Co.** for Louisville, New Albany and Jeffersonville. He succeeds William B. Gathright, who has retired after eighteen years with the company.

The Anchor Dean Coal Co., of Barbourville, capital \$10,000, has been chartered

by W. R. Lay, P. W. Golden and A. M. Decker, as an operating company.

With the December tonnage estimated production of coal in the Big Sandy field of Kentucky amounted to 7,125,490 tons in 1923, according to the Northeast Coal Association. In 1922 it was 6,133,077 tons.

George Marting, of the Logan Pocahontas Coal Co.; J. T. Bradley, of Jewett, Bigelow & Brooks, and R. R. Atkins, of the Liberty Coal & Coke Co., of Hazard, met with John P. White, former president of the United Mine Workers, and two others at the Hotel Gibson, Cincinnati, on Jan. 12-14 in the hope of finding a solution to a wage agreement that will have to be fixed for the men working in the territory of the **Kentucky-Tennessee Coal Operators' Association**. This association was formed following or during the strike of 1922 and the agreement expired. Those above were appointed arbitrators and their sessions were kept secret. It appears, however, that no point of contact was reached and it was decided to adjourn to meet on Feb. 4 at the same place in the hope that progress at the annual meeting of the Mine Workers at Indianapolis would open the way to a solution.

R. H. Davis, treasurer of the **United Collieries Co.**, of Ashland, has announced the purchase of Barney Nos. 1 and 2 mines on Beaver Creek, in eastern Kentucky.

NEW YORK

Rights to subscribe to the stock of the Lehigh Valley Coal Co. are expected to be listed on the New York Curb Market soon according to a statement made Jan. 17. The stockholders of the railroad company were offered rights to subscribe to the coal company stock on the basis of share for share of railroad stock held by them, plus a charge of \$1 for each share of coal company stock.

J. G. Allspach, Jr., recently was appointed sales manager in New York and New England for Camp, Osgood, Sleppy, Inc., of Scranton, Pa.

NEW MEXICO

The Phelps Dodge Corp. has embarked upon a thorough campaign of safety and first-aid training at its Stag Canon branch in Dawson. A class for miners is now organized which is expected to grow to a membership of 1,000. Also about 250 women in the coal communities and nearly 100 children are to have first-aid training.

OHIO

That Governor Donahey's appeal to the people of Ohio to burn Ohio-mined coal is bearing fruit is shown by conditions in the Hocking coal fields the past two weeks. In the Corning-Athens field, comprising about 50 mines, the output for the week ending Jan. 12 was 352,188 tons, as compared with 58,226 tons for the same period in December. There are about 1,200 fewer idle miners in this field than on Dec. 1. Storing of coal by railroads and factories in anticipation of a strike in April is said to be helping the situation.

The Blanchard-Zanesville Mining Co., a Pittsburgh concern, has made application to the United States Government for permission to construct a coal tippie, ice breakers, pile clusters and dredges in the Muskingum River at Ellis, 10 miles north of Zanesville, for the purpose of mining coal on a large scale for the Ohio Power Co.'s \$15,000,000 plant at Philo. The coal will be transported in a fleet of barges if permission is granted to the company.

Applications for permission to increase their capital stock have been filed with the Secretary of State by the **Oakley Coal & Supply Co.**, of Oakley, from \$100,000 to \$145,000; the **Ohio Coal & Supply Co.**, of Cleveland, from \$10,000 to \$200,000; and the **Hocking Valley Coal & Oil Co.** of Bellefontaine from 20 to 2,000 shares of stock, no par value designated.

The office of the **Puritan-Tuttle Coal Co.** has been succeeded by the **Tuttle Coal Corporation** in the Dixie Terminal Building, Cincinnati, a divorcement of the Tuttle from the Puritan interests having taken place. **The Pocahontas-Kanawha Coal Co.'s** office in the Dixie Terminal has been closed, the company's business being done through its Dayton office. The Kentucky & Virginia Coal Co. has opened for business in the First National Bank Building. **The Fayette Smokeless Coal Co.** of Mt. Hope, W. Va., has opened a selling office under the direction of Mr. Kirley in the Dixie Terminal Building.

PENNSYLVANIA

Charles D. Wells, of Scranton, has been appointed receiver for the **Buck Ridge Coal Co.**, operating an independent mine at Shamokin, which suspended Dec. 30 after failing to pay employees wages due them for the first two weeks of December. It is reported that \$70,000 in wages remain unpaid. The company is composed of New York men.

Suit for \$300,000 has been filed in Common Pleas Court by the **Pittsburgh & West Virginia Ry.**, against **John A. Bell**, banker and coal-land owner, in connection with the building of a branch line from the main track of the plaintiff company to property, owned by the defendant in the Cross Creek district, Brooke County, West Virginia, and Jefferson township, Washington County, Pennsylvania. The railroad alleges that after it had built a spur track at the request of Bell the defendant failed to open mines as he agreed to do, thereby occasioning a loss in the amount sued for.

John Markle was re-elected president and **A. B. Jessup** was named vice-president at the annual meeting of the **Jeddo-Highland Coal Co.**, held at Jeddo. There were no changes in the personnel of the board of directors. The company in 1923 produced more than 1,000,000 tons of coal. This is about the average and the corporation stands at the head of the independent operators in production. Gradual extension of the policy of electrification of the Jeddo-Highland Coal Co. mines is to be pushed until the whole chain of mines is eventually electrified.

George F. Osler has resigned his position as general superintendent of the **Carnegie Coal Co.**, of Pittsburgh, and accepted the position of vice-president, in charge of operations, with the **Pittsburgh Terminal Coal Co.**, with headquarters in the **Wabash Building**, Pittsburgh, to succeed **M. D. Kirk**, transferred.

Employees of Lehigh Coal & Navigation Co. and subsidiary companies have an opportunity to purchase stock of this concern. They can subscribe for stock at the rate of \$65 a share and the maximum number purchased is to be determined by the salary received by the individual. Subscriptions end Feb. 1, when allotments will be made.

Edward V. D'Inviillers, geologist and mining engineer, formerly located at 518 Walnut Street, Philadelphia, has formed a partnership with **Walter Gilman** and **J. B. Dilworth** under the name of **Edward V. D'Inviillers Engineering Co.**, with offices at 121 North Broad Street.

The Hillman Coal & Coke Co. of Pittsburgh, has begun cleaning up the Orient mine recently purchased at sheriff's sale, and is preparing it for operating. This company on Jan. 1, closed down its **Patterson** mine, near Elizabeth, for an indefinite period due to the dull condition of the coal market.

Arthur N. Young, of South Brownsville, inspector for the **Hillman Coal & Coke Co.**, was on Jan. 1 appointed superintendent of that company's recently acquired **Orient** plant, with headquarters at **Orient**, Fayette County.

John Lepitsky was recently fined \$10 and costs for taking matches and cigarettes into the **Francis** mine of the **Ford Collieries Co.**, **Curtisville**. This is the first prosecution brought in this locality in many years under the **Mine Protective Act** of 1911, which makes such an offense a misdemeanor.

William C. Hood, of Uniontown, assistant general superintendent of the **H. C. Frick Coke Co.**, has been elected to the board of directors of the **Merchants and Miners Bank** of Uniontown.

An indication that business is picking up in the **Connellsville** coke region is seen in the firing of 600 additional beehive coke ovens by the **H. C. Frick Coke Co.** last week. **The Oliver & Snyder Steel Co.**, which had been operating only about 40 per cent of its ovens, is now operating all of them. **The Hillman Coal & Coke Co.** has resumed operations at the **Warwick** mine, on the **Monongahela** River near **Masontown**, and is cleaning up the **Orient** mine, recently acquired at **Sheriff's** sale, preparatory to operating it. **The Pittsburgh & Erie Coal Co.'s** **Braznell** mine, which has been operating only two days a week for some time, resumed full operation last week. **The Poland Coal Co.** also recently resumed operations.

A State charter has been issued to the **Sullivan Flynn Coal Mining Co.**, of **Wilkes-Barre**. The company has a capital stock of \$200,000 and **Eugene Sullivan**, 1016 **Plane Street**, **Avoca**, is treasurer. The incorporators are **Eugene Sullivan**, **Edward M. Flynn**, **Avoca**, and **Margaret Flynn**, **Avoca**.

Other companies incorporated were the **Campbell Coal Co.**, **Ellwood**, \$25,000; **Oscar J. Zimmerman**, **Coraopolis**, treasurer, who with **Lester A. Campbell**, **Ellwood City**, and **Lola M. Zimmerman**, **Coraopolis**, incorporated the company; **Clyde E. Speer Coal Co., Inc.**, **Pittsburgh**, \$25,000; incorporators, **Clyde E. Speer**, 706 **Hastings Street**, **Pittsburgh**, treasurer; **Lee H. Funckem**, **Pittsburgh**, and **Joseph A. Richardson**, **Pittsburgh**.

Ten steel smokestacks 90 ft. high, over the steam-generating plant of the **Prospect colliery**, of the **Lehigh Valley Coal Co.** near **Wilkes-Barre**, were blown down by heavy winds on Jan. 16. Two men were injured. When the stacks fell the main steam lines supplying pump stations, fans and engine house with power snapped off. Steam locomotives used about the yards of the colliery were placed in position and furnished sufficient steam to start the fans after several hours' delay. With the fans shut down all men in the mines were notified to come to the surface. Colliery officials balanced the powerless cages with a coal car and scrap, raising one loaded with men and lowering the other loaded with ballast. This operation was repeated, the men at the bottom unloading the ballast from the down cage and getting on it themselves while those at the surface loaded the other cage with ballast of sufficient weight to lift the down cage. Men in the workings were hoisted to the surface in this manner.

A letter sent out by **A. T. Dice**, president of the **Reading Company**, and **W. J. Richards**, president of the **Philadelphia & Reading Coal & Iron Co.**, notifies holders of the general mortgage, 4 per cent gold bonds issued under the general mortgage of Jan. 5, 1897, that they have the right to surrender their bonds and receive in exchange \$666.66 principal amount of general and refunding mortgage 4½ per cent gold bonds, series A (or scrip certificates, as hereinafter provided), of the **Reading Company** issued under the mortgage and deed of trust dated Jan. 2, 1924, made by the **Reading Co.** to the **Central Union Trust Co.** of **New York**, trustee, and \$333.33 principal amount of refunding mortgage 5 per cent sinking fund gold bonds (or scrip certificates, as hereinafter provided) of the **Philadelphia & Reading Coal & Iron Co.** issued under the mortgage and deed of trust dated Jan. 2, 1924, made by the **Philadelphia & Reading Coal & Iron Co.** to the **Central Union Trust Co.** of **New York**, trustee, for each \$1,000 principal amount of general mortgage bonds so surrendered.

VIRGINIA

The New England Fuel & Transportation Co. has taken over the nine steamers formerly operated by **Crowell & Thurlow**, and will put them exclusively in the **Hampton Roads-New England** coal trade for the **New England Coal & Coke Co.** It is one of the largest single fleets of ships now in the coastwise trade.

WASHINGTON

The Roslyn mining field went through the year 1923 without a fatal accident, **John E. Morgan**, an operator, recently reported.

"Snowbirds" in the **Seattle** region are offering more serious competition than ever before. No less than twenty-eight in **Seattle** alone have formed an association and claim to be buying **Utah** and **British Columbia** coal in steady volume. They have undercut the market about \$1.50. **F. H. Benton**, of the **Consumers Fuel Co.**, is one of the organizers of the group.

WEST VIRGINIA

It has been announced by **C. F. Keeney**, president of **District 17**, **United Mine Workers**, that **R. M. Williams**, of **Morgantown**, an insurgent leader in the **United Mine Workers**, was elected vice-president of the district over **William Petry**, the present incumbent, and **Nick Aeillo**, in the special election held in December. **Petry** was elected vice-president at the regular election held in December, 1922, but soon after **Williams** made the claim that he had been debarred as a candidate when his name was removed from the ballot by the district board. He started a movement for a special election.

The Wyatt Coal Co. recently won a suit in the **U. S. District Court** for the **Southern District of West Virginia**, in which it was a defendant. The suit was brought by the **Detroit Edison Co.**, which asked damages

for alleged non-delivery of coal on contracts for 1916 and 1917. The verdict in the case was returned at the instance of the court.

Preparations are well under way for the opening of a new mine at **Chapmansville** by the **Dwyer Coal Co.** The company has obtained a lease on 500 acres of coal land in **Logan County**. Two openings have been driven and in driving a third opening the company will operate in the **Alma** seam, having a vein 5 ft. thick. Work has progressed to a point where it has been possible to lay the tracks 300 ft. within the mine as well as to the base of the hill where the tippie is to be located. That structure will be equipped with shaker screens and other equipment for the preparation of coal. It will be necessary to lay only about 100 ft. of rails to reach the mine from the **Chesapeake & Ohio** and it is proposed to put in a two-end siding with three tracks. In addition to a club house and other plant structures, the company is preparing to build a number of five-room houses for miners, with hot and cold water and provided with other conveniences. The company has made provision for an adequate water supply by building a concrete reservoir on the side of the hill and also has installed a sewage system. This corporation is capitalized at \$100,000. The president of the company is **John G. Dwyer** and **J. W. Dwyer** is secretary and treasurer. The **Dwyer** brothers were among the early operators in the **Greenbrier** field and have also operated mines in the **Kanawha** and **New River** fields.

Ejection of nineteen miners occupying dwellings belonging to the **Francois Coal Co.** in the **Harrison County** field is sought, the company desiring to gain possession of its houses in order that miners who will work in an open shop or non-union mine may be employed. Change in the labor status of the mine, it is indicated in the proceedings, follows the leasing of the company's mine at **Norwood**, to the **Turkey Run Coal Co.** After hearing the testimony, **Magistrate Kidd** took the case under advisement and will announce his decision later.

The Bonafide Coal Co. will operate in the vicinity of **Tunnelton**, in the **Preston County** field, having just been organized with a capital stock of \$125,000. Among those interested in the new concern are **Guy M.** and **Alberlee C. Bonafide**, **John F.** and **Lola F. McKone** and **C. M. Eliason**.

CANADA

The Vancouver City (B. C.) Harbor Commissioners have announced that coal bunkers are to be constructed at the Port of **Vancouver** at a cost of about \$500,000. They are designed to handle shipments from the interior of the province as well as from the **Province of Alberta** and the **Vancouver Island** field. It is recognized that to be a great grain export center and shipping port **Vancouver** must have fueling accommodations for ships making long voyages. It also is thought that **United States Pacific** ports will be in the market for higher grade steam coals.

Coal operators of **British Columbia** are meeting with competition in the domestic market from the products of the coal fields adjacent to the **City of Bellingham, Wash.** This has been classified as lignite, or lignite dust, by the customs officials and so is being admitted to **Canada** free of duty.

It would appear as if the problem on carbonizing **Saskatchewan lignite** is being solved. The new **Hood-Odell** oven erected at the lignite utilization plant at **Bienfait, Sask.**, is turning out char in large quantities and complete success has been attained in briquetting it at the briquetting plant at **Hebron, North Dakota**, where two carloads of briquets have been manufactured. One carload was distributed to householders in **Regina**. Exhaustive tests will be carried out at **Ottawa** under government auspices.

The Dominion Coal Co., Ltd. has declared a dividend at the rate of 1½ per cent upon the preferred stock of the company, payable Feb. 1, to shareholders of record on Jan. 12.

J. E. McLurg, has been appointed vice president of the **British Empire Steel Corporation**, and will reside in **Sydney**. **Mr. McLurg**, who has been general manager of the **Halifax Shipyards Co.**, a subsidiary of the **British Empire Steel Corporation**, succeeds **D. H. McDougall**. Since the retirement of **Mr. McDougall**, **H. J. McCann**, former assistant general manager of the company, has been in charge of coal-mining operations. **Mr. McCann** has been in ill health for some years.

New Equipment

Bulldog Trolley Clamp

The outstanding feature of the Ohio Brass Co. new bulldog trolley clamp is the automatic operation of the jaws in opening when the nut is turned to the left. Ordinarily one thinks of clamping the jaws to the wire only with the nut, leaving the problem of preparing the jaws for taking the wire to the man who makes the installation. Anyone who has tried the combination of lifting the trolley wire into place, manipulating the wrench and at the same time trying to hold the clamp jaw apart will readily see the importance of this new feature. The nut can be set to open and hold the jaws ready for receiving the particular size wire to be used.

The design is simple, consisting of only five parts, nut, stud, two jaws and a high-strength steel hinge pin. The assembly provides for great holding power, and offers a pleasing appearance. One size of the clamp will take care of all the usual figure 8 and



TROLLEY CLAMP EASY TO INSTALL

The nut on the top holds the jaws open, thus enabling the workman to place the wire in the clamp with ease.

grooved wire sizes without changing the jaws. Another size with different shaped jaws takes all ordinary sizes of round wire.

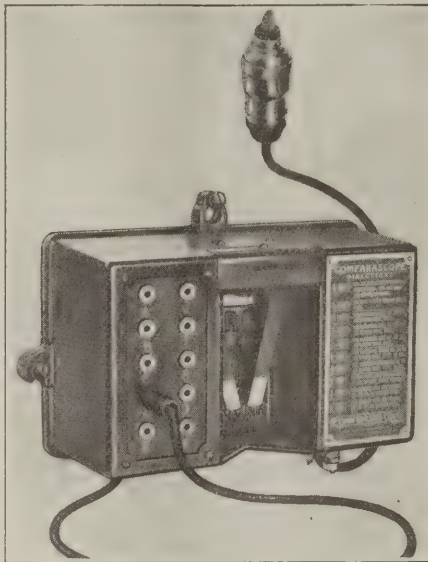
Waugh Comparascope

The Waugh Comparascope, manufactured by the Denver Rock Drill Manufacturing Co., of Denver, Colo., was designed to simplify the process of forging and heat-treating drill steel so as to obtain the highest efficiency in drilling and to insure durability of the drill steel. By the use of this instrument it is possible for the blacksmith to heat-treat his drill steel easily with speed and precision.

Steels when heated to various temperatures have certain definite colors corresponding to the hardening temperatures. Therefore heat-treating is very much a matter of color comparison. The varying shades which the steel

takes when heated are almost imperceptible, so the comparascope has been developed to enable the blacksmith to match the color shown by the comparascope with the color of the steel that he is heating.

The Comparascope is connected to an



INSTRUMENT FOR ASSISTING THE WORK OF TEMPERING STEEL

By comparing the color of the heated steel with the color indicated by this device—for that particular grade of steel—it is possible to heat-treat the material to the desired degree of hardness.

electric-light cord and the current heats a small coil of high-resistance wire, visible through a lens in the center of the apparatus, to any desired temperature color, the blacksmith comparing his steel when heated. The coil has a fixed resistance and is connected in series with a variable resistance, which in turn is connected with various plug connections on the front of the unit.

To further aid in the process of hardening steel, a high-grade permanent magnet is suspended at the center of the instrument immediately below the radiating coil. This magnetic indicator shows the magnetic condition of the steel, which is another indication of the hardness to which the steel will temper.

When the carbon content of drill steel is known, forging and hardening temperatures are quickly and easily determinable. By plugging into the socket having a carbon content corresponding to the material being worked, as indicated on the directions plate, the Comparascope shows the proper color to which the steel should be heated. The magnet is very useful when the carbon content of the steel is not known. If the magnet is attracted to the steel, the change point—that is, the hardening temperature—has not

been reached. By first heating the material to a low red heat and increasing its temperature and testing with a magnet, the temperature of the steel may be raised until the test shows no attraction of the magnet.

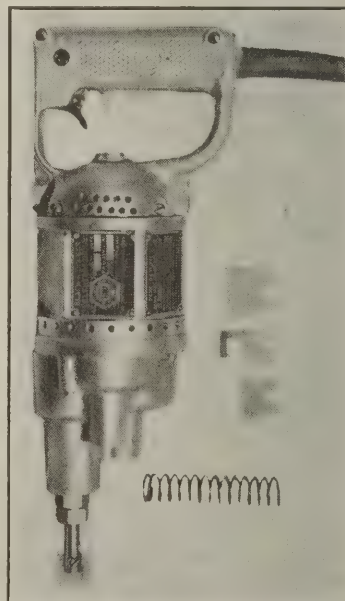
Light-Weight Electric Valve Grinder

The new No. 1 slow-speed Black & Decker electric valve grinder is similar in all respects to the valve grinder previously produced by this company except that it embodies many refinements. It weighs only 6 lb. and is arranged with a double gear reduction to give what has been ascertained by experiment to be the most efficient grinding speed.

It is equipped with the most improved designed pistol grip and trigger switch and particular attention has been given to the elimination of vibration, so that it can be used with the greatest of ease and comfort by the mechanic.

The manufacturers are now making tools for this machine, and will be able to make deliveries in large quantities within a very few weeks. The Black & Decker Manufacturing Co., of Towson Heights, Baltimore, Md., makers of the grinder, give the following example to show the value of this tool to the automotive maintenance man from a dollars and cents standpoint:

"If an eight-cylinder car requires one man's labor for five hours to perform the actual valve grinding operation and he charges his customer \$1.25 per hour he will have to charge \$6.25 for the grinding work. As the new valve grinder performs the work more than four times as fast as it can be done by hand, the same man can grind the valves on at least four eight-cylinder motors in the same length of time, five hours."



ELECTRIC VALVE GRINDER

Increasing the work per man per day, resulting in more productive effort is real labor saving. This equipment sells its own value.

COAL AGE

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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
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How Mr. Lewis Favors Machines

ON ANOTHER page John L. Lewis, president of the United Mine Workers, denies that the union opposes the introduction of labor-saving machinery. With entire willingness to be fair with Mr. Lewis, it is still easy to say that what Mr. Lewis says is largely fluff. The union favors such machinery but insists, he says, only upon receiving a fair share of the benefits in the form of wages. What is a fair share? Therein, of course, lies the nub of the situation. Judging by the recent Kansas cutting-machine case, the union's idea of a fair share is peculiar. The operators were willing to agree upon a machine differential of eleven cents, but the miners would not recede below five cents. So there is no machine scale in that state and the field is deprived of the economic advantage of machine mining.

Somebody is responsible. Mr. Lewis would say the operators are at fault for their grasping efforts. Somehow we cannot see it that way. Paying a machine runner only five cents a ton less than the hand mining scale is not our idea of a fair division of the benefits of machine mining. This sort of "fairness" on the part of organization is the direct means by which the union has delayed and handicapped labor-saving machines. It would be encouraging if the union's idea of fairness were to change with regard to the introduction of loading machines. The time is upon us when a loader scale must be fixed.

"The Won'ts"

A PREVALENT ailment in the coal industry is "the won'ts." Too many good men in coal "won't" help educate the public, "won't" meet the critic of the business halfway, "won't" recognize that perhaps something ought to be done at Washington about coal, "won't" this and "won't" that. In the present session of Congress they are interested only in blocking legislation that is offered—if they are interested at all. They are not trying to propose anything helpful. They do not purpose telling Congress or the nation what the coal man really wants. They are merely going to tell what the coal man does not want.

Of course defense against improper coal legislation is important. But it is unfortunate that, paralleling all the defense now being marshaled, there is so little offense. There is so little of it, in fact, that no ordinary citizen could say what the coal man's program is; nor could the ordinary coal man define it. There isn't any program. "Let coal alone" is as near an approach to it as can easily be set up in words. But that is a poor program to be frankly adopted by coal men who, everywhere, have been admitting there are all sorts of ills afflicting their industry. If there are all these ills, there must be ideas for cures.

What are these ideas? They ought to be laid before

the congressional representatives of every state in the Union, and laid there in sincerity. On the other side of the fence politicians and grandstanders, and honest but deluded gentlemen are saying and doing plenty about coal; but what constructive thing is coal doing for itself? Altogether too little. It is cheerful to note even so small an effort as is now starting among a little group of Midwestern operators. That few intend to say something constructive to Congress about coal, even at the risk of not getting much of a hearing.

They are going to say what they think would do coal some good, whether the rest of the industry agrees with them or not. They are at least constructives. They are not stricken dumb by "the won'ts," and that's something in their favor.

Man to Man

WHAT is the operator of a coal property to his men? What are the men to the coal operator? Only too little too often. A railroad president, Sir Henry Thornton, operating a 22,000-mile system, the Canadian National Railways, speaking at the Bond Club in New York City a few days back detailed a way in which he proposed to keep in touch with the thousands of men under his direction scattered over an area almost as large as the United States—only "almost as large," for only part of Canada is netted with railroads.

He said he intended to establish a "chain of broadcasting stations from the Atlantic to the Pacific at such intervals as will enable headquarters to keep in constant touch with the whole of the property." He added: "We propose to place at the disposal of our employees wireless sets for a moderate price. The sets can be bought either by paying for the entire outfit at once or at the rate of \$1 or \$2 a month. The result will be that in a comparatively short time most of our men will have equipped themselves with wireless sets, and we propose, as fast as circumstances may require, to talk to our men in the evenings at their own homes. I propose, myself, as president of the company, to speak at least once a week to our men."

Think what might be done in the coal industry if this were tried by the right kind of man, one who looked upon himself as one of the gang by which the job of mining coal was being done, a red-blooded man among red-blooded men helping to do a work that was worth the doing, inspiring other men to work with him in doing just that kind of work, thinking with them, of them and for them.

What would it not do for safety! How strongly would the message of saving one's life for the sake of the family and for the good of humanity ring through the air! Every man lives for accomplishment in the home and in the community. How earnestly could the message of avoiding injury be impressed on

those men in the virile words and convincing tone of a man moved by ambitions like those of his hearers!

What would it do for coal preparation, for co-ordination between various units in the organization, for clearing up misunderstandings. Out of it would come a new team work. The larger aggregations would re-align themselves into a body of men with one aim and purpose, inspired by a community of interest, actuated by a common ideal. It is no pipe dream. Some might not be able to carry that message; they are the men who have none, who have no common purpose with their men, who are ill fitted to be leaders. But to those who have the power of leadership the radio furnishes a voice, the *vox humana*. No more powerful tool for good—or for evil—has ever been devised.

Putting the "Eagle" on Coal

EVEN when a manufacturer has a monopoly it pays him to make a good article. He finds it brings him larger business and the amiable regard of the public. Had the manufacturer made the automobile a wheezy, rattling and uncertain means of travel the automotive industry would never have made the progress it has.

When, however, a product is competitive, like coal, it pays even more for every producer to make a good article and to have a ready way of convincing the public that his is a reputable product. No better way can be found than to get the indorsement of the industry corporately expressed or, better yet, to get the approval of the government.

When the goldsmith craftsmen of Great Britain found their product looked upon with suspicion because some of the dishonest workmen put excessive quantities of dross in their gold, they arranged to have their guild assay all gold and put a stamp upon it to show how much dross was mixed with it, dross being necessary in the metal because otherwise it would not be hard enough for any use. More dross is advisable where the metal is subject to much wear.

It would pay the coal operators to have their coal similarly assayed, so that the buyer would know what he was getting. Some coal is inherently less efficient than other, some is necessarily higher in ash or sulphur, some of it is not suited to boilers having high rating; but whatever the coal may be, the purchaser should know just what it is and the best of guarantees should be placed on it so that it could be bought with assurance.

To take an example from the publishing industry, a bureau has been created to find and record the size and character of the circulation of periodicals for those interested in knowing these facts. Is it paid or unpaid? Is it paid to date or does it consist of persons who are being carried along long after their subscription has lapsed? What is the character of the readers among whom it circulates? The larger publishers nearly all submit to this inquiry, for they have nothing to hide.

Similarly the coal operator with a good product with nothing to disguise, who has taken the dirt out of his coal, prepared it and perhaps washed it, wants the public to know that he has a good article. He would welcome the approval of a guild or bureau or the United States Government.

Some time ago O. P. Hood, mechanical engineer of the U. S. Bureau of Mines, advocated that any company that requested the Bureau so to act should have the product in several of its cars in various parts of the

country sampled at random. The Bureau would not take samples in cars indicated by the operator but take its own pick of all the cars shipped. It would then determine by this investigation the rating of the mine from which the cars came, that rating being above or below a correct rate of the coal in the face of the mine according to the degree of cleaning.

The mine would be permitted to sell the coal as being of a quality vouched for by the government, but should it prove in analyses of samples taken frequently thereafter that the rating should be lower or higher, a new rating would be issued, and the mine, whether it wished or not, would be obliged so long as it quoted the government approval to announce its rating so that all the world would know if the coal from that time was 12, 14 or 18 carat, so to speak.


The mine that failed to get government approval would find the going hard. It would be as difficult to sell such coal as it would be to pass a gold dollar which did not have the government's stamp of approval. The mine owner with the uninspected coal might soon have to leave the market, and dealers who failed to say that they sold only coal which was under the government cachet would automatically be ruled out of the market.

Definitions

SOME years ago it was decided in Great Britain that the coal industry should be put on the six-hour day and the mines nationalized. The day was reduced from eight to seven hours and when the suggestion was made that the industry would be better off for a change back to the longer working day, the labor leaders gave notice that they had not abandoned the six-hour day. Now that the Labor Party in England is second strongest and may become first there are some interesting questions arising.

Should the Labor Party take over the government they must carry out the policy of nationalization of mines and railroads, policies they have sponsored for years. But they have no clear conception of what they mean by nationalization of these industries. Their leaders are divided on definitions and schemes. Some, the more moderate laborites, profess to believe that nationalization can be interpreted to mean state control for the benefit and support of the entire community. Others maintain that what they mean by nationalization is "control by the workers." They likewise are divided on the question as to whether they intend to confiscate the property or compensate the owners.

JOHN LEWIS IS STAMPING ON ONE BRAND OF RADICALISM, if evidences displayed at the Indianapolis convention mean anything. Whereas two years ago the radical vote all but beat the United Mine Workers' administration, this year, on such important radical issues as the reinstatement of the Red and recalcitrant Livingston and McLachlan, of Nova Scotia, the recognition of Soviet Russia, and the alliance of the union with an all-labor political party, Lewis' forces soundly defeated the advocates of these measures. However, this does not mean there is less bolshevism in union ranks. It means there is less defection among big union leaders. Bringing Frank Farrington, of Illinois, into camp a year or so ago is the real reason. The bolshevist sentiment is still in the union but it lacks a powerful enemy of Lewis around whom to rally.



Making Coal-Loading Machines Work Successfully in Indiana

Ayrshire Coal Co. Cuts Loading Costs Even on Room-and-Pillar System with Machines Averaging but 75 tons Daily—With Snubbing More Lump Is Obtained Than With Hand Loading—Some Loader Speculations

BY DAVID INGLE*
Evansville, Ind.

IT'S "FASCINATING"

It is fine that so many American coal operators have a pioneering spirit—a spirit that drives them to do by their own ingenuity the thing the other fellow thinks is impossible. There is a certain adventure into the unknown for Mr. Ingle, for instance, as he toils and cudgels his brain over the problems of fitting machine loaders into his mines. He calls it a "fascinating experiment." But he and many other mine operators all over the land must toil and cudgel their brains and invest their money and lie awake nights over this revolutionary machine, the underground loader. Nothing else will ever make it meet the conditions of this country. Inventors and manufacturers can do only a small part of it. The operator and the practical mining man, meeting heart-breaking obstacles in the path of their great adventure in loading, are making the new machine revolutionize coal mining. In the fascination of the quest lies the future of machine mining.

though we have a long way yet to go.

This mine, Ayrshire No. 6, was opened in 1917 on a coal tract of 200 acres lying near the railroad, but inaccessible from any of our other operations. During the war we worked this mine up to a production of about 800 tons per day. In January, 1921, the mine was closed down because we didn't need the tonnage from it, and because it was the one we could maintain idle with the least expense.

When we decided to try mechanical loading this idle mine seemed the natural place to try the experiment. The coal there is 5 ft. thick,

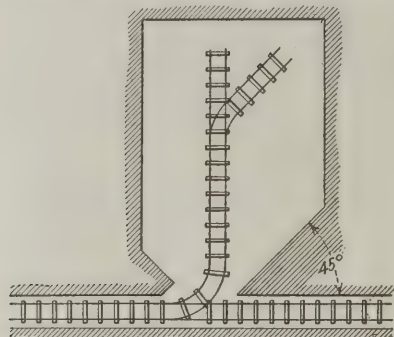
overlaid by a gray shale which is not reliable, standing fairly well in entries but requiring close timbering in wide working places. The fireclay bottom in places is soft and wet. The thickness of the overlying strata runs from 35 to 70 ft., and this accounts both for the uncertain roof and the quantity of water in the mine.

FOR several years our company watched with interest the progress of mechanical loading of coal in mines. In December, 1922, we made our first entry into the loading-machine game by installing two loaders in one of our mines that had been lying idle for nearly two years. Later four more were added. The six machines and the method of using them in this mine have been developed to a point that enables them now to load out an average of 75 tons a day operating on a room-and-pillar basis, and their service is improving steadily. Already coal is produced cheaper at this mine than it ever was under the hand-loading system, the proportion of lump coal is higher, and we are fairly well satisfied with the results we are getting in this venture in machine loading, even

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The coal itself is of good quality, running only about 1.25 per cent sulphur and 6 per cent ash, with no partings of any kind. The mine was opened and worked by the usual room and pillar method, and the coal was all undercut by machines.

We started the two Joy machines working in rooms and entries that had been standing idle for nearly two years, and our first discovery was that the little loaders,



How Room Necks Are Turned

Making the turn at an angle of 45 deg. to the haulageway not only maintains the narrow necks necessary for the support of bad roof but enables the long loading machines to enter without hitting the ribs.

could get a foothold we had no further trouble of this kind.

We have tried operating various widths of working places and found that the best way, so far, to operate this particular loader in our coal is by regular room-and-pillar methods, with the room necks turned off the entry at 45 deg., in order to give the long loader a chance to get into the corners of the rooms. We are driving these rooms, where we can, about 24 ft. wide, leaving pillars between them from 6 to 8 ft. thick. Owing to the bad roof, it has been necessary usually to timber pretty close and to reneck many rooms. This has interfered greatly, preventing the attainment of results that the loaders might have afforded had the layout originally been made for their accommodation.

The cars used at this mine hold about $1\frac{1}{2}$ tons as loaded by the machines. The tops are merely rounded up, as the loaders put the coal on the cars too quickly to permit of building. The loading machines are kept supplied with cars by mules, one mule and a driver being provided for each loader. The empty car is brought by the mule to the turnout, which is placed just as close to the loader as can be arranged conveniently. The mule is then hooked to the loaded car, and as soon as the load is pulled out, the loader's helper shifts the empty car by hand to the loading position.

Two men are used on each loader, one to operate the machine itself and the other, a helper, to lend a hand wherever needed, his main job being to shift the empty car to the loader, to shift it as it is being loaded, and to keep in shape the loose rails on which it stands. These loose rails are fastened at one end only, usually by steel ties, which are readily clamped to, and loosened from, the rail.

Of course, all the coal is undercut and shot down before the loader tackles it. In this mine one undercutting machine can easily cut all the coal two loading machines will handle, and the operation is conducted on that basis—one undercutter for each two loaders. Five or six loading places are allotted to each loader, principally in order that the cutting machine may keep plenty of coal cut ahead. Two men are used on the undercut-

ter, operating on soft, wet and partly heaved fireclay bottom, promptly tried to dig themselves in. We provided some heavy planking on which they could get a start, and after they had loaded out two or three falls of coal and had advanced far enough into a working place on freshly uncovered bottom so that the caterpillar treads

ter. One man drills, makes the cartridges, tamps, and shoots for two loaders. This means that he drills, tamps and shoots anywhere from 15 to 30 holes a day, for in wide places we drill three holes over the coal.

Additional loaders have been installed from time to time, and at present, practically a year from our start, we are using six of them. Each of these loaders is producing, at present, an average of about 50 cars, or 75 tons, per day, making the day's hoist about 450 tons. This is much better than was done at first and is fairly satisfactory, but we hope to improve as we learn more.

To operate this mine, with its six loaders, the following 53 men are employed at present:

- 1 Mine boss,
- 1 Electrician,
- 1 Machine-repair man,
- 1 Dumper at shaft bottom,
- 1 Coupler at shaft bottom,
- 2 Motor men and trip riders,
- 3 Tracklayers,
- 2 Pumps,
- 6 Jerry and timber men,
- 6 Drivers,
- 3 Shotfirers,
- 2 Snubbers,
- 6 Loader operators,
- 6 Loaders' helpers,
- 6 Cutters and cutters' helpers,
- 1 Top boss,
- 1 Blacksmith,
- 3 Railroad-car trimmers and yardmen,
- 1 Stable boss.

The coal is dumped into a hopper at the bottom of the shaft, and hoisted by a continuous bucket elevator, so no engineer or fireman enters into the calculations. The dumper also is the weigh master.

We have found many interesting things as the work has progressed; in fact, it is quite a fascinating experiment. In this mine conditions are far from ideal. Reference already has been made to the bad roof. It is so bad that less than half the working places are as much as 15 ft. wide. So much narrow work involves moving the loader from place to place too often and diminishes seriously the available time for the actual loading of coal. Roof conditions are a much more important factor in mechanical loading than they are when the loading is done by hand with a shovel.

For quite a while one of the major difficulties encountered was that of getting coal out of the corners of the working place with the loader. It seemed that in an average room-full of coal with, say, a 22- to 24-ft. face, having perhaps 30 tons of coal in each fall, it would take longer to load out the 5 tons or so in each corner of the room than it did to load out the 20 tons in the middle. The coal in the corners would be wedged in tight and hard to get down.

Recently this trouble has been almost entirely overcome by the simple process of snubbing each cut of coal before it is shot. The snubbing allows the powder to roll the coal over as the latter falls and seems to do away with the tight corners. Also much less powder is required to shoot a well-snubbed shot, and a much better percentage of lump coal is recovered.

Of course it costs something to do this snubbing, and the cost and the results obtained may not be so marked in inverse proportion in other mines and other coals, but it is very successful with us. Perhaps equally good results in this respect may be obtained by shearing either one end or the center of a room that has been undercut. We expect to try this out also when we get around to it.

One rather gathers the idea, from reading of the performance of loading machines, that the great difficulty in mechanical loading would be to keep empty cars supplied to the loader. So far, this has been one of the

least of our troubles, even though our cars are small as cars go nowadays. One driver with his mule could easily supply from 25 to 40 per cent more cars to our loaders than they have used so far, provided his track is in good shape and the train locomotive keeps cars on his parting for him. Not that the importance of transportation is to be minimized for a moment, but thus far it is the narrow work, close timbering, and soft bottom that have held us back and not transportation.

We believe that the loaders would work to much better advantage under good roof. A hard, smooth bottom greatly facilitates the operation of any kind of loading device, and, of course, one would expect proportionally greater results in a thick bed of coal than in a thin one, because it would enable the loader to handle a larger tonnage with less moving.

In spite of the adverse physical mining conditions under which we are operating, we are loading coal with our machines at somewhat less expense in this mine than it costs us to load by hand in our other mines, where similar physical conditions prevail. This reduction is enough to lower the total cost of producing coal even though the company does all drilling and shooting.

Many types of mechanical loaders are now in process of development and many are in actual use. We have had actual experience only with the Joy, but there are enough machines operating under diverse conditions to show that the mechanical loader is a thoroughly practical device. We have found some weak places in it, but these details have been promptly remedied in every instance by the makers, the operating results continually improving.

We are operating entirely with union labor, and the union has offered no objection to the introduction of these machines. Our men seem to like to work with them. After all, it is much better to let electricity do the hard, heavy work than to get human energy to perform it. Though it takes an able-bodied man to operate a Joy loader successfully, it certainly requires no more muscular effort to handle it efficiently than it does to

operate any of the standard undercutters now so universally used.

If the loading machine does away with the old back-breaking shovel, naturally the man who graduates to it from the hand shovel will like the change. If the use of mechanical loaders will enable a mine worker to realize just as much for his day's work, and come out of the mine at the end of his shift less tired, he is bound to be for it, when he learns about it. And if its use enables the miner to earn just as much and enables the coal operator to reduce the final cost of coal to the consumer, it will then have become no longer an experiment but will be a necessity.

Of course there are apparent disadvantages connected with the use of mechanical loaders. One of them is that coal is loaded too rapidly to permit the impurities to be removed while loading is actually going on. This can and is being done more or less successfully in loading by hand. Mechanically loaded coal must be picked and cleaned outside of the mine on loading booms and picking tables and by crushing and mechanical separation of the impurities. A dirty seam of coal loaded by machines will not be successfully marketed unless an elaborate cleaning equipment is provided in the tipple.

An objection that has been urged is that it will be necessary to shoot the coal too hard, and get it all down in a pile before a loader can handle it successfully. We found this true at first, but by snubbing and studying our methods of shooting we have succeeded in turning out just as good or a larger percentage of lump coal than before the loaders were used. And I am sure we will do still better in that respect in the future.

Still another objection, and a formidable one just now when the industry is so demoralized by overproduction and ruinous competition, is the cost of the machines themselves and the auxiliary equipment necessary to their proper exploitation.

To completely equip one of our modern 4,000-ton mines with Joy loaders would increase the invested capital in that mine by from \$250,000 to \$300,000,



This Machine Proves Economical Though It Averages But 75 Tons a Day

Six like it are operating in room and pillar mining in Ayrshire No. 6 and their tonnages are increasing as various changes in method are made to benefit them. The scheme of delivering cars to the loaders is 40 per cent ahead of the rest of the system, so there is no handicap there. Roof falls and too frequent machine moves due to narrow working places are the most severe checks on the loaders.

assuming that the loaders would turn out 100 tons each per day, which is more than we have been able to do to date.

It is fair to assume, however, that this initial expense will be offset to a large extent by a saving in development owing to the greater concentration of work that is possible by the use of loaders.

Working on the room-and-pillar system, in vogue in Indiana and elsewhere, to produce 4,000 tons per day would involve perhaps 500 to 600 working places. Operating, say, 40 loaders, the number of working places to produce the same tonnage might easily be held down to 200 to 250, or 40 per cent of the number now required for hand loading.

Fewer mine cars would be needed and less steel rail, although probably more mules or locomotives would have to be provided. The consumption of power in operation probably would be increased, but not so much as might be imagined. We do not notice as yet any marked increase in this respect, but it is reasonable to anticipate that machines which must be operated almost continuously during the shift will increase power consumption noticeably, and of course the loader must operate if it is to be efficient.

Most of the foregoing is written with the idea that the work of the loader is done on a room-and-pillar system. That is the only plan we have tried effectively so

far. But it is doubtful indeed whether the future coal loader will work on this system. It would seem that a continuous working face would be much more productive of tonnage.

I do not at this time know enough about the possibilities of working a continuous, or longwall, face to hazard much of a guess as to its merits. But of course the greatest advantage apparent in such a plan would be the ability to load an uninterrupted train of cars, reducing the delay due to the shifting of loads and empties.

LOADER NOW PAST EXPERIMENTAL STAGE

The development of machine loading is coming rapidly. I have no hesitation in saying that the machine we are using is past the experimental stage, and is an established dependable loading unit; it is being made in quantity. The loss of time from breakdowns is not much greater than in other heavy-duty mining machinery like undercutters and gathering locomotives.

The industry daily evinces greater interest in the subject. Hardly a day passes that we do not have visitors at this little mine. The boys have gotten so used to them that they do not even "play to the galleries" any more. It is all part of the day's work. Operators, miners and the public from all parts of the district come to look the proposition over, and they are all welcome.

The Miner's Torch

Certificates of Competence?

THE State of Connecticut has been receiving much distasteful publicity recently because some members of its medical examining board are under indictment for furnishing copies of examination questions in advance of the examinations, thus allowing "quacks" to qualify as physicians.

It would be pretty hard to think of a more despicable crime, and when one considers that at best the bribe money they receive could not have been considerable it seems rather hard to believe that any state official could stoop so low. In fact I have heard people, in discussing the press comments, argue that they never could be made to believe that men with enough standing to have been appointed on such a board could possibly be led to stoop so low.

I only wish that my contact with public officials could have been of a nature to make me feel that way about it, but while I was listening to such sentiments being passed I recalled, unfortunately, that once when I was a young man I knew of my own knowledge that a state mine-foreman's examining board allowed its questions to get out in advance so that a few favored ones could be sure of passing the examination. If an incompetent mine foreman is not capable of doing as much damage as an incompetent physician I miss my guess.

Personally, since that time I have never considered certificates of competency of any description of much value and I have always been glad that I came to that conclusion early in life because it has allowed me to explain to my own satisfaction many otherwise unex-

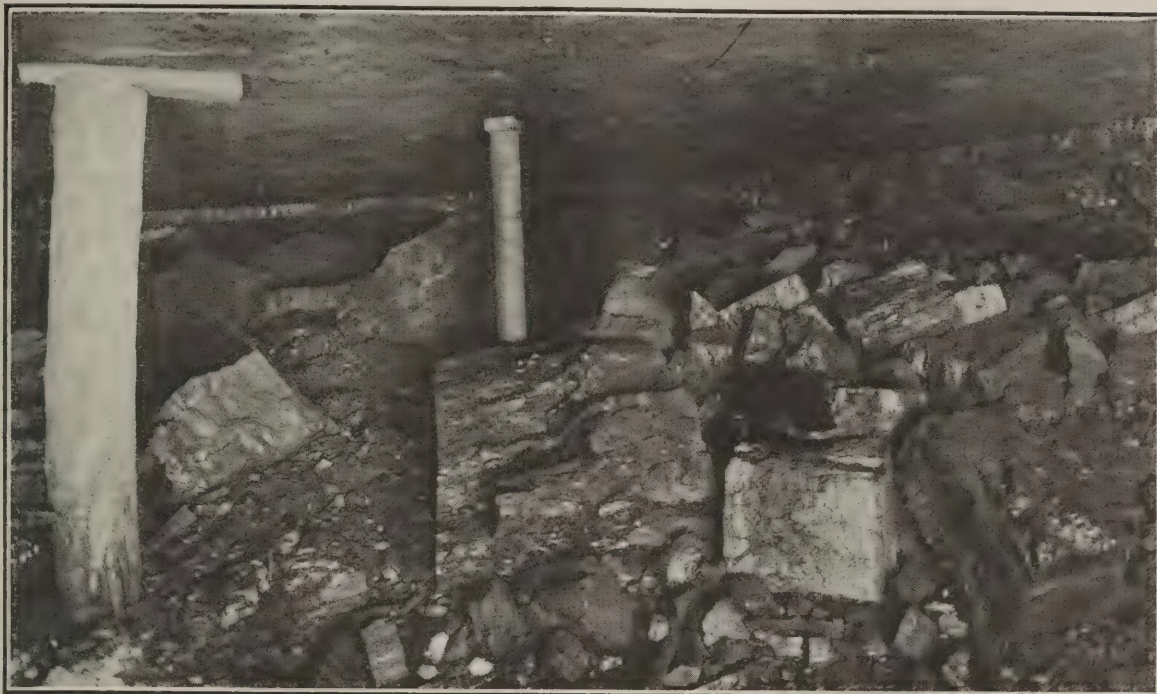
plainable errors of supposedly trained men with whom I have been thrown.

I recall, for example, several camp physicians employed by some of the companies for whom I have worked who, if they still are holding similar positions, are undoubtedly feeling very uncomfortable as this Connecticut publicity spreads around, and they do not live in Connecticut either. I never questioned their certificates or their diplomas but I questioned their abilities and I feel sure they have made little change for the better in the years that have passed since I was in close contact with them.

Let me hasten to add that I have no desire to offer an argument against the advisability or necessity of having state boards pass on the competency of physicians, mine foremen or other men having equivalent responsibilities to the public; but the okehs of such boards should be taken only for what they are worth.

The mine foreman examining-board leak that I knew about "of my own knowledge," as the lawyers would say, was not one that could be traced back to a money bribe, but it was chargeable to a popular and influential mining official's pull with the board; he had two men due to come before the board and he was uneasy about their chances of passing on examination and yet was anxious to have them pass because they were men whose services he required.

Just how he persuaded the board to do his bidding I do not know but I saw the questions the day before the examination and they were in the hands of one of the men who were to take the test. The man with the pull and the men who profited by his efforts have all been dead quite a number of years and, so far as I know, no harm ever came of the adventure; otherwise I would not record it here. Possibly you are wondering why the man who obtained the questions showed them to me the day before the examination. Very easily explained—the questions were of no value unless someone worked up the answers, and he thought that I could help him.



Heavy Shot of Coal in Anthracite Mine

Classification of Coal That Will Enable Buyer to Know What Kind of Fuel He Is Getting

Suggested That Coals Be Divided Into Ten Classes by Percentages of Fixed Carbon with the Ash Equated to Seven per Cent—Seven New Classes Added to Recognized Divisions—Graded Also for Quality

BY GEORGE H. ASHLEY
State Geologist, Harrisburg, Pa.

COAL has been much in the public eye in recent months, and the eye has not been altogether friendly. The complaints have been uncertain supply, high prices and uncertain or low-grade product. This paper deals with the last problem only. The first step toward meeting that problem must be an understanding among coal men as to what constitutes superior, good, fair and poor grades of coal, and the formal designation and adoption of standards for grading coal. Tied up with this question of coal grades is the larger, though possibly no more important, problem of the standardization, definition and naming of kinds and classes of coals.

I have been studying this problem for the last six years and have published several preliminary drafts of proposed schemes of coal classification and grading, which have been followed by a voluminous correspondence. Studies and correspondence have shown that while the classification first presented more than four

years ago was technically correct it was too complicated to be of the greatest service. This paper, prepared at the suggestion of the Executive Board of the Coal Mining Institute of America, presents the same scheme of classification reduced to its lowest and simplest terms.

Today one does not call his dealer and order "a ton of coal." The class and size and perhaps the grade are specified, for experience has shown that certain kinds or types of coal are best suited to certain uses. Furthermore, coals from different localities vary widely in physical and chemical characteristics and in adaptability to various uses. The most easily recognized classes and types have been long recognized and named as cannel coal, coking coal, anthracite, brown coal or lignite, and so on; or local names have been used to designate coals, as Clearfield, Pocahontas, Pittsburgh, Youghioghenny gas, Sea coal, Brazil block, and so on.

Many attempts have been made to classify coals both here and abroad. In Table I will be found examples of classifications that have formerly served the industries.

Detailed classifications of the lignites have been made by several German authors, and many of the distinctions made are commonly recognized in the coal fields. These classifications divide the lignites into four to

An article entitled "A Practical Classification for the World's Coals," presented at the December (1923) meeting of the Coal Mining Institute of America. A committee consisting of A. C. Fieldner, W. E. Fohl, A. R. Pollock, E. A. Holbrook, F. B. Lockhart and J. J. Rutledge was appointed by the institute to confer with Mr. Ashley and report on a classification that could be used in the marketing of the world's coal resources.

TABLE I—SELECTED CLASSIFICATIONS OF COALS AS FORMERLY USED

<i>Ure (Dictionary of Arts, etc.), 1845</i>	
(1) Cubical coal—(a) Open burning (b) Caking	
(2) Slate or splint coal	
(3) Cannel coal	
(4) Glance coal (anthracite)	
<i>Watts Dictionary of Chemistry.</i>	
(1) Lignite or brown coal	
(2) Bituminous or caking coals—(a) caking coal, (b) cherry coal ("does not fuse"), (c) splint, rough or hard coal, (d) cannel coal	
(3) Anthracite, stone coal or culm	
(4) Steam coal	
<i>H. D. Rogers, 1858.</i>	
Anthracite	Hard or dry (volatile matter below 6 per cent) Semi or gaseous (volatile matter below 10 per cent)
Common Bituminous coal	Semi-bituminous (volatile matter between 12 and 18 per cent) bituminous (volatile matter about 18 per cent)
Hydrogeneous or gas coal	Cannel coal (minimum yield of gas 9,000 cu.ft. per ton) Shaly (Torbanhill) Asphaltic (Albert mine)

Persifer Fraser, Jr., 1877.

(Based on "fuel ratios," or fixed carbon divided by volatile hydrocarbons)

	Fuel Ratio	
	From	To
Hard, dry anthracite.....	100	12
Semi-anthracite.....	12	8
Semi-bituminous.....	8	5
Bituminous.....	5	0

(This classification has been widely used in North America, but obviously it does not distinguish lignites, cannels, splints or a score of coals recognized by trade names from one another. It does not distinguish between the high-volatile and low-volatile bituminous coals nor between the low-moisture coals of the Pittsburgh region and the high-moisture coals of the Illinois region which differ greatly in heating value. It is followed in the classification here proposed as far as it applies.)

Regnault, extended by Grüner, revised by Bone (dry, ashless fuel)

	Per Cent Fixed Carbon Below 55	Per Cent Volatile Matter Above 45
(A) Lignites (non-caking).....		
(B) Bituminous	1. non-caking, long-flame..... 55-60	45-40
	2. caking, long-flame..... 60-68	40-32
	3. hard-caking..... 68-74	32-26
	4. hard-caking, short-flame..... 74-82	26-18
(B.C.) Semi-bituminous, non-caking, short-flame.....	80-85	20-15
(C) Anthracites	steam-raising..... 85-92	15- 8
	domestic..... 92 or more	Below 8

Wedding (Dry, ashless fuel)*

	Per Cent of Volatiles
(1) Lean anthracite coals.....	5.0 to 10.0
(2) Sintering coals (old) poor in gas.....	10.0 to 15.5
(3) Caking coals (old) poor in gas.....	15.5 to 33.3
(4) Caking coals (recent) rich in gas.....	33.3 to 40.0
(5) Sintering coals (recent) rich in gas.....	40.0 to 44.4
(6) Sand coals (recent) rich in gas.....	44.4

* Grundriss der Eisen huttenkunde.

nine types, based largely on physical differences in plant composition and texture.

Besides practical classifications, of which examples have been given, many attempts have been made to classify coals by using the ratios of certain elements obtained by ultimate analysis. None of these classifications has gained practical recognition here or abroad.

During the war coals were pooled for more efficient handling. As no practical accepted classification existed covering the need, groups of mines producing coal of similar type and grade were grouped in numbered pools. Since then many analyses of the coals have been made, and average analyses of the coals in the several pools have been published by Dr. H. M. Payne. These reveal the differences that practical coal men deemed worthy of being distinguished by pool numbers. They also reveal the coal man's interpretation of "low-volatile," "medium-volatile," and "high-volatile."

The time seems ripe, therefore, to take advantage of all the work that experience has shown to be of real value to the coal producer and coal user, and from it prepare and adopt a classification of coals.

Coals differ, broadly speaking, in three ways:

(1) In type, as cannel, splint or caking coals, due to differences in origin, involving differences of plant material and conditions of deposition.

(2) In grade, as low-ash coals; high-sulphur coals, due to differences in quantity and character of mineral

matter contained in the plant material or washed in during the deposition of the vegetal material, or carried in later by circulating waters.

(3) In class or rank, as anthracite, low-volatile bituminous, high-volatile bituminous, lignite. Differences in class or rank are caused by pressure, heat and folding of the original deposits, resulting in progressive distillation of the volatile constituents of the original material (including inherent water) and an increased ratio of uncombined or "fixed" carbon. At the same time the original body of vegetal material underwent physical changes in texture, structure, hardness, weight, fracture and in other ways.

Any adequate classification of the several kinds of coal must recognize the three foregoing fundamental differences in type, grade and class; it must consist of three parts, one of which indicates the type, another the grade, another the class.

Types of Coal—Three general types based on origin are given in Table II:

TABLE II—THE THREE TYPES OF COAL

- (1) Common, "fat," resinous or "bituminous" coals.
- (2) Splint or "dry" coals.
- (3) Cannel or canneloid coals.

Coals of the "common" type are derived from various kinds of plant life that lived in the ages of coal. These coals were almost certainly derived from peat bogs where the plants grew and where the coal is found today. This type is commonly laminated with irregular bright and dull streaks. The bright streaks, usually lenticular, consist of woody materials altered to jet; the dull streaks are a mixture of woody and other plant fragments, spores and spore cases broken down into a nearly structureless mass. The Pittsburgh bed in the Pittsburgh region is typical of this type of coal. It is a caking coal in the middle stages of the change from peat to anthracite.

Cannel coal, in contrast, is believed to be a water-laid deposit composed mainly of plant spores and of plant detritus washed into open water within the swamps. Fish remains are occasionally found with the plant material. Cannel coal is easily distinguished from the common type of coal by its massive, non-laminated structure, its velvety luster and conchoidal fracture as well as in many other ways. It is characteristically a non-caking, long-flame coal high in volatile matter. True cannel coal has more volatile matter than fixed carbon.

EVEN SPLINT COALS VARY IN CHARACTER

Splint coals are of two types; one is dull gray and massive, apparently consisting entirely of plant detritus identical to that in the dull layers of common coal. Cross-sections of the other type reveal many thin layers of bright and dull coal. Splitting along the dull layers reveals a surface of "charcoal," "mother-of-coal," or "coal rash."

These charcoal-like layers consist of almost pure carbon and are thought to represent the dried surface of the swamp. This drying of the surface appears to have occurred with great regularity in some coals and suggests seasonal change. Both types of splint coal are distinguished by a splintery fracture like that of wood. Both kinds are non-caking. Cannel coals are characteristically low in moisture and splint coals are high, probably because the spongy charcoal layers absorb moisture.

Classes of Coal.—All three of these coal types are

found in various stages of alteration from their original condition as a bog deposit to anthracite or graphite. There are canneloid lignites and canneloid anthracites as well as bituminous cannel. For classification naturally they may form three parallel series. It should therefore be possible to plan one series showing the stages of the change of the common type and apply the same names to the other types. Attention may be confined for the present to the common type of coal.

The first step in converting peat to coal is bacterial action which may partially or entirely obliterate the plant structure. Then follows compression by overlying subsequent deposits. Later, horizontal pressure may throw the originally horizontal deposit into folds, induce vertical joints and fracturing, and drive off part of the "moisture" and more or less of the volatile hydrocarbons of the original deposit.

If this horizontal pressure becomes great enough the moisture is nearly all driven off and the volatile matter reduced to 20 per cent or less. The coal may be squeezed until it fractures easily along innumerable vertical planes. This is the stage of the "low-volatile" or smokeless coals. Still greater pressure may reverse the fracturing tendency and cement the bed into a hard anthracite.

Locally, as in Rhode Island, the pressure has been so great that the coal bed flowed like putty. Practically all the volatile matter and moisture was lost and only the fixed carbon left in the form of graphite. Similar changes may be brought about by the intrusion of hot igneous rock.

The ash of the coal is mainly an accidental ingredient varying in the same bed from point to point or even in the same mine. It must be either disregarded in any acceptable classification or the coal reduced to a "standard" proportion of ash.

As ashless coal does not exist in nature, and as "ash-free" analyses give slightly higher ratios of the other ingredients, a classification based on a selected "standard" amount of ash probably will be more useful, require less explanation, and eliminate much mental calculation in interpreting ordinary analyses.

The average of a large number of samples of "seaboard" coal suggests the use of 7 per cent ash for this purpose. There remains, according to the ordinary proximate analysis, the moisture, volatile combustible matter and fixed carbon.

SOME VOLATILE MATTER NOT COMBUSTIBLE

The alteration process involves the gradual chemical elimination of the moisture and volatile matter, resulting in an increased proportion of fixed carbon. Recent studies have shown that: (1) A part of the so-called volatile matter consists of hydrogen and oxygen in the proportion of water and having all the practical effect of water in burning—the so-called "inert volatile matter." (2) Under defined conditions the moisture of a coal is characteristic of the coal. It has been found that after dried coal is submitted to a moist atmosphere at various temperatures and vapor pressures a definite quantity of moisture will be re-absorbed and retained.

Where it is necessary to determine the amount of moisture with extreme accuracy, the suggested "standard moisture" of any coal should be its moisture content at a temperature of 68 deg. F. and an aqueous-vapor pressure of 15 mm. of mercury. The coal then may be considered to consist of fixed carbon, volatiles

TABLE III—NEW CLASSIFICATION OF COAL ACCORDING TO ITS CARBON CONTENT

Descriptive Names	Suggested Short Names	Suggested Code Names	Range of Fixed Carbon, per cent* (incl.)	Moisture	Volatiles Matter	Fixed Carbon	Ash	Fuel Ratio	Suggested Technical Names
Anthracite or hard anthracite.....	Anthracite	Coal 88	83 or more	3	2.88	7.12	+		Anthracite
Freeburning, soft or semi-anthracite....	Semi-anthracite	Coal 82	80-82	3	7.83	7.12	-8		Semi-anthracite
Semi-bituminous "Admiralty".....	Loervol	Coal 77	74-79	3	13.77	7.8-5			Loervolite
Low-volatile smokeless bunker.....	Lovol	Coal 70	65-73	3	20.70	7.5-3			Lovolite
Medium-volatile coking byproduct.....	Midvol	Coal 63	60-66	3	27.63	7.3-2			Midvolite
High-volatile gas.....	Hivol	Coal 56	53-59	3	34.56	7.2-			Hivolite
High-volatile.....	Hiervol	Coal 49	46-52	6	38.49	7.2-			Hiervolite
High-volatile sub-bituminous.....	Moistvol	Coal 42	39-45	15	36.42	7.2-			Moistvolite
Sub-bituminous.....	Himoist	Coal 35	32-38	25	33.35	7.2-			Himoistite
Lignite.....	Lignite	Coal 28	25-31	40	25.28	7.2-			Lignite

* Based on 7 per cent ash and moisture determination after coal has been subjected to a temperature of 68 deg. F., and 15 mm. of mercury-vapor pressure.

(including moisture) and 7 per cent ash, making together 100 per cent of the coal. In the process of change from peat to anthracite the volatile decrease in ratio and the fixed carbon progressively increases.

Coal may be classified by either the decreasing quantity of volatiles or by the increasing quantity of fixed carbon. The use of volatiles may lead to confusion because, though in many early coal analyses the moisture and the volatile hydrocarbons were not separated, for many years "volatile matter" has been used to designate the volatile matter left after the drying of the coal at a temperature of 110 deg. C. or 230 deg. F. Less confusion will result if classification depends on the percentage of fixed carbon.

I propose to classify all coals of the common or "bituminous" variety on the basis of the percentage of fixed carbon in a "standard classification analysis," which may be defined as an analysis recalculated (if necessary) to 7 per cent ash, and one in which (if necessary) moisture has been determined at a temperature of 68 deg. F. and a pressure of 15 mm. of mercury vapor. Ordinarily the recalculation or use of "standard" conditions for moisture determination will not be necessary, because the range in percentage of fixed carbon is wide enough to allow some variation from standard ash or moisture. Recalculation is necessary only where the fixed carbon of ordinary analysis is very close to the line between two classes.

In the above table are given, first, some of the descriptive names now in use; second, suggested brief names, mainly new, which are presented and defined; third, a list of code names (in place of pool numbers); fourth, the range of the percentage of fixed carbon for each class; fifth, an average analysis for each class; sixth, the fuel ratios of each class; seventh, suggested technical names terminating in *ite* to correspond with graphite, anthracite, lignite.

CLASSIFICATION BY PER CENT OF FIXED CARBON

The names and limiting factors have been reduced to the simplest terms. The key to the scheme is the number seven. The code names, except for anthracite, are multiples of seven, as 77, 70, 63. Each of the numbers is in the middle of the range of fixed carbon for its class; thus, coal 70 covers coals having between 67 and 73 per cent of fixed carbon. In other words, the class of a coal will be expressed by the multiple of seven nearest to the fixed carbon of a proximate an-

alysis, provided that the ash is near 7 per cent. For example, a coal carrying 62 per cent of fixed carbon and 6 per cent of ash belongs in class coal 63. If the percentage of fixed carbon is nearly halfway between two multiples of seven (say 59.6) and the ash is very high or very low, it may be necessary to recalculate the percentage of fixed carbon to a 7 per-cent ash basis, in order to be sure of the classification. Usually a glance at the percentage of ash will show whether the recalculation would raise or lower the percentage of fixed carbon and may save the time of an actual calculation.

TABLE IV—EQUIVALENTS OF POOL NUMBERS IN NEW CLASSIFICATION

Short Name	Code Name	Pool Numbers
Loervol	Coal 77	1, 2, 3, 44, 54, 64, 84.
Lovol	Coal 70	4, 9, 20, 42, 71.
Midvol	Coal 63	5, 7, 8, 10, 11, 12, 14, 43, 53, 63.
Hivol	Coal 56	6, 15, 18, 21, 30, 31, 32, 33, 34, 35, 37, 38, 39, 40, 41, 44, 45, 15, 53, 54, 56, 60, 61, 62, 63, 64.

Accepting the average analysis of coal in each tide-water pool as published by Henry M. Payne in *Coal Age* for March 17, 1921, the coals are approximately classed as in Table IV.

The above relationships are not guaranteed to be true of all coal in each of the several pools, as a single average analysis has been used for each pool; some of the analyses are just within the limits of the claim.

Coal Grading.—By the grade of coal is commonly meant the percentage of ash. It is proposed that where ash alone is involved the letters A, B, C, D, be added to the code name to express four grades, for which the following limits are proposed: A (superior or excellent), below 8 per cent of ash; B (good), 8-12 per cent of ash; C (fair), 12-16 per cent of ash; D (poor), above 16 per cent of ash. Thus "coal 63-A" is a medium-volatile bituminous coal having less than 8 per cent of ash; "coal 42-C" is a high-moisture bituminous coal carrying between 12 and 16 per cent of ash.

In most transactions involving coal the ash is the only element considered in grading. For some uses, however, it is desirable or necessary, to consider either or both the percentage of sulphur and the fusing point of the ash. To cover these in the code it is proposed to use a second and third set of letters A to D to designate superior, good, fair and poor quality in the coal as regards those factors. Thus "coal 63" is a medium-volatile (or midvol) coal, of any grade. "Coal 63-B" is the same coal with the limits of ash designated. "Coal 63-BA" is the same coal with the ash and sulphur classified. "Coal 63-BAA" defines the content of ash and sulphur and the fusing point of the ash. Table V gives the minimum and maximum limits of each letter in each grade.

Grading Anthracite.—The grading of anthracite is a subject by itself. Grading usually has been on the basis of the percentage of slate and bone observable to the eye. In practice, 100 lb. of coal is taken from a car, drawing from not less than three places in the car, spread out and the slate and bone separated and weighed. During the war the Fuel Administration set the limits on anthracite of different sizes as specified in Table VI.

After a study of a large number of car inspection tests I propose the following limits for grading anthracite according to visible slate and bone contained. Secretary Walsh, of the State Department of Mines of Pennsylvania has co-operated in this study.

It must be remembered that the slate and bone is in addition to the ash in the coal itself. On the other hand the bone coal may have as high as 70 per cent of coal matter. It must also be remembered that in the alteration from bituminous coal to anthracite the ash increases in the same ratio as the fixed carbon. A bituminous coal having 56 per cent fixed carbon and 8 per cent of ash, if altered to an anthracite having 84 per cent of fixed carbon, should have 12 per cent of ash. It is therefore hardly fair to expect anthracite to be graded on the same low percentage of ash as bituminous coal.

Considering the cost of cleaning and sizing anthracite and that steam sizes may sell at the mine at one-fourth the cost of mining and preparing, it is not to be expected that the steam sizes will be cleaned with the same care as household sizes while they sell at present low prices.

Code Designation of Cannel and Other Coals.—The table of classes given in an earlier paragraph treats of the common type of caking bituminous coals and anthracites derived from that type, which may be taken as "standard" type coal. Letters may be added to the class name to express other types of coal as follows: "K" for canneloid coals or "semi-cannel coals" of any class; "KK" for cannel coals (coals in which the percentage of volatile matter exceeds the percentage of fixed carbon—or the fuel ratio is less than 1); "KKK" for boghead coals (in which the fuel ratio is less than one-half); "KKKK" for Torbanite or oil shale.* Sp designates a splint coal; X, a sub-bituminous coal; L, lignites. Thus "Coal 63 KBAA" is a canneloid, medium volatile coal having between 8 and 12 per cent ash, less than 1 per cent sulphur, and a fusing temperature of ash above 2,600 deg. F.

COAL READILY CAN BE PLACED IN RIGHT CLASS

All coals can be classified by this plan as closely as ninety-nine out of one hundred users need, with little expense for chemical analyses, as the "class" is determined by the percentage of fixed carbon and ash alone. If the percentage of fixed carbon is close to the limits of the class and the ash far above or below 7 per cent, recalculation of the fixed carbon may be necessary to determine the definite class to which the coal belongs. To recalculate, divide the percentage of fixed carbon by 1 less the algebraic difference between .07 and the percentage of ash.

Practical Application.—The results of the application of this classification to coals of many states will be interesting. The following notes apply to some of the better-known coal fields of the United States.

Pennsylvania.—Anthracite is cleaned as "anthracite" or "coal 88"; the grade is commonly BAA for large sizes. The coal of the western ends of the Western, Middle, Southern and Bernice fields is semi-anthracite or "coal 82."

At a few places in Huntington, Bedford, Cambria and Somerset counties the coal is of a "Loervol," or

TABLE V—GRADE OF COAL EXPRESSED BY LETTERS

Grade	First Letter Ash Per Cent	Second Letter Sulphur Per Cent	Third Letter Fusing Point of Ash in Deg. Fahr.
"Superior"	A = less than 8	A = less than 1	A = over 2,600
"Good"	B = 8 to 12	B = 1 to 2	B = 2,600 to 2,300
"Fair"	C = 12 to 16	C = 2 to 5	C = 2,300 to 2,000
"Poor"	D = 16 or more	D = 5 or more	D = less than 2,000

*For detailed description of cannel coal see U. S. Geological Survey. Bulletin 659.

TABLE VI—WAR-TIME LIMITS ON IMPURITIES IN ANTHRACITE

	Slate	Bone	Total
Broken.....	1	2	3
Egg.....	2	2	4
Stove.....	4	3	7
Nut.....	7	5	12
Pea.....	8	10	18
No. 1 buckwheat.....	10	10	20

"coal 77," class (semi-bituminous). In general, however, the coal of the eastern or mountain counties of the bituminous field is of "Lovel," or "coal 70," type, grade A or B. The coal of Indiana County and eastern Westmoreland and Fayette counties is "Midvol," or "coal 63," class, and all of the coal in the western and northwestern counties is of "Hivol," or "coal 56," class.

Maryland.—Most of the coal of Maryland is of "Lovel," or "coal 70," class.

Virginia and West Virginia.—The coal of the Pocahontas district in Virginia and West Virginia is "Lovel," or "coal 70," class, grading rapidly into "Hivol," or "coal 56," in Russell and Wise counties, Virginia, and in western Fayette and Kanawha counties of West Virginia. In Harrison and other western counties of West Virginia the coal is of "Hiervol," or "coal 49," class.

Ohio.—The coals in the eastern part of the Ohio coal field are of "Hivol," or "coal 56," class, and of "Hiervol," or "coal 49," class in the western part.

Eastern Kentucky and Tennessee.—Most of the coal in eastern Kentucky and Tennessee is in "Hivol," or "coal 56," class, but some "Hiervol," or "coal 49," class coal is present.

Indiana, Western Kentucky, and Illinois.—The coal of the eastern interior region is, in part, "Hiervol," or "coal 49," class, notably in the Ohio River areas and, in part, of "Moistvol," or "coal 42," class. The coal of the northern and western parts of Illinois particularly is of the "Moistvol" class, the percentage of fixed carbon decreasing from the southwest corner to the northwest corner of the state.

Missouri and Iowa.—The coals of Missouri and Iowa belong to "Hiervol" and "Moistvol" classes, or "coals 49 and 42," except in Barton County, Missouri, where the coal is of "Hivol," or "coal 56," class.

Georgia and Alabama.—Georgia has some coal of "Lovel," or "coal 70," class. The coal of Alabama ranges from "Midvol," or "coal 63," in the east to "Hivol," or "coal 56," to "Hiervol," or "coal 49," in the west.

Arkansas.—Some of the coal in the Shinn basin, Pope County, is of semi-anthracite, or "coal 82," class. The coal of Johnson County is mainly "Loervol" class, or semi-bituminous coal ("coal 77"). The coal of the western counties is in the "Lovel," or "coal 70," class. The lignite of Lester County is a cannelloid lignite or, "coal 28-KK."

Texas.—The lignites of Texas are, in part, cannelloid (28-KK), and in part the ordinary type ("coal 28"). The bituminous coals of the north central part and of

the Eagle Pass region are of "Hivol" ("coal 56") class, and "Hiervol" ("coal 49") class. The coal of the Laredo area is a bedded cannel of "coal 35" and "coal 42" classes.

Oklahoma.—The coal near the eastern Arkansas line is of "Lovel," or "coal 70," class. Westward the coal changes through the several classes to "Hiervol," or "coal 49," class, as in Coal County.

Kansas.—The coal of Kansas is of "Hivol" and "Hiervol" classes ("coals 56 and 49").

Western States.—The coals of the Rocky Mountain and other Western states are extremely variable from field to field, ranging within short distances from anthracite to lignite.

Book Reviews

Pros and Cons for Coal Debaters

GOVERNMENT Ownership of Coal Mines," by Julia W. Johnsen, is an excellent compilation of 392 5x7-in pages, published by the H. W. Wilson Co., New York, as one of the series of the University Debaters' Annual. The entire book consists of a collection of papers, with the source given in each instance, on the aspect of coal as a public resource and considerations for and against the government entering upon a more direct trusteeship in the immediate interest of the people as against private ownership. Both the articles selected and their references have been classified as general, affirmative and negative, and there also is a brief. A separate section is given to government control or regulation of coal prices.

To all appearances the compiler has been impartial in her selection of material, for we find Herbert Hoover and J. D. A. Morrow alongside of John Brophy and Louis Bloch. Even W. Jett Lauck and John Spargo are drawn upon. The author also has drawn upon British sources for arguments pro and con on nationalization, where the matter has been more thoroughly argued out than in this country.

The book will prove extremely useful to the multitude of high schools and colleges that are now and have for several years been debating the subject of the nationalization of coal mines. This is the first book, we believe, that puts into their hands a compact summary of articles containing material possibly useful in preparing for such debates. From the number of inquiries that have come to the desk of the editor of *Coal Age* in the last few years, asking for just this kind of material, it is quite certain that this book will get a wide distribution.

Training of Oxyacetylene Welders

IN THE form of an outline of a course for the training of oxyacetylene welders the American Welding Society has just issued a report of its committee on welding. For the employer the text includes a discussion of the qualifications that a candidate for instruction should possess. There also is included fundamentals in gas welding and a description of various types of welding jobs. Copies of the report may be obtained from the American Welding Society, 29 West 39th Street, New York City.

TABLE VII—GRADING ANTHRACITE BY LIMITS OF SLATE AND BONE

	(In per cent, or in pounds in 100 lb. of coal)			
	Grade A Excellent Less Than	Grade B Good	Grade C Fair	Grade D Poor or Bad
Broken.....	2	2 - 3	3 - 4	4 or more
Egg.....	2	2 - 4	4 - 5	5 or more
Stove.....	3	3 - 5	5 - 7	7 or more
Nut.....	4	4 - 7	7 - 10	10 or more
Pea.....	5	5 - 7	7 - 10	10 or more
No. 1 buckwheat.....	5	5 - 10	10 - 15	15 or more

Why It Pays to Keep Electrical Equipment At Coal Mines in Repair

Production Delays Usually Due To Breakdowns Which Would Not Occur If Equipment Were Given Prompt and Careful Attention—Advantages of Training Motormen and Hoist Operators to Become Electricians

By M. S. BEDDOW
Scranton, Pa.

THE hurried attention usually given to electrical mine equipment during a breakdown naturally brings forth the question: "Why not a little foresight before the breakdown instead of so much hindsight after the delay occurs?" Too often the energy of all concerned in the production of coal is used up in an all too careless a manner when a mine locomotive, for instance, is on the repair pit and the movement of coal to the foot of the shaft is temporarily stopped as a consequence. Repairs made during the delay usually are not of a permanent nature, serving only to keep the locomotive in operation for the remainder of the day.

Important parts of the locomotive sometimes are disturbed in making a hasty repair, and are not readjusted as they should be by regular overhauling. Electricians so skilled in their trade as to be considered experts do careless things in a time of excitement such as is brought upon them during a breakdown of important machinery. The old saying "What is worth doing at all is worth doing well" should have a peculiar significance to the mine electrician.

A mine locomotive can be made just as efficient or inefficient as those in direct charge of it are desirous of making it. Nothing better satisfies an electrician or mine foreman than a perfectly operating piece of equipment. The grinding of bad fitting gears, the vicious flashing of a commutator due to ill fitting brushes, the shrill squeaking of a trolley wheel crying for oil and a whole locomotive going to pieces due to double-flanged wheels pounding over latches and frogs are as so many stabs in the back to the man who really and truly cares.

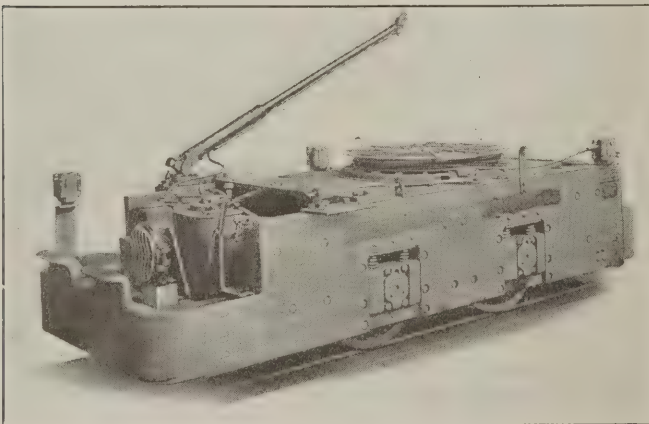


Fig. 1—Trolley Locomotive Complete with Cable Reel

This popular type of locomotive used in gathering work weighs 8 tons and therefore is capable of handling semi-main-haulage loads. The reel permits its use in gathering work. If every detail of a locomotive were maintained in as good condition as when new there would be fewer transportation delays and accidents.

General observation over a period of twenty years has convinced me that a smooth-working locomotive will not only bring more coal to the foot of the shaft in a given time but will tend to build up the morale of the whole operating force. A smooth working locomotive rides easier, and a motorman compelled to ride it all day probably can tell best just what this means. That this is so is obvious from the fact that it is not difficult to keep an operator on a locomotive which rides easily, whereas it is almost an impossibility to get a regular runner for the other kind. It is no difficult matter to keep a locomotive in good condition when every detail is promptly attended to and repaired.

Badly fitting gears and drive pinions need not be in this condition if proper measures are taken to see that they are brought into perfect alignment when first installed and are carefully maintained by having the axle bearings fit as snugly as possible with no great amount of wear at the bearing surface and shoulder, so that there will be little opportunity for the motor to slide sidewise on the drive-wheel axle. Axle bearings, or linings, as they are familiarly called, should be removed when it is noticed that they are worn sufficiently to allow the pinion and gear to get out of perfect alignment, for it is this loss of metal which allows the uneven wear across the face of the teeth almost invariably noticed on all discarded gears and pinions.

KEEP BEARINGS IN PROPER FIT

Insufficient hub liners or badly worn journal boxes serve only to allow the whole locomotive frame to move from its natural position; then there can be no true alignment of pinions and gears. Worn journal boxes are not easily prevented, but there is no getting away from the fact that hub liners are made for the purpose of taking up this wear, thus preventing the side motion referred to above. In this respect it is only necessary to take notice of how neatly this point is taken care of when a locomotive is first received from the manufacturer. If the general condition of the locomotive were taken as a pattern at this time and an honest effort put forth to keep it as near this condition as possible, what a splendid difference would be noticed in electric mine-locomotive operation!

The gear wheel, another important feature of a locomotive, should be put on the axle before the wheels are put under the locomotive and great care should be taken that the bore of the gear fits snugly down on all points of the axle. Due to the fact that the same axle is used over and over again, the worn wheels being pressed off and new ones pressed on at the foundry, considerable wear is found at the gear fit as well as at the axle lining fit, and sometimes an effort is made to install a gear over this worn portion. If a little more time is taken and extra care used a very serviceable job is

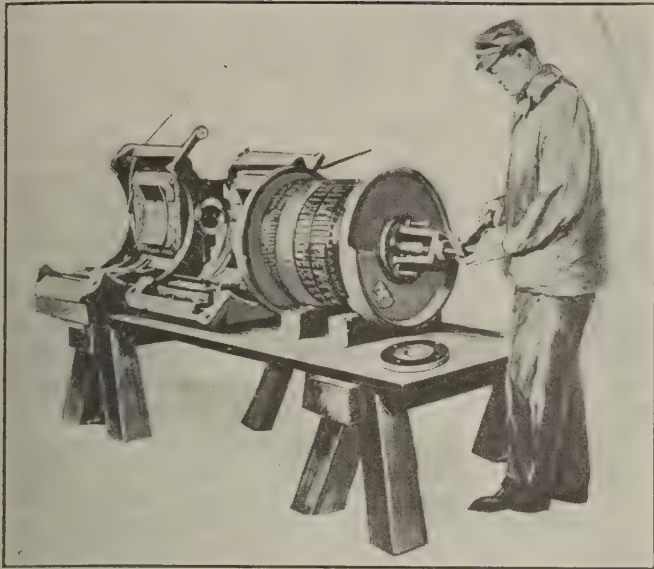


Fig. 2—Repairing the Motor

Whenever it becomes necessary to repair the motor all parts should be carefully removed and replaced. Pinion puller, ball-race pullers, etc., are essential and should be on hand; otherwise the parts will be hammered off and probably broken.

sometimes done, but it is questionable whether it pays to install an axle which necessitates this precaution being taken. In late years well-equipped foundries, by the use of welding equipment, fill in these low spots and then machine off the axle to the original gear-wheel fit. Axles are often installed upon which this has not been done, however, and the electrician is soon confronted with a loose gear wheel, which does considerable damage to the entire locomotive before it is attended to.

Special emphasis should be placed upon the great need for having in the locomotive pit at all times an extra pair of wheels upon which the gear wheel has been fitted with the greatest care. The reason for this is so that there will then be no need of a hurried job when it becomes necessary to change wheels on the locomotive during the day. Quite often a pair of badly worn wheels will break off a piece of a wheel flange 10 or 12 in. long and the locomotive must immediately be taken out of service. If there is not a spare set of wheels ready, completely fitted up with a gear wheel, it will be necessary to place the gears on hurriedly, and nine times out of ten it is done in an unsatisfactory manner.

The function of the axle lining is to hold the motor so that the pinion and gear will mesh properly. Any great amount of wear will prevent this. Just as properly lined up journal boxes prevent undue side motion, so do neatly fitting axle linings prevent the gear and pinion from meshing improperly. Nothing short of false ideas of economy will prompt the electrician to deliberately allow axle liners to remain in service when they are worn to the point where the pinion is allowed to pull away from the gear. The back lash which occurs results in the destruction of both gear and pinion, to say nothing of the unnecessary damage to the rest of the equipment. The habbitted type liner used on some of the earlier locomotives can be refilled and bored to the proper size for use again; the brass ones usually are turned in with the old brass scrap.

A locomotive which is not given regular attention will soon become a hindrance rather than a help to transportation. So many things contribute to keeping

it in or out of good operating condition that it is difficult to put one's finger on any particular point of most frequent trouble. However, it is doubtful whether any other one thing will aid in keeping a locomotive in service so much as a properly working controller. Here we have what has been aptly termed the brains of the locomotive with many working parts which will make or break its proper functioning. From this point the motors are made to work in series or parallel, depending upon the severity of the task put before them; from here proper steps are taken for cutting just enough resistance in or out of the circuit so that the right amount of current is allowed to flow to the motors in order that they may perform a certain duty.

Possibly no other part of the locomotive is so essential to its proper performance, and no other part is so badly abused and neglected. A network of wires leading to a score of different places, each with its separate duty to perform, offers an opening for just that many cases of trouble, any one of which might result in so seriously crippling the locomotive that it will have to be taken out of service temporarily at least. The controllers as used on mine locomotives consist generally of four important parts, viz., main cylinder, reverse cylinder, blow-out coil and the swinging pole piece, on which is the arc deflector with its division plates.

Going in by way of the blow-out coil the power is led through to the main cylinder, from which point it makes its way to the proper resistance box and thence to the motors by way of the reverse cylinder. As this entire path up to the point where the reverse cylinder is passed is all in series, it does not require much imagination to see that it needs only one open circuit, indeed a high resistance at any one of these innumerable contacts, to stall the locomotive.

Wiping contacts, such as are found in all drum controllers, have the disadvantage that they demand a certain amount of pressure and sufficient wearing surface. The path from a lead wire to a finger and through this to a wiping contact down through the segment on the cylinder must be as near a solid as it is possible to make it, and the very truth that it is not a solid should make the repairman doubly certain that all terminals

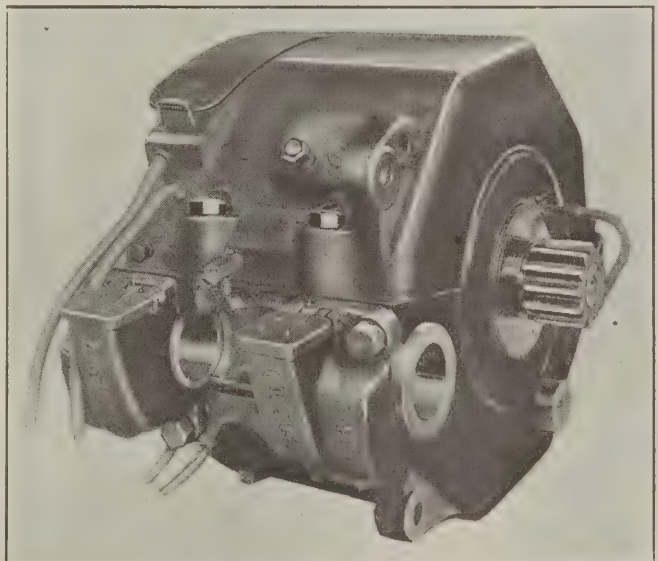


Fig. 3—The Locomotive Motor

The distance between the center line of the armature and driving axle is very important and must be maintained very accurately because it establishes the mesh of the driving gear and pinion. Note that the brasses are removable for replacement when worn.

are soldered properly, fingers screwed tightly to finger bases; finger bases in turn bolted fast to the main finger board, and last, but not least, the under side of the segment, which carries the power from the finger to the main cylinder, must be free of foreign substances which will creep in if it is not held tight to the block on the cylinder by the steel studs provided for this purpose.

A loose segment will soon gather a scale on its under side, which together with the loose segment will set up an almost infinite resistance to the passage of power and gradually develop heat which will pass back along the finger to the fingerboard, in time destroying the latter and making it unfit for further holding the finger solidly against the base. Much of the trouble experienced with controllers used on mine locomotives comes from burned finger boards, eaten away at the point where the finger base is fastened to it. Without a single exception this particular trouble can be attributed to either a loose segment or to the finger itself becoming loose and developing heat and passing it on to the board, with its consequent ill effects.

Very little trouble comes from the reverse cylinder and finger board, due no doubt to the fact that these are not subjected to the frequent strains that the main board and cylinder must bear. The contacts between the segments on the reverse cylinder and the reversing fingers are broken only when it is necessary to reverse the direction of travel of the locomotive, and this is so infrequent that little strain comes on the studs which hold the fingers in place. This pushing action, especially as it is repeated hundreds of times, as in the case of the main fingers, tends to loosen up the screws which hold the finger base to the board, and if these are not continually cared for the fingers become loose and lose their proper contact against the main segments.

It is due, possibly, to the character of the service it performs rather than to any extra care it receives that not much trouble is experienced with the reversing feature of the controller. The current handled is the same

as in the main cylinder, yet it seldom requires any attention aside from that care which comes through periodic inspections. A little lubricant thinly applied at certain intervals at the point of contact will prevent burning of both fingers and contacts and thus ward off loss of tension in these members which comes from too great an amount of heat. Precautionary measures such as these will help immeasurably in keeping the controller in service over a longer period of time than would be the case otherwise.

Probably no other person having to do with a mine locomotive in its day's run has a better opportunity than the motorman to observe its actions and apply first aid when it can do the most good. And it must be said to their credit that little escapes them, and many a serious breakdown has been prevented by quick action on their part. Indeed some of the most capable electricians in the anthracite mines have come up from the ranks of the motormen and hoist operators. And this is not to be wondered at, since these men learn by force of circumstance rather than from any other reason.

It is seldom that an electrician can be located immediately following trouble of any kind, as he may be in another part of the mine. For this reason the operators have learned to look for the trouble themselves while waiting for the repairman to arrive. In this way these men have acquired much skill, and it is not to be wondered at, therefore, that so many former motormen and hoist runners are now expert electricians and electricians' helpers.

FITTING MAN TO THE JOB

A number of years ago one of the larger coal-producing corporations required an applicant for a position as motorman or hoist runner to possess a certain amount of skill in the performance of his duties before being given the position. This knowledge consisted, aside from a general understanding of the duties of the job, of knowing just what to do in the event that something happened to put the machine out of commission. The questions asked were not intricate and the applicant had a general idea of what they would be beforehand, so that it was an easy matter for him to study up on the subjects before presenting himself for examination. The very fact that the prospective motorman or hoist runner was compelled to study at all in anticipation of what was to come served to make him a better man for the position, and, naturally enough, this plan resulted in the best man being chosen for the place.

During the examination the applicant was impressed with the fact that his position was first of all a responsible one, fraught with dangers that could be increased or lessened according as he performed his several duties. He was made to understand thoroughly, for instance, that a locomotive must always be provided with a proper grade of sand because it is extremely dangerous to try to operate on the heavy anthracite grades with empty sand boxes. The difference between series and parallel operation of the two motors was explained in detail and made so clear that the applicant received a thorough knowledge of why the series position must always be employed wherever it is possible. The harm which ensues from a general practice of the parallel position when a series coupling of the motors can be employed was made very plain in the beginning.

These men, it is scarcely necessary to say, become excellent electricians in after years at the finish of a

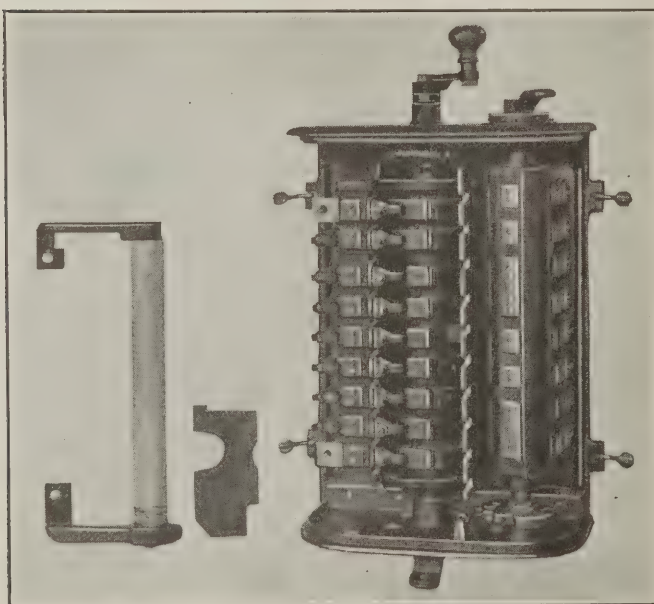


Fig. 4—Open View of Controller

From here every operation of the locomotive is regulated. Fingers and drum segments should be maintained in the best condition; otherwise heat will be generated at the contacts and not only burn the copper but the drum cylinder, thus requiring its complete renewal with the necessity of remounting each and every segment.

well-spent apprenticeship, during which time they were taught many useful things which served them well at a time when this knowledge was most needed. Running too much on resistance notches in the parallel position of the controller in order to get a certain decreased speed, when the same result could be brought about through full-series operation subjects the resistance panels to a terrific amount of heat, which in time buckles them and makes them unfit for further service. These and many other valuable points which come up from time to time are made plain to the applicant, and the usual result of this tutelage is a better motorman in the beginning and an excellent operator after a year or two of actual work on the job.

New Furnace Solves Problem of Burning Anthracite Dust

Difficulty in Ignition and Tendency to Clog Air Passages Overcome—Piles at Welsh Pits Hitherto Considered Only Waste Now Valuable

By C. H. S. TUPHOLME
London, England

ONE of the problems confronting engineers at the anthracite pits in South Wales is the generation of steam for use about the mine. In the bituminous field coal is burned either in lump or as slack in pulverized form. The difficulty of igniting anthracite even in lump form is well known, while to throw anthracite dust and fines on a fire is about as effective in smothering the fire as a load of sand. In natural-draught furnaces it is more than likely that the fines will put the fire out by choking the air passage, while if forced or induced draught is used the dust will be blown off the grate before it can be ignited. Consequently most of the attempts to burn these anthracite fines, which, by the way, have a heating value of over 13,000 B.t.u. per pound and only about 10 per cent ash, have failed. As a result there are many large piles of anthracite dust which are regarded only as a waste product.

GRATE HAS AIR BLADES

Lately, however, a special type of furnace has been developed which seems to have solved the problem and which gives excellent results when fired with anthracite dust. This furnace is commonly called the "Turbine," on account of the fact that the passage of air into it is almost exactly similar to the passage of steam on the blades of an impulse steam turbine.

The general construction of this furnace, which is set slightly closer to the boiler than the ordinary fire-bars, is shown in the accompanying illustrations. The furnace consists essentially of seven or eight longitudinal cast-iron trough bars, placed side by side according to the width necessary for the boiler, and a projection to protect the nozzles. The troughs are rounded at the bottom to a radius of 2 in., are 5 in. wide at the mouth and 6 in. at the firing surface, being shallower at the back than at the front. At each end the troughs are supported by lips which hook over bridges on the deadplate and on the bridge plate, as shown in the diagram, no drilling being necessary. The firebrick bridge is of the usual construction, but is combined with a second bridge shown in Fig. 1.

Located transversely in these troughs are a large number of cast-iron elements which slip into the trough, forming a composite grate. Each element rests on the upper edges of the trough and fits into the element in front and back. A length of trough containing forty-two of these elements constitutes a 6-ft. grate.

FREE AIR COURSES

Between each pair of elements is a small air space $\frac{1}{2}$ in. wide, so that the entire grate is a series of small air spaces, uniformly divided and communicating with the body of the troughs underneath. This construction insures an even distribution of air over the whole furnace.

The rear face of the blade of each casting is at an angle of 45 deg. to the top surface of the grate, while the forward face is at an angle of 60 deg. with the grate surface (see Fig. 4). The result of this design is that the $\frac{1}{2}$ -in. opening is maintained below in the form of an inclined and tapered air passage. The section in Fig. 1 shows that the lower edges of the sloping blades form a radius with the curved bottom of the trough, so that an air passage of approximately circular shape is provided. The area of this passage, through the angle at which the trough lies, narrows from front to rear so that as the air escapes into the furnace through one slot after another, the velocity of the air in the trough remains constant, which means also an even supply of air to every part of the furnace. This obviates the difficulty of most steam-jet furnaces, that the draught is unequal over the grate, because the air pressure diminishes toward the end of the bars.

The air combustion is supplied to each of the troughs by means of a steam jet through a gun-metal nozzle $\frac{3}{8}$ in. in diameter. The steam used is supplied by a $\frac{1}{2}$ -in. or $\frac{3}{4}$ -in. wrought-iron pipe from the boiler, as seen in Fig. 2, passing through the side flues so as to super-

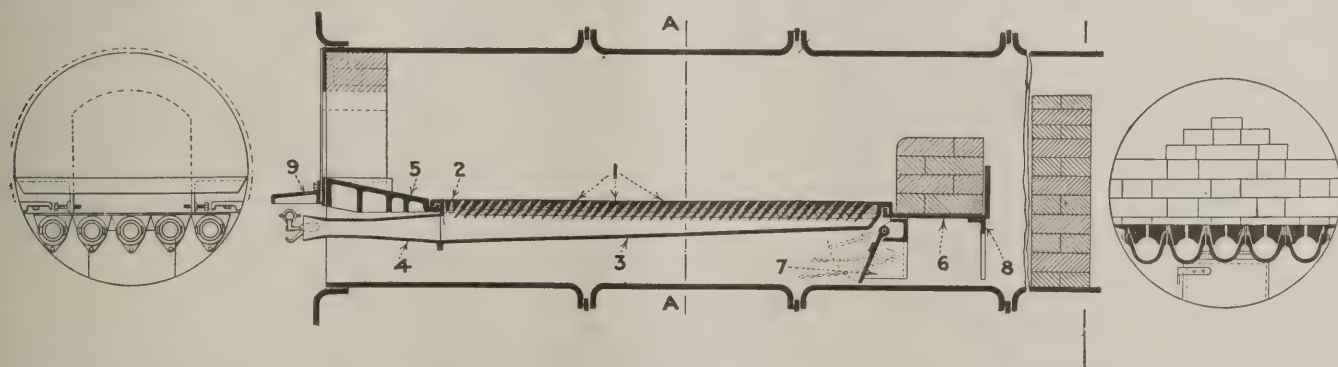


Fig. 1—Furnace for Burning Fine Sizes of Anthracite

The left-hand view is of the front of the furnace; the middle view shows a side elevation; the right-hand view shows a section at A A. (1) Fire bars; (2) fire-bar locking device; (3) air trough; (4) injector; (5) deadplate; (6) bridgeplate; (7) cleaning door frame; (8) bridge support; (9) ash guard.

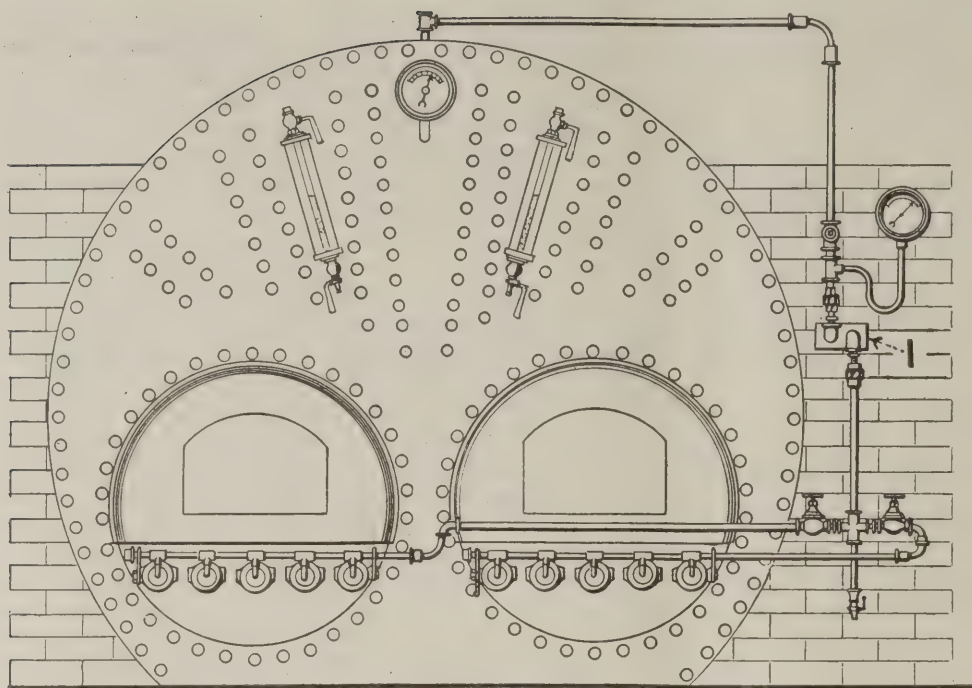


Fig. 2—Front of Furnace

This view shows how the air is introduced to the tubes by pipe connections to the boiler; (1) shows the location of a superheater wall box.

heat the steam, and along the front of the trough bars, so that one nozzle blows steam into each trough and forces a blast of air along the trough and through the $\frac{1}{8}$ -in. air spaces above into the furnace.

The steam-supply pipe is provided with a valve, the forced draught thus being under perfect regulation. A 10-lb. steam pressure indicated on the gage, Fig. 2, gives an air pressure in the troughs of 0.15-in. W.G.; at 20-lb., 0.25-in. W.G.; and at 35-lb. 0.35-in., W.G.; being, as already stated, constant throughout the whole length of the trough, so that the amount of air admitted is the same at all parts of the furnace.

Firing can be done by hand and the air supply regulated to burn more or less fuel as required. Any small amount of dust and fine ash that falls through the slots into the troughs is removed by means of a long-handled scoop inserted into each trough, but most of the ash falls between the two bridges. There is provided with the installation a cleaning door or flap operated by a chain from the front of the boiler, so that the ash and clinker falling between the two bridges can be raked out as required.

The small grate elements, as will be seen from the illustrations, are in the form of a V section lying in-

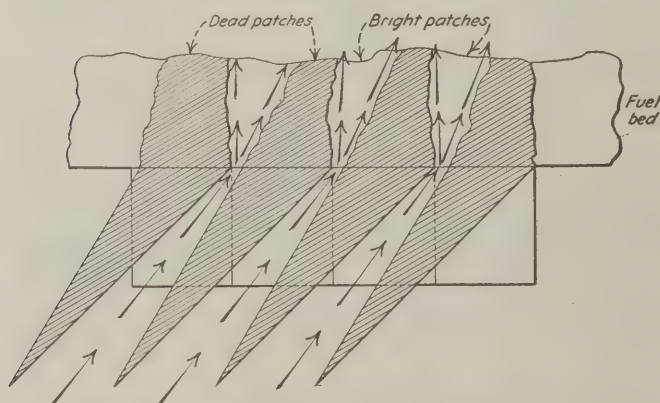


Fig. 3—Grates Which Do Not Distribute Air

Unless the grates are properly designed the air would not reach all the fuel, thus causing dead spots in the fire bed.

clined to meet the air blast—the name of the “Turbine” furnace is derived from the likeness of the arrangement to a steam turbine—the air enters the throat of the trough and passes through the furnace from between the elements.

When this furnace with the type of nozzle described was first used with fine anthracite it was found that it was possible to burn only a certain portion of the fuel charged so as to evaporate about 3,000 lb. of water per hour from a Lancashire boiler, using a limited air pressure of not over 0.6-in. W.G. under the bars. This, however, results in alternate black and bright patches, as seen in Fig. 3, the material on the bars being unburned, while any increase in the draught simply blew

the fuel off the bars. The solution of the problem is shown in Fig. 4. Instead of the unidirectional air slot between the elements, by means of a special design the air is spread in many directions. The design also is such that projection A overhangs into groove B, leaving an air space as shown in the section view at C. The projection A prevents any of the fine anthracite falling between the bars, and the air is so split up and subdivided that it has not sufficient strength to blow the material off the bars, but is strong enough to burn it

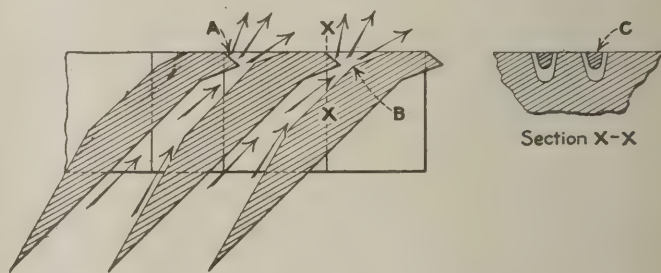


Fig. 4—Special Grate for Burning Fine Anthracite

Note that the air passageway is formed to distribute the air to burn all the fuel.

without any “dead” spots, whereas a straight slit, as in the ordinary bars, localizes the air too much and blows away the material.

This simple arrangement apparently has solved the problem of burning anthracite fines, and the furnace is now operating at one of the largest Welsh collieries with 1 in. W.G. or even lower, burning 20 to 30 lb. of anthracite per square foot of grate area per hour with a normal evaporation of over 6,500 lb. of water per hour from a standard 30x8-ft. boiler.

UP TO JUNE 30 LAST, coal and asphalt deposits in 93 tracts comprising 71,882 acres in the Choctaw and Chickasaw segregated areas, Mr. Merritt, of the Indian Bureau states, had been sold for \$1,975,934, leaving unsold deposits of 369,255 acres.

News Of the Industry

President Lewis Says Miners' Union Favors Loading Machines

But Will Not Talk Scale Until Loader Proves It Is Beyond Experimental Stage—Will Demand "Fair Share" of Benefits of Mechanical Loading

A settled plan for getting a continuance of the present agreement for a term of years continues to be the obvious program of the United Mine Workers of America. The end of the first week of their convention saw no important point brought out which was not apparent when the International assemblage opened in Indianapolis on the 22nd. The scale committee has not yet reported and may not bring in its message until its limit of time has arrived—on Friday—but the outcome is without much doubt.

The one interesting thing about the convention thus far is that the strength of the Lewis administration against the red and rebellious minority is proven. They failed to get the convention to reconsider the case of the Nova Scotia officers ousted from the union last summer for defiance of headquarters. They failed to get a resolution favoring the recognition of Soviet Russia and they failed in everything else except to get a long, loud voice. That has never been denied them.

The Lewis administration suffered its first real blow Tuesday, when the demand that Lewis be stripped of his power to appoint organizers swept the convention. The convention committee's report against the resolution for the election of organizers by the rank and file was rejected 760 to 734. Then 689 voted for a roll call on the question; only 570 votes were necessary. The roll call, which takes half a day, started immediately after noon. The drive to take appointive power away from Lewis has been growing throughout the convention and is backed not only by the so-called radical group but by many others. It is assumed that the strength shown against the administration on this matter will be about the same as will be shown in favor of demanding more wages later in the convention against President Lewis' program. Secretary of Labor Davis is to speak Wednesday against increased wages.

Take John L. Lewis' word for it, the miners' union favors underground loading machines. It is hastening rather than postponing, the inevitable day when loaders will revolutionize mining.

"The United Mine Workers favor the introduction of labor-saving machinery and always have favored it," said Mr. Lewis. "Anybody who says this is not so simply misrepresents the facts; that's all. We have always encouraged such machinery. The one thing the organization insists upon is that the mine workers be given their fair proportion of the benefits accruing from the use of machinery. The trouble has been that the operator has tried to keep for himself the entire benefit.

"This is exactly our position toward loading machines. The mine workers are co-operating all over the country in the development of loaders by permitting men to work the machines on day wage rates. This we are ready to do for any new loaders that are brought forward.

Important Convention Acts

Brought 1,500 delegates to Indianapolis from every union district for biennial meeting.

Displayed less defection than usual by the radical wing, which was firmly squelched by Lewis strength.

Reaffirmed original stand favoring nationalization of mines and railroads, but without positive action in the matter.

Declined to favor American recognition of Soviet Russia.

Declined to ally United Mine Workers, "an economic organization," with any united labor party because such a party would be purely political.

Supported the Lewis administration in its ouster of Nova Scotia district leaders charged with bolshevism and defiance of headquarters authority.

Referred to International Mining Convention at The Hague next summer the question of a world-wide strike of all labor to stop war.

Cleared Lewis of the radical charge that he "sold out" the union by ending the anthracite strike without getting the check-off.

"We recognize that mechanical loading is coming. It is going to revolutionize mining and the preparation of coal. The mine workers, however, cannot take part in negotiating a loader scale until loaders are developed to a point that will show definitely what these machines can do consistently. The experimentation has by no means progressed that far yet. Of course, it is known what certain machines will do for short periods under certain conditions, but this is only fragmentary information. Loaders are making progress in certain coal fields and I trust it will continue and will expand."

The convention opened quietly at 10 o'clock Jan. 22. No hoarse orators fought for the floor. Nobody hissed the chair. No maneuvering on the floor took place. There was hardly so much as applause even at the appearance of President Lewis, and during the international officers' reports. As reported in *Coal Age* of last week, President Lewis declared for a wage contract "for a period of years." Vice-President Philip Murray condemned bolshevism within the ranks and Secretary-Treasurer William Green showed the union to be clear of debt and to possess \$1,100,000 in bank. But nothing in the reports stirred up any enthusiasm. Only one or two gentlemen of the small radical opposition rose to protest Mr. Murray's sharp jabs and these were silenced by the president on the ground that debate could not begin until the committee on officers' report was made.

The various committees were appointed including the one on scale. The fact that Frank Farrington, Illinois president and one-time bitter enemy of Lewis, was made chairman of the committee on scale was indicative of the main harmony of the organization. John Hessler was made secretary. The resolutions committee was headed by Thomas Kennedy with Percy Tetlow secretary. Rules were made limiting speeches to 10 minutes, permitting a roll call on vote of 30 per cent of the delegates and forewarning belligerent speakers that a man can be expelled from the convention for refusal to abide by the rules of the session.

Samuel Gompers, president of the American Federation of Labor, in a verbose telegram, sent good wishes and urged the miners to support "super-power" plans as possible regularizers of working time in coal.

At the opening of the Wednesday session the report of President Lewis was accepted without argument. A

small storm broke over Vice-President Murray's report, however. Murray's condemnation of the efforts of the Progressive Miners roused much objection from the radical wing. He charged the Pittsburgh Coal Co.'s efforts to get wages reduced to the 1917 scale were behind the Axelton (Pa.) meeting of 500 men just after Thanksgiving, 1921, and the Dec. 4 meeting of 1,200 men soon after at Monongahela City, Pa. Defenders of the Progressives denied the meetings were held to reduce wages to the 1917 scale but merely to talk over what to do. Murray read the circular announcing the Monongahela City meeting, declaring no other interpretation could be placed upon it.

Defenders of the Progressives protested the ousting of the signers of the circular. P. T. Fagan and other union officers, however, condemned Tom Myerscough and the other principal leaders in the union defection in District 5.

The financial report was accepted after a brief discussion in which a hospital bill for Ellis Searles, union publicity chief was mentioned and in which John Watt, stormy petrel in Illinois, proposed that the Brotherhood of Locomotive Engineers' bank in Cleveland be condemned for refusing to lend the miners union money during the 1922 strike.

The first real fireworks of the convention were touched off during Wednesday afternoon, when the conclave got to work on the first of the 728 resolutions proposed from all over the country before the deadline 10 days before the convention opened. The resolutions ran the usual gamut from conservative to extreme radical points of view, including a number aimed directly at the embarrassment of the organization heads.

Clever work by the resolutions committee, headed by Chairman Thomas Kennedy and Secretary Percy Tetlow, staved off a good deal of war from the noisy but inferior minority. On the issue of recognition of Soviet Russia the committee reported in favor of recognition when that government recognized the right of every other people to shape their own destinies and when the Soviet Government fulfilled "honorable obligations." This came as a surprise since it did not condemn the proposal to recognize Russia, and therefore disarmed and rather disconcerted the radicals. So the committee's report was adopted without a dissenting voice.

In the same way the committee met the radical demand for affiliation of the United Mine Workers with a United Labor Party. In the resolution the committee substituted for the several that had been filed, it is "recognized that the formation of a Labor Party proper has passed the visionary stage and can be made a reality." yet it committed the United Mine Workers to co-operation with the progressive, legitimate political forces of labor and the organized farmers already in existence but

Miners' Union Is 34

On Jan. 25, in the midst of the International convention, at Indianapolis, the union became 34 years old. President Lewis, paying tribute to the "little group of organizers," said they "built better than they knew." The union has justified itself before the bar of public opinion in this country, he said. Mr. Lewis is ninth in the succession of presidents and he told the convention every one of his predecessors had retired with a feeling of sadness at the attacks always aimed at the president by sections of the union. Such is the lot, he said, of any United Mine Workers president.

held the union to be an economic organization for the increasing of miners' wages and the bettering of their condition and therefore should not affiliate with any purely political organization. This resolution, which included congratulations to the Laborites of England upon their winning control of their government, passed by a loud aye vote.

The real outburst came on the question of reinstating the ousted Nova Scotia district officers who long defied and embarrassed the International headquarters until they were dethroned by President Lewis last August. The administration's action finally was approved but not until much loud shouting had been uncorked and not until there had been a demand for a roll call with but 421 votes mustered for it out of the necessary 550.

The question of nationalization of mines, slated as another fighting topic, was skimmed over neatly. In place of the mass of nationalization resolutions the committee brought in one substitute which merely reaffirmed the past declaration of union policy favoring nationalization of both mines and railroads and the democratic management of all industry. The ayes had it loudly again.

Some Pennsylvanians and a few others were rousing in their demand that a new drive be made to organize the coke region and bewailed the fact that the union had quit the strike of 1922 without rescuing that region from the domination of union-fighting operators. Some said they were ashamed of the union for "deserting" the region. Secretary Green spoke in defence of the union's action only to draw a new fire. However, the 28 resolutions attacking the union's policy and calling for another coke-region war for organization, were replaced by one merely referring the matter to the executive board and urging it to continue the effort to organize the region 100 per cent. It passed easily.

Thus, all through the day, the Lewis administration was absolutely in control of the convention and rode the opposition down hard at every turn.

A delegate from the coke region,

James Chicolini, was refused a seat after a verbal battle by a vote of 840 to 250, on the ground that he is an officer of the Progressive International Committee, the radical wing of the union. This was followed by an attack on the administration for "railroading" reports of the resolutions committee. The committee's report against a resolution calling for the reading of all resolutions "as presented" was voted down.

The main reason for the outburst was the Wednesday action on the Nova Scotia matter. President Lewis also came in for a whack for not openly debating the charges made against him in Resolution 27 from local 155 of Weaver, Pa. It charged Lewis with having made statements that Frank Farrington, president of the Illinois Mine Workers, accepted \$100,000 in the strike period of 1922 to permit coal to be loaded out of the Herrin strip mine and that Farrington said Lewis accepted operators' money "for various reasons." The resolution demanded an investigation and "if these charges are true, these men are not fit to be members of our union, if the charges are not true a liar is not fit to be a member of the United Mine Workers, and that it is the sense of this convention that both men resign." The resolution committee merely found the charges "absolutely untrue" and the convention accepted this report.

The Brotherhood of Locomotive Engineers was bumped by Thomas Kennedy, who charged it with owning and operating non-union mines. This came up in defeating a resolution favoring affiliation of the mine workers with railroad workers. The committee's substitute resolution said everything possible had already been done to affiliate but it was futile because of the attitude of Brotherhood officers, but recommending that efforts continue to get a working understanding. Fred Mooney said he thought the time will never come when any affiliation can be made with the Brotherhoods—"the aristocracy of labor"—which never hesitate to desert the other railroad unions. Secretary Tetlow of the resolutions committee explained the Brotherhoods were not organized in a way that would permit affiliation with the miners.

The various resolutions to abolish war and vitriolically flaying capital for making wars for labor to fight were replaced by a substitute resolution abhorring the institution of war and referring the question of a world-wide strike in case of war to the International Mining Congress at the Prague next year. The final resolution was a subdued and sane document recognizing that this nation cannot disarm when other nations are "sounding their drums" and that the miners' union has no ability to cope with such a problem as world peace although the problem is worthy of the best union thought. John Wall and Freeman Tompson, radicals, of Illinois, made the usual capital-baiting speeches, but they were answered by such leaders as G. W.

Savage, of Ohio, who reminded the convention that capital, too, had given its sons and patriotically suffered its losses in war. The vote was a roaring "aye."

A resolution charging Lewis with "deliberately giving up the check-off" in the anthracite settlement was quashed after Tom Kennedy, of anthracite District 7, denied that allegation and explained how the miners got 10 per cent more wages, the universal 8-hour day with 12-hours pay, an equity clause in the contract and other benefits in such quantity that anthracite workers unanimously favored accepting even without the check-off.

Delegate Rooney, of District 1, an anthracite region, said the anthracite workers are able to take care of themselves and don't care a snap whether they ever get the check-off so long as they can keep their present solid union strength. Rinaldo Cappelini, another anthracite leader further emphasized the solidity of the union in hard-coal fields and its independence from influence outside that one group. Duncan MacDonald editor of a labor paper in Illinois, alleged author of an article against the check-off, was condemned as a non-union wolf in the union's sheepskin. He was defended by speakers of the radical group, but a demand was made that MacDonald be invited to the convention to defend himself. Philip Murray, temporarily presiding, would not permit a motion of invitation.

President Lewis, in his defence of his anthracite action, denied giving away anything belonging to the union but instead, got the men \$44,000,000 a year in increased wages. "The anthracite men," he said, "will tell you Lewis can sell them out any time for \$44,000,000."

In a tilt with John Watts, President Lewis denied he ever had written any letter charging Frank Farrington with receiving \$100,000 to permit the Herrin strip mine to run during the 1922 strike.

A resolution was adopted favoring restriction of immigration to as low a point as possible and the enforcement of the present immigration laws against smuggling of labor through Pacific and Canadian borders.

On Friday the convention declined to consider alliance with either the Amsterdam International or the Red International of Labor Unions, on the ground that both oppose labor and that the United Mine Workers "might as well ally with the United States Chamber of Commerce, the National Coal Association" or any other labor-fighting group. This action was taken over the heads of the radical wing without a "No." The convention demanded the repeal of such American laws as interfere with free speech and the freedom of assembly.

John P. White, former president of the union, addressed the convention, complimenting the present union administration.

So much noise in protest was made over the action of the convention in the Nova Scotia case Tuesday that at the

Safety by Radio

Radio as a life saver got attention from the United Mine Workers at the Indianapolis convention. Some locals wanted headquarters to set up a broadcasting station to counteract anti-labor broadcasting now going on. The convention's resolution, however, merely favored an investigation into the question of radio communication between top and bottom of mines. It was stated that within the last two weeks such communication has been established at a mine 1,000 ft. deep near Scranton, Pa.

beginning of the Friday afternoon session Vice-President Murray offered the opportunity to reopen the question. A mass meeting of 200 men the night before had damned President Lewis for "steam rolling" the convention in the Nova Scotia case. So debate on that case ran all afternoon and through Saturday forenoon before the convention once more supported the ouster from the union last summer of defiant Nova Scotian officers. The vote was overwhelming.

One of the thoroughly radical outbursts of the convention was a speech made Friday by John Watt. He condemned Lewis for publicly admitting there are too many miners in the industry, and declared the policy should be to reduce hours of labor so as to give everybody a job. He attacked the union for not stanchly and openly supporting "the brothers" who conducted the Herrin massacre of 1922, in which 21 non-union men were killed by an unidentified mob. Watt made sport of the union's public claim that the riot was due to communism.

"When good union men fought for unionism at Virden and Pana," said Watt, "they were heroes. Nobody called them communists and nobody should call the Williamson County men communists." Watt did not get a good reception with this bloody-shirt stuff. It appeared to send a shiver through the convention.

After beating the radicals on the Nova Scotian and other issues so many times, the administration thought best on Saturday to yield to the considerable demand for the reopening of the old Howat case and also the case of Myerscough, who had been booted out in Pennsylvania for leading the "Progressive Miners." This was announced Saturday for attention on Sunday by the grievance committee. The committee did not report on Monday but it was expected to report against reopening the two matters.

William Z. Foster, a recognized Red, came to Indianapolis to cause all the trouble he could. Saturday night he held a radical meeting at which he called President Lewis a liar in the statement that radicals in American labor had received millions from Russia. He urged the miners to "get rid

of the present reactionary leadership." Foster defended the Herrin massacre, saying that more such union acts would reduce non-unionism. The meeting was attended by the usual 250 or so rebels of the convention in a dark little back street hall. A squad of police was there but took no action.

After a long debate the administration suffered its first setback Monday morning at the hands of the radicals when the convention seated Nick Perovich, of Dowell, Ill., against the credentials committee's report and against the administration speakers. The man was fired from a mine for absenting himself from work for more than two days and therefore was ineligible for the convention. The administration favored standing by the contract with operators on the point of miners staying on the job, but the case was lost 668 to 611. The same radical group failed, however, to upset the committee in the case of John McGraw, of Kansas, who was finally denied his seat because he leased a mine and prepared it for operation during the 1922 strike.

A thousand dollars was appropriated to aid in the renewed defense of Tom Mooney and Warren K. Billings after Mrs. Mooney told the convention all about the famous San Francisco bombing for which Mooney is still in jail. She said new evidence has been dug up but it is secret. More community centers, athletic fields and playgrounds in mining communities were favored. Other resolutions opposed injunctions by courts and condemned interference in union affairs by such as Myerscough and Foster. An effort to change the constitution to permit members to join the Ku Klux Klan failed.

An effort to reduce the excess of miners in the industry by denying charter rights to all men except miners' sons and miners in newly organized districts was defeated without much discussion.

The entire convention stood silent for one minute Monday in sorrow for the dead of the Shanktown and John-son City disasters.

California Coal Dealers Deny Trade Commission Charge

The King Coal Co., as a company, and Frank J. Foran, as an individual and vice-president of the company, have issued an answer denying that they are members of the California Retail Dealers' Association or have been guilty of practices complained of by the Federal Trade Commission.

The complaint of the Trade Commission charged that uniform prices on coal were fixed by the respondents; that distribution of coal through channels other than those determined upon by the association was prevented and that co-operative purchasing associations were prevented from obtaining coal at wholesale under any conditions, causing obstruction in the sale and transportation of coal in interstate commerce.

32 Succumb in "Mysterious" Illinois Mine Blast

An explosion Friday afternoon, Jan. 25, in the East mine of the Crerar-Clinch Coal Co., Johnson City, Ill., caused the death of 32 miners and eight others are in a hospital suffering from injuries from which two are not expected to recover. Illinois mine authorities, the Coroner and officials of the coal company have joined in an effort to determine the cause of the explosion, which is believed to have resulted from the ignition of firedamp with a consequent explosion of dust.

At the coroner's inquest, officials of the coal company testified to the effect that the explosion in the mine was caused by gas being ignited by a miner's open carbide light. On the other hand, miners, all survivors of Williamson County's greatest mine disaster, blamed the company's officials for the explosion, because of their failure to observe certain safety rules, stress being laid upon the attempt to find the man responsible for the miners being sent into an entry in which gas said to have been formed by a squeeze or the loosening of coal.

H. L. Goodnow, superintendent of the mine, asserted in his testimony that the danger sign had been posted at the entrance to the squeeze and that he believed that the gas which had been formed by the squeeze was ignited by an open carbide light carried by one of the miners. G. I. Evans, mine examiner, employed by the coal company, told of having found the squeeze and having marked the entry as dangerous. His testimony as to precautions taken to keep the men out of the danger zone was supplemented by the statement of Floyd Howard, assistant mine manager, who said he believed Jesse Ford, face boss and one of the victims of the explosion, had ordered the men into the entry where the squeeze had been discovered. He admitted, however, that it was he who told one of the loaders to get his tools, but would not admit that he sent this man into the dangerous entry. He added that no gas had been found in the vicinity that morning. William Johnson, night boss manager, testified he was the man who had placed the danger sign on the entry.

Miners who were at work during the time of the explosion contradicted the testimony given by the officials of the company as to the presence of the danger sign. All agreed that no sign was to be observed at the entry when the men were ordered to tear up the track in the chamber in which the squeeze had been found. Louis Owens, a driver in the mine, told of unloading some cars several of which contained dry and dusty coal which caused such dust that he could hardly breathe. This testimony was given to show the contention of the miners' officials that the force of the explosion had been augmented by the presence of the dust which was ignited by the gas explosion.

How forceful the explosion was was brought out by the testimony of several men who had assisted in searching for the victims. Some of the men who had been working more than 300 ft. from the place of the explosion had been found dead, with their tools either in their hands or nearby their bodies. Miners also testified that several of the dead were men who had been sent into the abandoned chamber where the squeeze had been found, to tear up the tracks, and that these men carried open instead of safety lamps.

State Inspector Plum Lee was called on the stand to testify as to the condition of the mine as found by the State Commission on the day after the explosion. He asserted that the mine was found in good condition during this inspection.

The blast in McClintock mine at Johnson City, Ill., occurred at 2:45 p.m., Friday, just at the hour when the miners were preparing their shots. Permissible powder is used throughout the mine, according to E. C. Searles, of Chicago, general manager of the Crerar-Clinch Coal Co., operators of the mine. About 40 men were in the 11th northeast entry where the blast started, and the casualties were suffered entirely by the men in that entry, including Mine Manager McCullough and Driver Boss Ford, both killed.

William Griffith, Engineer And Geologist, Dies

William Griffiths, well-known mining engineer and geologist, died at his home in West Pittston, Pa., on Jan. 19, at the age of 69 years. Born Jan. 12, 1855, he was a member of the class of '76 of Lehigh University being graduated as a civil engineer. In 1878 he obtained a position with the Union Pacific R.R. and surveyed and supervised the construction of railroads in Nebraska, Idaho, Montana, Utah and Colorado.

Two years later he returned East and became division engineer with the Lehigh Valley Railroad Co. In 1880 he became assistant geologist on the Second Geographical Survey of Pennsylvania and supervised the mapping of the Schuylkill, Lehigh and Bernice coal measures. He had charge of the completion of the geological survey of the Lackawanna and Wyoming coal fields in 1887 and then opened an office at Scranton as a consulting mining engineer and geologist.

Mr. Griffith investigated and rendered a report on the anthracite deposits of northern Peru in 1897, and from 1906 to 1908 he examined and reported on the coal resources of the Matanuska Valley, in Alaska. With Eli T. Conner, another well-known engineer, Mr. Griffith was appointed by the City of Scranton to investigate the risks to which that city was exposed by the extensive mining work being carried on beneath it and made an extensive report which later was published by the U. S. Bureau of Mines.

He was a frequent contributor to technical magazines, his last article in *Coal Age* appearing in the issue of June 7, 1923.

Mr. Griffith was a member of the American Institute of Mining and Metallurgical Engineers, the Mining and Metallurgical Society of America, the Scranton Engineers Club, the Wyoming Historical and Geological Society, and the Franklin Institute of Philadelphia. His funeral took place Jan. 22.

Keeney Sends Invitations to Non-Union Operators

Reports indicate that the hold of the United Mine Workers on northern West Virginia is in great danger of being loosened if further attempts to launch an offensive for the purpose of putting fear in the hearts of miners and operators, particularly in the Fairmont field, are no more successful than those recently attempted. It is believed that John L. Lewis and his followers cannot intrench and that either they must clean house of non-unionism in that section or move out.

Recent investigation has shown that there are 577 tippable mines in the Fairmont field, only 180 of which are working at this time. Of the 180 working mines 57 are non-union, or 30 per cent of the field's production. Just prior to the strike of 1922 all the tonnage from northern West Virginia came from union mines. The field was 100-per cent union. Though many mines are idle the production from the field is healthy, being obtained from low-cost mines aided by non-union operations. The return for 1923 shows a larger production in the Fairmont field than in the banner year of 1918.

Frank Keeney, president of the Seventeenth district of the International, is said to be at his wits' end in this situation, which so vitally concerns him. Like those in Illinois, most of the mines in the northern West Virginia district—on the basis of number and not tonnage—cannot participate in coal trade with the present wage scale. Mr. Keeney is said to realize the predicament, but its relief is not in his hands.

He seems much worried. On Jan. 12 in Clarksburg he asked the owners of the non-union mines in the vicinity to meet him. There was no response. Again on Jan. 14 he made a similar request, but was no more successful. The non-union operators say: "Mr. Keeney can receive little benefit from us; he must deal with his men single-handed." And so he headed for Morgantown, it is said, where he intended to try the same stunt.

The general impression among operators is that he is sore pressed and that he is trying to create the impression of one seeking to relieve a troublesome situation. There may be a possibility of sectional agreements in April if other union officials take the same stand as Frank Keeney, provided, of course, he is sincere. It looks as if he really desires what he appears to be seeking.

Senator Borah Introduces Pinchot Bill To Regulate Coal Industry

Legislators Manifest Deep Interest in Measure—Closely Follows Decision in Kansas Industrial Court Case—Enactment Considered Unlikely—Much Discussion Certain

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Senator Borah, of Idaho, on Jan. 24, introduced in the Senate the coal bill drafted at the instance of Governor Pinchot, of Pennsylvania. While Senator Borah told the Senate, on introducing the bill, that he had not had an opportunity to study its details, he did declare that he is in thorough sympathy with the object and purpose to be attained by proper legislation along the lines indicated by this measure. "The coal situation," said the Idaho Senator, "is a very serious one, and, in my judgment, one with which Congress ought to deal. The bill ought to go to the committee so that those who are in favor of it may be given an opportunity to urge it. After full examination, I may find myself in perfect accord with the entire measure."

The bill is of unusual interest to legislators in that it is recognized as being the most competently and carefully prepared measure which has come before Congress. Numerous proposals to regulate the coal industry have been introduced and some have been considered at great length, but without exception these measures have been more or less crudely drawn. There is every evidence that this is the product of capable talent.

It is apparent that the drafters of the bill gave much attention to the decision of the Supreme Court of the United States in the Kansas Industrial Court case. In that opinion, it will be remembered, the high tribunal recited that since the adoption of the Constitution it never has been considered that the price of coal could be regulated by the government. On the strength of that statement, some have deduced that the court holds it to be unconstitutional to regulate the price of coal. The more general thought in that connection, however, is that the court simply made a historical statement, because it goes on to say elsewhere in the decision that the justification for classifying a business as being charged with public interest and subjecting it to regulation is "the indispensable nature of the service and the exorbitant and arbitrary control to which the public may be subjected without regulation."

In other words, the court made it perfectly plain that the power to regulate turns on a question of fact, which is whether or not the public would be subjected to exorbitant and arbitrary control if there were no arbitrary regulation.

The Pinchot bill uses almost the exact language of that decision. It does not give the proposed coal division

of the Interstate Commerce Commission power to fix prices and margins except "where in the absence of such regulation there exist exorbitant and arbitrary charges or there is danger thereof to the public." The coal division can issue an order of that sort only after having conducted hearings and having studied the particular situation so as to establish certain facts. Even in cases where the commission may decide that power resembling monopoly is being exercised, its order is subject to review by the courts, and holds only if the court sustains the finding of fact. This is a formula quite different from that applied by the Lever law. It is regarded quite generally as being an ingenious formula. The regulation of prices under such a plan might not be effective but the first impression in Washington is that the plan is constitutional.

Another lesson of the Kansas Industrial Court case is that there is no hard and fast line between a business subject to regulation and one not subject to regulation. A popular conception is that businesses fall in two distinct classes. They are either absolutely independent or fall into the public-utility class where they are subjected to sweeping regulation. The Kansas case makes it plain that each instance of regulation must be justified separately. That decision, in the opinion of some members of Congress at least, is that no business, and least of all the coal business, is free from regulation. On the other hand, the decision shows that few, if any, businesses can be subjected to general governmental control. As a result of this decision of the Supreme Court, members of Congress are generally of the opinion that the question is not so much whether the business or commodity is charged with the public interest but whether the specific form of regulation proposed is justified by specific facts and conditions.

It is regarded that the application of the rule-of-reason policy in the Kansas Industrial Court case carries with it an indication of what the Supreme Court might do in a compulsory fact-finding case. If it were established to the satisfaction of the court that the coal business is an indispensable service and if it were made to appear to the satisfaction of the court that the public had suffered through exorbitant and unreasonable prices, through shortage or the element of monopoly, the opinion among the lawmakers seems to be that the court would approve of regulatory legisla-

Clever Red Water

An ingenious use of a chemical last week enabled engineers to discover the source of water flowing persistently into the Radium mine of the Aluminum Ore Co. of America at Belleville, Ill. Three men were drowned when the flood originally broke into the mine from adjoining abandoned workings. When pumps could not dewater the mine, a search began to find out the reason why. A nearby creek running over the property was under suspicion. A little phenolphthalein, a chemical containing highly concentrated red color, was put into the stream a short distance upstream. Soon the water flowing into the mine was intensely red. The stream had been caught in the act. Its course is to be changed.

tion. Though the court might hold that the fixing of prices might not be justified, under the rule-of-reason policy, it well might hold that publicity of accounts properly could be required by Congress.

The consensus of opinion on Capitol Hill seems to be that the Pinchot bill will not pass, but it is certain to give rise to much discussion. It has been referred to the Committee on Interstate Commerce, in which Senator La Follette is in a position to obtain hearings or other consideration of this measure. If any disposition to deny that should develop, he probably would be as well satisfied to carry the matter onto the floor of the Senate.

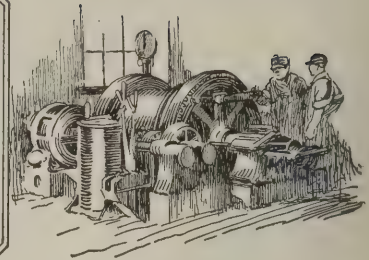
36 Die in Mine Explosion At Shanktown, Pa.

An explosion at 3:51 p.m., Saturday, Jan. 26, in Lancashire Mine No. 18, of the Barnes Tucker Coal Co., at Shanktown, Indiana County, Pa., entombed 48 miners, 36 of whom were dead when taken out. The explosion occurred near the main heading. The last body was recovered at 2:30 p.m., Jan. 28.

The slope is 950 ft. long and on an 8-per cent grade, requiring rope haulage. The mine, which is in the Miller seam, is gaseous, requiring shotfirers and safety lamps. On the day of the explosion 51 men worked. Four men left the mine a few minutes before the explosion. Eleven men in section 6, right where open lights are permitted, made their escape through an opening far distant from the seat of the explosion. One man refused to accompany these eleven, wanting to reach the slope, and was the only man killed by the attempt. The cause of the explosion is not known, but is thought to have been gas and coal dust. Inspectors will hold investigation after ventilation is restored and the mine drained of accumulating water.



Practical Pointers For Electrical And Mechanical Men



Fatal Accident Is Narrowly Averted On Motor-Generator Set Lacking Ground

I was greatly interested in the story told by Mr. Emerson, of Alabama, concerning a ground on a rotary which might have killed someone. I remember a similar circumstance which occurred at one of our mines. A motor-generator set was installed in a new tile building; the floor was of concrete and the building was set on an old fill. For about two years this motor-generator set had operated without any trouble and incidentally without a ground connection.

One day something happened to the machine which the men in the mine did not understand. Some time during the day the oil-switch, through which the power passes to the motor, tripped open and shut down the motor-generator set. This is something that occurred occasionally under very heavy overloads, so the station attendant went into the substation and proceeded to restart the set, but each time he operated the starting handle of the oil switch a fuse on the line outside blew or the main circuit breaker opened up.

NEW MAN SHUNNED A.-C. WORK

The electrician at this mine was a new man and like many other electricians always shunned any work on alternating-current machinery. However, he was called in and after several attempts to start the machine without succeeding, the mine foreman, being quite anxious about the output of the mine for that day and the cost for keeping his men idle waiting for power, 'phoned the electrical department of the company for assistance.

Fortunately the engineer in this de-

partment, to whom the superintendent had explained his trouble, was a thorough and practical man, having had considerable practical experience with

electrical equipment at the mines previous to his technical training. Sensing the situation or realizing the possible danger to the inexperienced men at the mine, he instructed the mine foreman not to make any further attempts to start the machine or start any investigation or repairs until he arrived.

It was some time before this engineer arrived on the job because the mine was about twenty miles from the main office. When he arrived everyone particularly interested in the supervision of the electrical equipment at the mine was greatly puzzled as to the cause of the trouble.

FLASH AT BRUSH RIGGING

It had so happened that while the electrician was trying to start the motor-generator set a flash occurred at the brush rigging on the d.-c. generator and just as soon as the engineer arrived this fact was called to his attention. Everyone naturally expected that the trouble was with the direct-current end of the motor-generator set because this was the only place where there was any visual indication of trouble. Naturally enough the engineer made a careful investigation of the damage done on the direct-current generator and, of course, he examined this most logical point of trouble.

Much to the surprise of all who stood around watching for the trouble to be located the engineer directed two men to repair the damage on the direct-current generator and called upon the electrician to disconnect the motor leads from the wires leading to the oil switch. This was a surprising thing because no one expected or thought there was any trouble with the motor, as there was no evidence of any trouble there and, everything considered, there is not a great deal about a squirrel-cage induction motor that can go wrong.

Test of the stator winding of the motor showed a heavy ground. Without very much trouble the grounded coil was cut out and by the time this was done the men working on the d.-c. end of the machine were through and the motor-generator set was quickly put back into service.

The negative lead of the d.-c. generator on this motor-generator set ran directly outside of the substation to a heavy ground connection in a nearby

creek and also tapped to the rail for the return circuit from the mine. The machine never had been provided with a ground wire and when the coil in the motor winding became grounded, there being no way for the current to leak from the frame of the machine through the concrete foundation, it passed along the base of the motor-generator set and into the frame of the generator. There it jumped across one of the brush studs to the negative or ground connection on the generator.

It has always been a wonder to me that some one was not killed in this substation. Who knows how long the

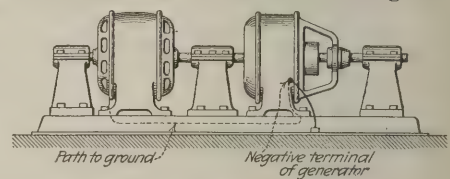


FIG. 2—HOW THE LEAK PASSED THROUGH THE BASE OF THE MOTOR-GENERATOR SET

The circuit from the grounded coil in the motor passed through the base of the machine to the generator, thus charging the whole machine with a high voltage.

2,200-v. motor winding was grounded to the frame of the motor before the breakdown occurred on the d.-c. generator to the negative lead? There is a possibility that this condition existed for some time before the trouble was actually noticed. The machine could operate properly for some time under these conditions and probably did, and anyone touching the machine would have been in danger of being killed, especially if he had touched the frame of the machine with one hand and accidentally had his hand or foot on the steam heater near the motor-generator set. Needless to say a ground wire was attached to this machine before it was started again.

It was no fault of the engineering department that this machine did not have a ground, because time and again letters of instruction had been sent out to the colliery on this general subject, but with this case as an example the engineering department was able to make the argument for ground wires quite forcible and I am glad to say that many a man with our company has learned an important lesson from this case. It is not always that we learn such a good lesson without having some bitter experience and I am hoping that someone will get this lesson as we did, before a fatal accident occurs.

ELECTRICAL STUDENT.

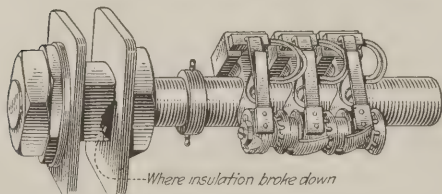


FIG. 1—BROKEN-DOWN STUD INSULATION

By puncturing this insulation the high voltage of the motor passed to earth and formed the circuit to ground, which caused the starting switch to trip open.

Visual Aids to Car Management

BY DWIGHT GREEN
Pittsburgh, Pa.

After all is said the eye is the quickest organ to sense values. A simple chart will tell more than a page of type. This chart, with a tabulation affording exact data, gives a clear visualization of the car-standing capacity at the various tippie trackages of a group of mines. It notes the capacities of the loaded tracks separate from those of the empty and the length of track space for any given size of coal. It also designates mines having special trackage facilities, such as loading tracks for box cars.

By other charts the total car-standing capacity of any individual mine might be summarized and the capacity of an entire group recapitulated, though for this a different scale would have to be used. It will be found convenient to make the chart of such a size that it can be posted in the office and be readable from any point therein. By reducing its size photostatically it can be placed for use under a desk glass.

When the original chart is made of such proportion that it will reduce to pocket data-book size (say Lefax proportion), an interesting and valuable page is obtained for the general manager's dope book. Many similar charts may be prepared to show relevant information such as the number of cars

loaded at each mine and the tonnage per month and per year.

The profile at the bottom of the chart is intended to outline track grades at any one mine or the general conditions sought for at all the mines constituting the group.

Hints on Pipe Gaskets

The greatest difficulty I have encountered during my experience with gaskets has been to convince users that it is not necessary to tighten a thick, flexible metallic gasket with the same extreme pressure as must be applied to thin non-flexible gaskets.

The idea seems to prevail that a gasket, in order to prevent leakage, must have as little thickness as possible and must be squeezed so thin that the distance between the faces of the flanges is a very close approach to absolute zero. Very often when applying gaskets we see the engineer or pipe fitter slip a pipe over the wrench, thereby increasing the wrench's leverage and making it possible to increase still further the pressure against the gasket. As a result the gasket is squashed. If it is made of corrugated metallic material it is pressed out so flat that the corrugations can do no good whatever.

It is poor practice to slip a pipe over any wrench on any gasket because wrenches are generally made of a proper and safe length to fit the nuts for which they are intended, and nut sizes usually are standardized to fit certain bolt diameters. This is a logical safety measure that has been almost universally adopted so that the bolt will not be subjected to too great tension. An extra long handled wrench, unless used with extreme care, is likely either to break the bolt or strip the threads.

One serious objection to the very thin gasket is that no matter how it is constructed it can have but little expanding or contracting capacity; consequently all expansion and contraction must be taken care of in some other manner—by means of pipe bends or expansion joints. A thicker gasket, having elastic properties, will naturally take care of considerable expansion and contraction. In many cases I have known thick, flexible gaskets to take care of all of the expansion and contraction in the line under ordinary temperature conditions of non-super-heat practice.

Where temperatures are high or where temperatures fluctuate considerably, copper, brass and other metallic gaskets having a coefficient of expansion different from that of the joint should not be used. On account of the difference in the coefficient the gasket and the joint tend to expand and contract independently of each other. The tightly bolted joint, being much stronger than the thin gasket, will compel the gasket to expand and contract along with it. Breakage and leakage of a serious nature are, therefore, often the result. A gasket made up of steel which has the same coefficient of ex-

pansion as the joint overcomes this latter trouble entirely, but if it is thin and non-flexible it does not overcome or assist in overcoming the longitudinal expansion troubles.

Hence when applying thick, flexible metallic gaskets, be certain that a wrench of the correct length is used and then tighten only enough so that the leakage is prevented. Do not tighten too much. Any further tightening after leakage is stopped simply reduces the elasticity of the gasket and does not give it an opportunity to "breathe" as it should simultaneously with the expansion or contraction of the pipe line.

I therefore regard the matter of tightening as most important of all and want to impress it upon all users of flexible metallic gaskets. By being as careful in tightening the gasket as one is when tightening an ordinary steam-engine stuffing box, or when taking up the wear in a bearing, the best results will be obtained. Take it easy. Don't strain muscles, wrenches, bolts, gaskets, or anything. If directions are always carefully followed, much labor and fatigue will be avoided.

HENRY BOHMER, JR.

Use Your Head When You Use Your Hand

In a recent issue of *Coal Age* I read a story where a man touched with the back of his hand a machine that had an electrical leak on it. It is not my idea to encourage the practice of being careless in touching electrical equipment, especially when one knows that it is charged, but I think this is a point which may be stressed a little more than was mentioned in the article to which I refer.

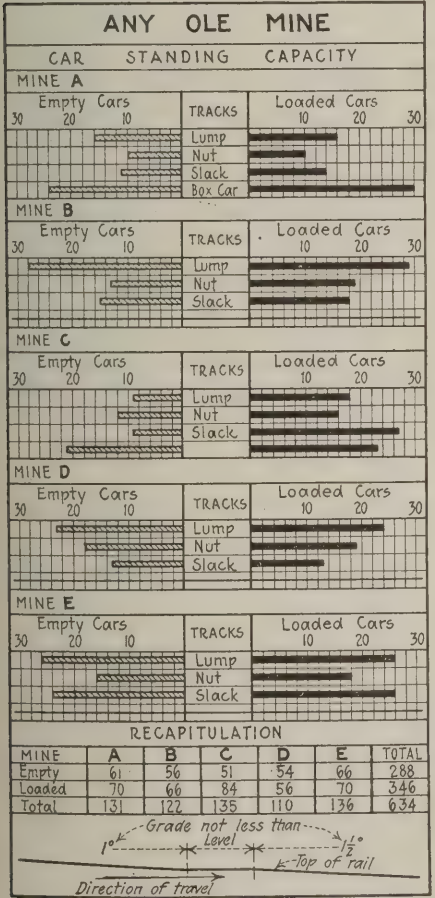
There is a strong tendency when the hand is placed upon an electrical conductor, or any piece of equipment which is charged with electricity, for the hand to automatically grasp the conductor and hold the person from breaking away. This is especially true with alternating current. Therefore, in testing for electricity if the back of the hand is used the fingers cannot close upon the conductor.

In this way it is very easy for one to be knocked away by the charge, or to pull his hand away quickly. This is no way to test a conductor for voltage, but where a person is going to work on a line and already knows that the switch has been thrown open it may be advisable to test the wires in this way to make doubly sure that it is safe to proceed with the work.

E. M. FORSYTHE,
Construction Foreman.

One lb. water evaporated from and at 212 deg. F. equals:

- 0.2841 kw.-hr.
- 0.3811 hp.-hr.
- 970.4 heat units.
- 104,320 kilogram meters.
- 1,023,000 joules.
- 754,525 ft.-lb.
- 0.066466 lb. carbon oxidized.



PUTS TRACK CAPACITY BEFORE EYE
A chart for office wall or desk which will convey at a glimpse what capacity for cars loaded or empty can be found at any of the mines of the company.



Problems In Underground Management



Loading Room Coal by Trips

BY G. E. ALLOWAY
Lexington, Ky.

A system of gathering coal from rooms in thin seams of coal not exactly new but still not at all in general use is being received with much popular favor in the mines of eastern Kentucky. It would have been almost impossible of operation with mules or large locomotives, but it fits in nicely with the low gathering locomotives now available.

Under the old method when rooms were driven 35 to 45 ft. wide a roadway was laid on each side of the room and only one car at a time could be loaded on either of these roadways. When the gathering locomotive came round to collect cars it got two cars from one room, but it had to make two trips up to the face and back in order to get them, and the miner waited a long time for the locomotive to come.

Now a curve is laid around the room face and this allows three to five cars to be placed alongside the face handy to the miner, the number of cars depending on the length of the face. The gathering locomotive can hitch onto a trip like this and haul it into the place or when loaded can haul it out just as well as it could a single car. The advantages are obvious.

The output per miner also is increased 25 to 50 per cent, for the time he loses is reduced to a minimum, and the miner does not have to shovel any of the coal two or three times to get it to the car, as was the case when the place was 45 ft. wide and the old method of laying the tracks was in use.

This method does not involve any unusual expense in laying track. All that is necessary when steel ties are used is to remove two spikes at the end of the permanent track and bar the entire curve and track forward to the face, replacing the same two spikes.

This method of tracklaying can be applied to almost any seam, for it requires no more room than the old method, and timbers can be set as close to the face as has been the custom with the usual trackwork. The locomotives are built as low as 25 in., and this allows them to enter any coal seam that can be worked profitably.

It will be said that it is useless to make such a provision where the men push the cars to and from the room face and the gathering cost is nil.

That might be true enough with rooms of favorable and easy grades where the miner is willing to push the cars, but there are almost sure to be excessively steep or dipping gradients, where the cars cannot be pushed by hand, and then a low locomotive with a track which curves around near the face will make the miner 25 to 50 per cent more productive and not make the gathering cost much greater than with hand-pushing methods.

Is a Board a Good Stretcher?*

BY GEORGE EDWARDS
Pikeville, Ky.

Many times it has occurred to me that some better means could be provided to carry an injured man. Stretchers of many designs are being sold, but most of them, unfortunately, are limber and cause so much movement to the patient when being carried that often he is so badly hurt in transportation that he never gets over his injuries. This is especially true when the injury is to the back, pelvis or thigh.

Just recently I saw an injured workman who, the doctor said, was in bad condition. The physician said much of the injury probably came from the long distance he had been carried without first placing splints to the thigh and knee.

I have been told that some coal companies have a board 7 ft. long and 20 in. wide (with three handholds on each side), the intention being that it should be slipped under an injured person regardless of his injury. He is lifted onto the board and onto the stretcher if there is one nearby. If not, he is carried on the board to the first-aid room in the hospital.

BACKWARD STEP FEARED

I have talked about this to several persons, and they feared that it would be a step backward and would encourage indifferent first aid, which, to my mind, is not true; for I believe a man who is capable would not hesitate to give the patient the best attention he could, and on the other hand should the unfortunate workman fall into untrained hands, which is often the case, if these boards which form a splint as it were, for the entire body were provided there would be fewer hopeless cripples. An objection has been raised

*This is an expression of opinion with which many readers will not agree.—EDITOR.

to the possibility that workmen would cut the boards into cap pieces and wedges. This could be overcome largely by painting a red cross on them and a sign calling attention to the object for which they were intended.

Dry Battery Always a Menace In Mine Blasting

BY W. T. GERMAN
Technical Representative, E. I. duPont de Nemours & Co., Inc.

A highly dangerous practice all too common in the mines consists in the use of dry-cell batteries for firing electric detonators. The contact points of a dry cell always are alive, and therefore the instant that the wires of an electric circuit touch these points a current flashes through the wires and explodes any electric detonator that may be connected in the circuit.

Recently a miner who was using a dry-cell battery fired a first shot and then returned to the face to connect the second without removing his leading wires from the contact clamps of the dry cell. The moment he joined the electric blasting-cap wires to the cable the shot fired, killing him on the spot. It was against the rules of the mine in which he was working to use a dry-cell battery, yet the miner who was killed had been employed there for twelve years and was considered a very careful man. This incident shows how necessary it is for mine officials to keep an unceasing lookout as to the kind of electric firing devices actually being used in their mines if they wish to prevent disasters.

New Powdered Coal Burner Is Tried Out

Experiments are being carried on by Washington University, St. Louis, in the use of pulverized coal at the Barnes Hospital, St. Louis, Mo., under new patents. A "carburetor" somewhat on the order of the one on gasoline motors, where the proper mixture of air and coal is fixed, is one of the features. The results for the first ten days were overwhelmingly in favor of this coal against the hand- and stoker-fired systems. There was no smoke, which in St. Louis is a big feature, and four scoops of ashes was the result of the 10-day trial. The carburetor delivers forty parts of air to one part of coal under the system devised by Wm. H. Whittaker, of Shelbyville, Ill.

Discussion

Principles Which Underlie the Satisfactory Humidification of Mine Air

Not Necessary to Use Baffles or Radiators—Current Split to Prevent Loss of Heat and Moisture Before Reaching Live Workings

THAT the temperature of mines is only a few degrees warmer in summer than in winter is well known, while the change in the outside temperature varies greatly in these two seasons of the year. It also is well known that the capacity of air for absorbing and retaining moisture increases with its temperature.

Bearing these facts in mind, it is easy to see that summer air is capable of holding a far greater weight of moisture per unit volume than winter air. Air is said to be saturated when it contains all the moisture it can hold at its present temperature. Therefore, it is clear that a comparatively small quantity of water vapor will fully saturate a greater volume of air in winter than in summer.*

Many confuse the idea of saturation with the weight of moisture carried in a given volume of air, whereas the two expressions have no relation to each other. For example, the same weight of water vapor that will fully saturate a given volume of air at 30 deg. F. would give but 10 per cent of relative humidity in the same volume of air at a temperature of 100 deg. F.

The safe operation of a dry and dusty mine requires not only the systematic removal of the dust, as far as that is practicable, but the mine air must be humidified. For that purpose the simplest and most practical means employed is the introduction of exhaust steam into the intake air current.

As we all know, the steam entering the intake airway of a mine produces a fog that fills the passageway for a considerable distance beyond the point where it enters. As the heat of the steam passes into the air the fog gradually disappears. The water vapor forming the steam is absorbed by the air and the temperature of the latter is considerably increased.

The warm air current now laden with moisture carries this into the mine and, as its temperature falls to the lower temperature of the mine workings, much of the moisture is deposited there and serves to keep the dust in a more moist condition and renders it less dangerous.

One difficulty experienced in humidifying mine air is the tendency or desire to circulate the required volume of air under as low a water gage as possible, in order to reduce to a minimum the power required for ventilation. This naturally means a smaller quantity of steam exhausted from the engine driving the fan and a comparatively larger volume of air to be humidified. The result is that this large volume of intake air is not saturated and produces a drying action in its passage through the mine. This has led many to discount and abandon the idea of humidification by the use of steam.

Others have been led into the error of using live steam in addition to what exhaust steam was available. In one instance I found a 2-in. pipe installed to deliver live steam at 160-lb. pressure in a mine where there was insufficient exhaust steam. In another instance where the results had been unsatisfactory, the mine superintendent concluded that the trouble was because the steam and air did not mix thoroughly.

To overcome this supposed difficulty he had installed a system of baffles, deflectors and check plates in the intake air course. This so obstructed the flow of air into the mine and increased the water gage and power required for ventilation that it became necessary to bring into use a spare boiler in the power house and employ an extra fireman on the day shift. The power required to drive the fan was increased from 70 to 235 hp., and the volume of exhaust steam was 3.3 times what it had been previously.

Let me say here that the use of baffles to insure the mixing of the steam and air is wholly unnecessary. The expanding steam mixes rapidly with the air within a short distance after entering the current. It is a good plan to place the steam jet or orifice at the center of the entry, so that it will blow in the direction the air is moving.

Another costly operation frequently resorted to is the use of radiators to heat the air. To my mind, the use of a radiator for that purpose is inefficient, and the device is cumbersome and costly to install. Nothing is more efficient than the direct contact of the steam with the air.

In humidifying a mine, my practice has been to use all the exhaust steam available from the engine driving the fan and from other engines at the plant, as far as that is practicable. It always is advisable to ascertain if the volume of air entering a mine is

greater than what is required for its efficient ventilation, after repairing the stoppings and making any changes necessary to reduce the required circulation to a minimum. This is an important factor if the best results are to be obtained. To avoid the loss of heat and moisture before the air current reaches the live workings it should be conducted by the shortest practicable route.

In one instance that I observed in a West Virginia mine the intake air was well heated and humidified at the entrance, but the moisture was practically lost before reaching the live workings, because of the excessive distance the air had to travel. This was finally overcome by the erection of one or two air bridges and splitting the circulation. My experience is that steam humidification along the lines I have suggested is not only the surest way of solving the dust problem but does this in the simplest and cheapest manner possible. Applied intelligently, it will do more to lay the dust than any quantity of sprinkling.

F. C. CORNET,
Mining Engineer.

Quaregnon, Belgium.

Veteran Among Coal Producers

Your readers may be interested to hear of what in my belief is the oldest of producing mines on the American continent, Caledonia No. 4, an operation now being conducted by the British Empire Steel Corporation. This mine was opened in 1865 and is still in operation. It has produced 2,400 tons in a single shift and 3,300 in a double shift. It is still capable of a maximum output of 1,500 tons and has a daily average production of 1,200 tons. The coal is transported by an endless rope haulage over 28,000 ft. long. The depth of the shaft is 180 ft. This has been equipped since 1894 with self-dumping cages. I would like to hear of any mine having a longer life and a more extended rope or a longer haulage, especially one with such a well-sustained output.

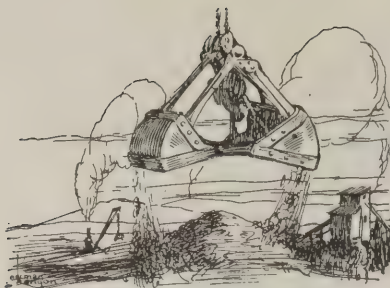
ALEX McDONALD.

Glance Bay, C. B.

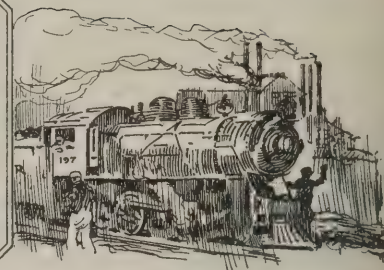
Cement Output and Shipments High for December

Production of portland cement during December, 1923, according to a report by the U. S. Geological Survey, based partly on estimates, totaled 9,997,000 barrels, compared with 12,603,000 barrels in the preceding month and 8,671,000 barrels in December, 1922. Shipments for the month were 6,408,000 barrels, compared with 10,251,000 barrels in the preceding month of November and 4,858,000 barrels during December, 1922. Stocks at the end of December amounted to 10,581,000 barrels, compared with 6,991,000 barrels at the end of the preceding month (according to revised figures) and 9,108,000 barrels at the end of December, 1922.

*How true this is may be seen by the rapidity with which the surface of the ground dries in summer as compared with the slowness with which it is dried in winter. In cold weather, however, the mine raises the temperature of its air and so reduces its saturation, whereas in summer it decreases the temperature and so completes the saturation.—EDITOR.



Production And the Market



More Inquiries for Soft Coal; Little Gain In Actual Business; Miners' Action Awaited

Inquiries from consumers of soft coal are growing, but actual business has not increased much, caution appearing to be the guiding influence of buyers, many of whom are awaiting the outcome of the miners' convention at Indianapolis. In the West the demand for domestic coal is much heavier because of the cold weather, and increased production is causing a growing volume of slack. Production continues heavy with considerable coal going on contracts or to stockpiles, while reports from some industrial centers show that current consumption is slightly heavier. The strike of the Nova Scotia miners increased the inquiries from Canada and some actual business is reported. Contracting continues to lag in most markets and while some contracts are reported as having been closed, the tonnage involved has not been large. Some operators are favorably situated as to orders between now and April 1.

Little Change in Conditions Observable

Conditions generally are little different from the early part of the month. Only in scattered sections have any of the mines reopened that were closed last autumn because of "no market" while operators in some parts of central Pennsylvania complain of the lack of labor in those mines that are working.

Coal Age Index registers 187 as of Jan. 28, an increase of five points when compared with the previous week, with an average price of \$2.26, an advance of 1c.

The Middle West markets are kept fairly active by good demand for domestic coals, although prices have not advanced. Some of the mines which were closed have been obliged to reopen and the entire outlook is much brighter. Domestic tonnage in both the Mount Olive and Standard districts is moving strong, but car shortage in both fields has interfered to some extent with coal movement. Dealers in St. Louis report movement to be 100 per cent, but the demand is for the

cheaper coals. Business in Kentucky is good, colder weather having created an active demand for prepared coals accompanied by a good car supply. There is better buying by utilities and heavier consumption of gas has resulted in a better demand for gas or byproduct coals. Stocks in yards in the Northwest are being rapidly depleted, forcing the owners into the market for replenishments.

A general improvement is noted throughout Ohio. There was a slowing down of car supply accompanied by slower movement of coal. Heavier demand for smokeless coals from Chicago buyers has tightened the various markets and there is a heavier call for domestic sizes. Reports are that many non-union fields are gradually getting back to the 1917 wage scale. Both steam and contracting situations are quiet. There is a trifle better outlook in the spot market at Pittsburgh.

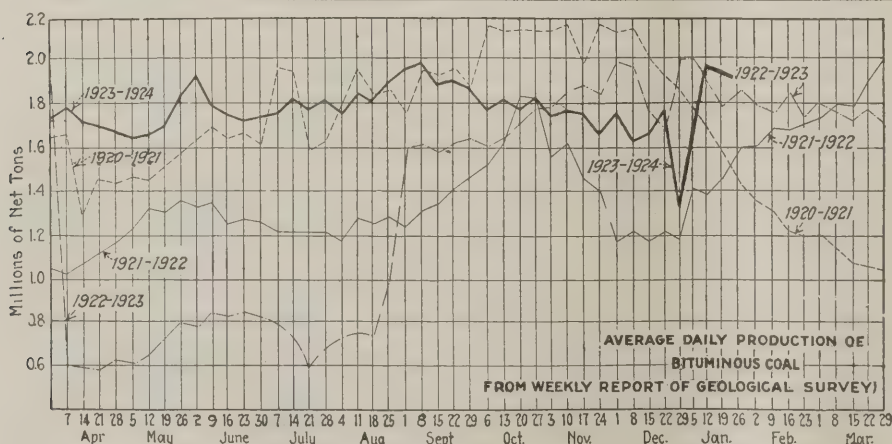
Restriction of production caused a slight stiffening of quotations for Southern coals in New England, but there are no favorable developments in the textiles and almost no signs of buying in any direction. Along the Atlantic seaboard everything is quiet.

The market for domestic anthracite is slow and some independent coals were quoted at figures close to company quotations.

Production of soft coal slackened during the week ended Jan. 19, according to the Geological Survey report, dropping to 11,621,000 net tons, a decrease of 328,000 tons when compared with the preceding week, while the output of hard coal during the same period increased 44,000 net tons when compared with 1,840,000 tons, the output of the week ended Jan. 12.

Midwest Works Hard

Reopening of a great many of the mines that had shut down during the autumn raised the early January output of the Midwestern fields tremendously, especially during the past week. Some mines have been running every day and



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Jan. 5 (b)	10,993,000	9,068,000
Jan. 12 (b)	11,217,000	11,949,000
Jan. 19 (a)	10,925,000	11,621,000
Daily average	1,821,000	1,937,000
Coal year	321,591,000	436,847,000
Daily aver. coal year	1,298,000	1,778,000

ANTHRACITE

Jan. 5	1,725,000	1,436,000
Jan. 12 (b)	2,113,000	1,840,000
Jan. 19 (a)	2,010,000	1,884,000

COKE

Jan. 12 (b)	323,000	258,000
Jan. 19 (a)	328,000	262,000
Calendar year	909,000	716,000

(a) Subject to revision. (b) Revised from last report.

more are going to work. The zero weather that prevailed through most of the week kept the domestic market at fairly high pitch. The flow of most coals was steadily so strong and cars so numerous that prices did not ascend. In fact they had the inevitable tendency to sink on screenings. Southern Illinois screenings sold down to \$1.75 and this 15c. drop was equalled in other competing fields. A great deal of Eastern smokeless coal has been flowing into the Midwest region. The demand is strong, with the result that Pocahontas lump sells in Chicago readily in spite of the slowly ascending price.

Mt. Olive field conditions have been materially improved recently. A good domestic tonnage is moving, and though steam is hard to find, the tonnage keeps moving with the assistance of railroad help for nut and egg sizes. Four and five days is the rule in this district. There has been a car shortage here that has stopped production to some extent.

In the Standard field lack of steam business has interfered with working time at several mines and car shortage has to some extent slowed up production. The demand has been good for 6-in. lump. Steam is more difficult to move

than any other size but the price of steam continues to show cost. Working time averages close to 5 days a week.

All St. Louis dealers report their equipment moving 100 per cent, but demand for coal is mostly for cheaper grades. A little high grade is moving and there is a good demand for coke. Anthracite and smokeless are slow. There has been no reduction in retail prices. The dealers' supplies are pretty well gone, excepting on high-grade fuels. Wagonload steam continues fairly good. Local carload steam is slow. Country steam is fairly good and country domestic is active on the cheaper grades.

Kentucky Business Is Good

Cold weather all the way to the gulf has resulted in a more active demand for Kentucky prepared sizes, and some of the mines that had been working about two days a week are getting in four days or better now and are finding business fairly good. Car supply is adequate and though prices are showing no real improvement, the situation is more promising. Steam demand is somewhat better than it has been and utilities are buying more freely.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Jan. 29 1923	Jan. 14 1924	Jan. 21 1924	Jan. 28 1924†
Smokeless lump.....	Columbus.....	\$7.25	\$3.35	\$3.35	\$3.15@	\$3.50
Smokeless mine run.....	Columbus.....	6.65	1.85	2.10	2.00@	2.25
Smokeless screenings.....	Columbus.....	5.85	1.30	1.50	1.40@	1.65
Smokeless lump.....	Chicago.....	7.75	3.10	3.25	3.50@	3.75
Smokeless mine run.....	Chicago.....	6.10	2.10	2.25	2.00@	2.50
Smokeless lump.....	Cincinnati.....	7.25	3.10	3.25	3.00@	4.00
Smokeless mine run.....	Cincinnati.....	6.00	2.25	2.10	2.00@	2.75
Smokeless screenings.....	Cincinnati.....	6.00	1.75	1.20	1.65@	2.00
*Smokeless mine run.....	Boston.....	8.10	4.80	4.70	5.00@	5.15
Clearfield mine run.....	Boston.....	4.35	1.85	1.85	1.75@	2.25
Cambria mine run.....	Boston.....	4.85	2.50	2.55	2.25@	3.00
Somerset mine run.....	Boston.....	4.55	2.10	2.10	2.00@	2.50
Pool 1 (Navy Standard).....	New York.....	5.50	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard).....	Philadelphia.....	5.45	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard).....	Baltimore.....	5.10				
Pool 9 (Super. Low Vol.).....	New York.....	5.00	2.25	2.25	2.00@	2.50
Pool 9 (Super. Low Vol.).....	Philadelphia.....	4.80	2.30	2.30	2.10@	2.50
Pool 9 (Super. Low Vol.).....	Baltimore.....	4.85	1.85	1.85	1.75@	2.00
Pool 10 (H.Gr. Low Vol.).....	New York.....	4.25	1.95	1.95	1.75@	2.10
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	4.30	1.85	1.85	1.70@	2.00
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	4.10	1.80	1.80	1.75@	1.90
Pool 11 (Low Vol.).....	New York.....	3.50	1.65	1.60	1.50@	1.75
Pool 11 (Low Vol.).....	Philadelphia.....	3.25	1.65	1.65	1.55@	1.75
Pool 11 (Low Vol.).....	Baltimore.....	3.35	1.65	1.65	1.65	
High-Volatile, Eastern						
Pool 54-64 (Gas and St.).....	New York.....	3.10	1.65	1.65	1.50@	1.75
Pool 54-64 (Gas and St.).....	Philadelphia.....	3.25	1.70	1.70	1.60@	1.80
Pool 54-64 (Gas and St.).....	Baltimore.....	3.10	1.50	1.50	1.50	
Pittsburgh sc'd gas.....	Pittsburgh.....	4.85	2.40	2.40	2.50@	2.65
Pittsburgh gas mine run.....	Pittsburgh.....		2.30	2.30	2.25@	2.35
Pittsburgh mine run (St.).....	Pittsburgh.....	3.35	2.00	2.00	1.90@	2.10
Pittsburgh slack (Gas).....	Pittsburgh.....	3.35	1.60	1.60	1.50@	1.75
Kanawha lump.....	Columbus.....	5.25	2.60	2.60	2.50@	2.75
Kanawha mine run.....	Columbus.....	3.25	1.60	1.60	1.50@	1.75
Kanawha screenings.....	Columbus.....	3.10	1.10	1.35	1.25@	1.50
W. Va. lump.....	Cincinnati.....	6.10	2.60	2.85	3.00@	3.25
W. Va. Gas mine run.....	Cincinnati.....	3.45	1.65	1.60	1.65@	2.00
W. Va. Steam mine run.....	Cincinnati.....	3.25	1.65	1.60	1.65@	2.00
W. Va. screenings.....	Cincinnati.....	3.25	1.30	1.10	1.15@	1.25
Hooking lump.....	Columbus.....	4.60	2.75	2.75	2.50@	3.00
Hooking mine run.....	Columbus.....	2.80	1.80	1.85	1.75@	2.00
Hooking screenings.....	Columbus.....	2.60	1.30	1.40	1.35@	1.50
Pitts. No. 8 lump.....	Cleveland.....	4.35	2.45	2.55	2.10@	2.75
Pitts. No. 8 mine run.....	Cleveland.....	3.40	1.85	1.90	1.90@	2.00
Pitts. No. 8 screenings.....	Cleveland.....	3.25	1.65	1.60	1.50@	1.75
Midwest						
Franklin, Ill. lump.....	Chicago.....	\$5.35	\$3.50	\$3.50	\$3.25@	\$3.75
Franklin, Ill. mine run.....	Chicago.....	3.85	2.35	2.35	2.25@	2.50
Franklin, Ill. screenings.....	Chicago.....	2.65	1.95	1.95	1.75@	2.00
Central, Ill. lump.....	Chicago.....	3.85	3.10	3.10	3.00@	3.25
Central, Ill. mine run.....	Chicago.....	2.85	2.10	2.10	2.00@	2.25
Central, Ill. screenings.....	Chicago.....	1.60	1.65	1.55	1.40@	1.50
Ind. 4th Vein lump.....	Chicago.....	4.85	3.10	3.10	3.00@	3.25
Ind. 4th Vein mine run.....	Chicago.....	3.60	2.60	2.60	2.50@	2.75
Ind. 4th Vein screenings.....	Chicago.....	2.30	1.85	1.85	1.75@	2.00
Ind. 5th Vein lump.....	Chicago.....	4.10	2.60	2.60	2.50@	2.75
Ind. 5th Vein mine run.....	Chicago.....	3.10	2.10	2.10	2.00@	2.25
Ind. 5th Vein screenings.....	Chicago.....	1.80	1.70	1.55	1.40@	1.50
Mt. Olive lump.....	St. Louis.....		3.10	3.10	3.00@	3.25
Mt. Olive mine run.....	St. Louis.....		2.50	2.50	2.50	
Mt. Olive screenings.....	St. Louis.....		1.55	1.55	1.50	
Standard lump.....	St. Louis.....	3.60	2.90	2.90	2.85@	2.90
Standard mine run.....	St. Louis.....	2.50	1.95	1.95	1.90@	2.00
Standard screenings.....	St. Louis.....	1.60	1.30	1.10	1.00@	1.25
West Ky. lump.....	Louisville.....	4.00	2.85	2.85	2.75@	3.00
West Ky. mine run.....	Louisville.....	2.50	1.65	1.65	1.40@	1.75
West Ky. screenings.....	Louisville.....	2.00	1.40	1.40	1.00@	1.25
West Ky. lump.....	Chicago.....	4.25	2.85	2.85	2.75@	3.00
West Ky. mine run.....	Chicago.....	2.35	1.75	1.75	1.50@	1.75
South and Southwest						
Big Seam lump.....	Birmingham.....	3.95	3.85	3.85	3.75@	4.00
Big Seam mine run.....	Birmingham.....	2.35	1.95	1.80	1.75@	1.85
Big Seam (washed).....	Birmingham.....	2.60	2.35	2.10	2.00@	2.25
S. E. Ky. lump.....	Chicago.....	6.00	3.00	3.00	3.25@	3.50
S. E. Ky. mine run.....	Chicago.....	3.25	1.85	1.85	2.00@	2.25
S. E. Ky. lump.....	Louisville.....	6.50	3.00	3.00	3.00@	3.50
S. E. Ky. mine run.....	Louisville.....	3.10	1.65	1.80	1.65@	2.00
S. E. Ky. screenings.....	Louisville.....	3.00	1.60	1.40	1.00@	1.25
S. E. Ky. lump.....	Cincinnati.....	5.60	2.75	2.85	2.75@	3.25
S. E. Ky. mine run.....	Cincinnati.....	3.15	1.60	1.55	1.65@	2.00
S. E. Ky. screenings.....	Cincinnati.....	2.85	1.25	1.05	1.10@	1.25
Kansas lump.....	Kansas City.....	5.50	5.00	5.00		5.00
Kansas mine run.....	Kansas City.....	3.60	3.25	3.50		3.50
Kansas screenings.....	Kansas City.....	2.50	2.25	2.25		2.25

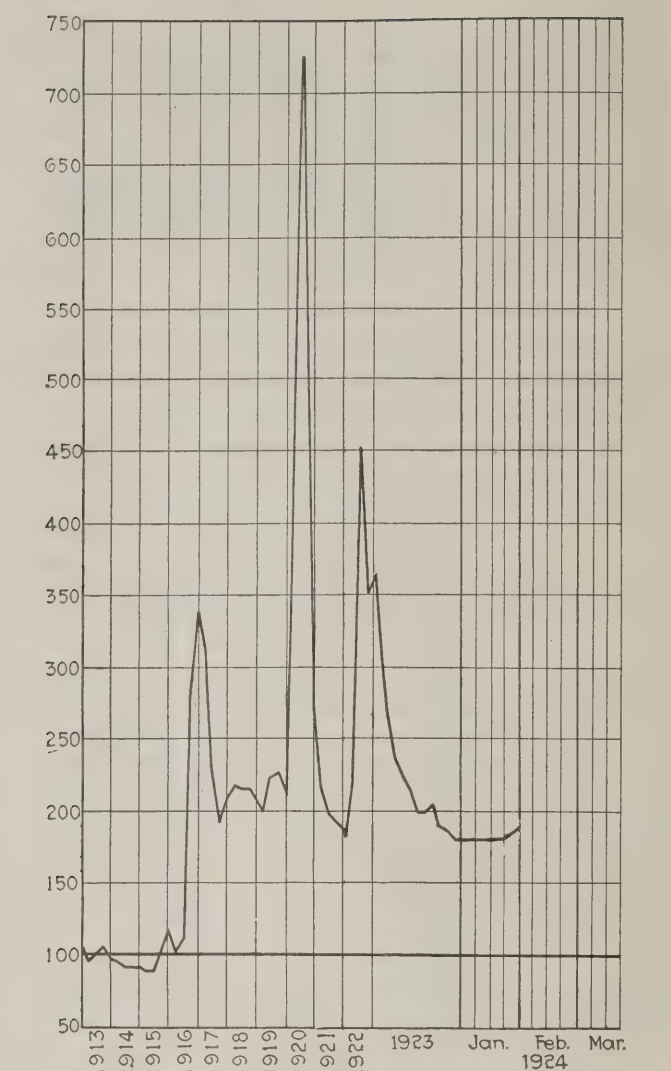
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

Market Quoted		Freight Rates	Jan. 29, 1923	Jan. 21, 1924	Jan. 28, 1924†
Broken.....	New York.....	\$2.34	\$9.00	\$7.75@	\$8.25
Broken.....	Philadelphia.....	2.39		7.90@	8.10
Egg.....	New York.....	2.34	9.25@	8.00@	8.35
Egg.....	Philadelphia.....	2.39	9.25@	8.10@	8.35
Egg.....	Chicago.....	5.06	12.00@	7.20@	8.25
Stove.....	New York.....	2.34	9.25@	8.00@	8.35
Stove.....	Philadelphia.....	2.39	9.25@	8.15@	8.35
Stove.....	Chicago.....	5.06	12.00@	7.35@	8.25
Chestnut.....	New York.....	2.34	9.25@	8.00@	8.35
Chestnut.....	Philadelphia.....	2.39	9.25@	8.15@	8.35
Chestnut.....	Chicago.....	5.06	12.00@	7.35@	8.35
Range.....	New York.....	2.34		8.25	
Pea.....	New York.....	2.22	7.50@	6.15@	6.30
Pea.....	Philadelphia.....	2.14	7.00@	6.15@	6.20
Pea.....	Chicago.....	4.79	7.00@	5.49@	6.03
Buckwheat No. 1.....	New York.....	2.22	5.25@	4.00@	4.10
Buckwheat No. 1.....	Philadelphia.....	2.14	5.00@	4.00	
Rice.....	New York.....	2.22	2.25@	2.75@	3.00
Rice.....	Philadelphia.....	2.14	2.75@	2.75@	3.00
Barley.....	New York.....	2.22	1.50@	1.50@	2.00
Barley.....	Philadelphia.....	2.14	1.50@	2.00	
Birdseye.....	New York.....	2.22		2.10	

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

Index	1924			1923
	Jan. 28	Jan. 21	Jan. 14	Jan. 29
Weighted average price	187	182	182	342
	\$2.26	\$2.25	\$2.20	\$4.14

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Eastern Kentucky prime block coal has been a shade firmer, with the market running to a maximum of around \$3.50 on better grades. Egg and nut sizes, along with lump sizes, show no change, but screenings are somewhat weaker. Utility buying is better and gas companies, meeting with a heavy demand for gas, have been placing better orders for gas or byproduct coal. Car supply is holding up well.

Northwest Trade Brisk

A succession of cold waves throughout the Northwest has created an active demand for coal in both city and country. Stocks are moving out of the yards at a rapid rate, but there is plenty of everything in the way of coal and coke. Several cargoes at Milwaukee remain to be unloaded. Jobbers who depend on rail supplies complain that receipts are slow owing to weather influences and strikes at some Eastern soft coal mines. There have been no changes in prices.

A big run on coal has developed at Duluth within the past week and all Head-of-the-Lakes docks are working to capacity. The result of the run has been to strengthen the tenor of the market without actually increasing prices. In fact the losses recorded last week have not been recouped, and bituminous is at the same level as quoted last. The

anthracite market at Duluth is struggling to hold its own as best it can. Pea is reported as fast disappearing.

West Continues Busy

Mines through the Southwest continue to operate full time as winter holds on. However, none of those closed for the summer and not reopened at the beginning of the season has resumed operation as a result of improved business, and there has been no difficulty in obtaining sufficient cars to move the coal as rapidly as it has been mined. Retailers have been compelled to make delayed deliveries on some grades of domestic coal, but there always has been sufficient coal of other grades to tide over.

The slack market in Utah is stronger for office buildings and the like are buying again. Weather continues very cold. The greatest trouble now is the moving of intermediate sizes. If the situation does not improve it is expected that some mines will be closed temporarily. Some of the biggest operators are getting behind on their lump orders as a result of this condition. Working time is around four days a week.

The coal market in Colorado is still showing signs of life and mines worked an average of five days last week. Demand for all sizes is coming in steadily and very few unconsigned loads at the mines were reported. "No Market" is slowly declining with less than 20 per cent of the total working time lost last week attributed to this cause. Prices are unchanged. The transportation equipment and car supply have been very favorable throughout the state except in Routt County, where weather conditions have prevented considerable movement of commodities.

Domestic Demand Strong in Ohio

General betterment of prices and a slowing down of both car supply and the movement of coal were the features of the Cincinnati coal market last week. The advance in prices for smokeless coals was attributed chiefly to the demand of Chicago buyers for "car numbers." Cold weather and the demand for domestic coals caused an upturn. There is little or no talk of contracts and some buyers are waiting for the outcome of the miners' convention before committing themselves. Retail business is on the same basis as earlier in the month. Exceptional coals are being quoted at \$3.75@\$4 for block, and \$2.75@\$3.25 for egg.

At Columbus lower temperatures have stimulated the domestic trade to a small degree, but the general market is draggy. Although retail stocks are comparatively light, dealers are slow to order, and buying on the part of householders is on a hand-to-mouth basis. Steam coal demand is quiet, due to large reserves, and the utilities and railroads are making small additions to their present supplies. Mines in the Hocking Valley and other field are gradually resuming operation. Contracting is quiet, both operators and buyers watching the outcome of the Indianapolis convention. Reports to the Southern Ohio Coal Exchange show that for the week ended Jan. 12 the total output of 446 mines reporting was 196,178 tons out of a full-time capacity of 682,824 tons. Of the shortage "no market" was responsible for a loss of 453,115 tons.

There is an active demand by domestic consumers for Pocahontas and other smokeless fuels at Cleveland. Eastern Ohio operators also report a heavy demand for their coals. Retail dealers are busy replenishing their stocks and industrial plants are adding to their stocks of steam coals, not willing to take any chances. Buyers as a rule are watching the market for bargains and are keeping distress coal down to a minimum. Some of the mines in eastern Ohio which were closed during the past couple of months have reopened.

The spot market at Pittsburgh was just a trifle dull last week, but is not as poor as in the first week of the year. Production is somewhat heavier. The change is only slight, however, rail mines running a trifle over 50 per cent as compared with about 45 per cent before the holiday season. Only a small part of the increase is attributable to the demand for domestic coal. The Pittsburgh district continues to feel sharp competition from the nearby non-union fields.

The soft-coal market at Buffalo shows comparatively no change, the chief demand being for slack. Severe cold weather resulted in increased inquiry, but prices were not affected.

New England Sees Few Signs of Buying

In New England there are again some signs of firmer prices on Pocahontas and New River. The advance that materialized last week, however, was due far more to restricted production than to any appreciable improvement in demand. The light tonnage available at the Hampton Roads terminals made possible a gradual lift in quotations the first of the week from \$4.75 to \$4.90, and near the close of the week from \$4.90 to \$5.15. No actual sales at the latter figure were reported, but the fact that a few agencies are naming \$5.25 shows a purpose to try out the market on the basis of current mining. All these prices are per gross ton f.o.b. vessel at the loading port, but there has begun to be a corresponding movement on coal in storage for delivery inland. Prices on cars Boston and Providence have in some cases been advanced to \$6.15@ \$6.25, also per gross ton.

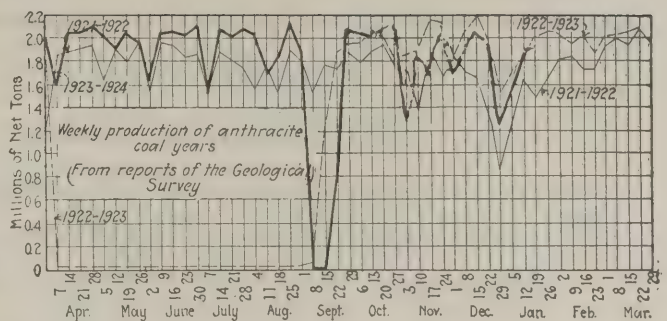
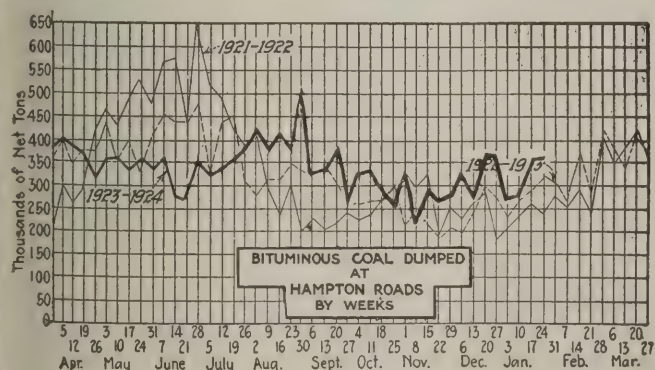
In the textiles, in shoes and in the paper trade there are no favorable developments. Reserves of coal in many cases are nearly at the maximum and there are few signs of buying in any direction. There is a certain response to strike talk, but it is by no means characteristic, and there seemed to be little chance that consumers will enter the market in any number during February.

All-rail there has as yet been no changes. It would take a material advance in the price of smokeless coals from West Virginia via the water route to approach the present delivered cost of coals from central Pennsylvania even at the minimum Clearfield rate. That one or two distributors of these coals are beginning to move their offices from Boston to Springfield, Mass., in order to be in closer touch with the actual buyers of those coals shows that the area nearer tidewater is being conceded to the shippers of Pocahontas and New River.

More Inquiries Along the Seaboard

Indications point to better buying and more inquiries for soft coal in the New York and Philadelphia markets. Some New York houses have been asked as to shipments to Canada and there has been an increased demand from the Dominion due to the strike of miners in Nova Scotia, both all-rail and water deliveries. Large consumers have shown a tendency to take in more coal, but they are not increasing their orders to a large extent. Most consumers are watching developments at Indianapolis. Contracts continue to be in the making and although \$3.25 is generally accepted as the contract figure for the better coals, some operators, it is said, are willing to take less. The market at Baltimore is flat, with prices remaining without change.

West Virginia reports a better demand for its coals in the West than in the East, but production has not been stimulated to any extent. Output in Virginia is about 60 per cent of capacity. Weather conditions have caused an improvement in the wholesale domestic demand at Birmingham. Dealers have been enjoying a better run of orders and are calling on the mines for replenishing stocks. Not much improvement is noted in the demand for steam coals.



The export market is a trifle more active, due to inquiries from Europe and from Canada, but the amount of new business placed is said to have been small. There was a sudden spurt in the movement from Baltimore, one vessel taking more than 10,000 tons to Genoa, Italy. During the first twenty days of January dumpings of cargo coal amounted to 38,458 tons, as compared with 3,390 tons during the corresponding period of last year.

No General Improvement in Anthracite Demand

Despite the more seasonable weather the anthracite trade fails to show any general improvement. Retail dealers are fairly busy, but production is sufficiently heavy to meet their demands. Yard bins are well filled and consumers of the domestic sizes are beginning to hold off in renewing their supplies. Stove and chestnut sizes continue to be the heaviest in demand, but there is no shortage. Straight lots of these coals of independent origin are held at slightly advanced quotations than when taken in conjunction with either egg or pea coals, which are draggy in most markets. Welsh anthracite is being offered to the trade in Baltimore as well as in New York, but comparatively few orders are reported as having been placed.

Utility Coal Consumption Gains Rapidly

Central-station plants were heavy consumers of coal in 1923. The reports of the Geological Survey show that whereas in 1919 these utilities used 96,200 net tons of coal daily for the generation of power, the daily consumption rose to 101,400 tons in 1920, but fell to 93,700 tons in 1922. In seven of the first eleven months of 1923 the quantity of coal consumed averaged about 110,000 tons per day and the average for the year was over 100,000 tons. Oil used by central stations also gained in 1923, the average daily consumption ranging from 32,600 barrels to 45,000 barrels. The average in 1922 was 36,200 barrels per day.

AVERAGE DAILY CONSUMPTION OF COAL BY ELECTRIC PUBLIC-UTILITY POWER PLANTS IN THE UNITED STATES

Month	1919-1923 (In net tons)				
	1919	1920	1921	1922	1923
January.....	104,000	115,600	95,000	95,300	114,700
February.....	102,000	111,500	93,900	92,600	116,000
March.....	93,900	105,000	85,200	87,800	108,100
April.....	88,100	97,200	80,600	81,900	96,900
May.....	85,300	91,100	77,900	79,700	95,100
June.....	88,300	95,000	81,360	82,900	98,400
July.....	85,700	94,800	79,400	82,700	98,000
August.....	86,700	97,100	83,200	90,900	103,500
September.....	92,200	100,100	86,300	96,600	105,600
October.....	98,400	101,800	89,000	105,700	115,300
November.....	112,500	105,200	92,600	111,900	113,300
December.....	116,800	103,200	93,700	116,000	.....
Year.....	96,200	101,400	86,500	93,700	.....

Car Loadings, Surpluses and Shortages

	Cars Loaded			
	All Cars	Coal Cars		
Week ended Jan. 12, 1924.....	872,265	211,098	Car Shortage	
Previous week.....	703,269	159,471		
Same week in 1923.....	872,730	198,770		
	Surplus Cars			
	All Cars	Coal Cars		
Jan. 14, 1924.....	292,921	129,846	Car Shortage	
Same date in 1923.....	28,282	6,155		
Jan. 7, 1924.....	353,790	165,975		

Foreign Market And Export News

British Production Registers Another Increase; Export Demand Slow

Production of coal in Great Britain was 5,747,000 tons during the week ended Jan. 12, according to a cable to *Coal Age*. This was an increase of 1,272,000 tons over the previous week's output and compares with 5,607,000 tons during the corresponding week of last year.

The South Wales coal market is reported to be quiet, due probably to the railroad labor trouble, while many of the mines have either stopped operations or are working on a curtailed schedule.

Many mines are well supplied with orders for immediate shipment, but others have filled their recent contracts in record time and are now running short of business. Foreign customers are holding their business for the fall in prices which they anticipate will accompany the decline in business.

The European demand is slower. Italian business being especially deficient. South American business is also very slow. Though the current export demand is fairly active the market is slack.

The Newcastle market is more stable though the recent strong position has been materially weakened by the arrival of a considerable amount of German coal in Belgium. Most of the mines are well booked ahead.

Hampton Roads Market Brisk

Business was more brisk at Hampton Roads in all branches last week, with prices stiffening, and inquiries on the increase. Car shortage on the N. & W. and C. & O. contributed to a marked increase in prices, due to the consequent lack of coal.

Foreign inquiries improved, while bunker demand was good and coastwise business fair. Improvement was noted for the first time in several weeks.

The tone of the market was strong, and the outlook for business good. Supplies of coal were low, but operations at the mines had been reported improved, and no shortage at tidewater was anticipated.

French Coal Market Active

The French coal market is normal following the holiday season and it is expected that production figures for January will be higher than for December. Demand for domestic coals is sufficient to absorb production and some improvement is noted in the call for house coals.

Owing to the difficulty in securing shipments, work was stopped for a few days the second week of the month in the Sarre district, reducing deliveries from that district to France. The Sarre collieries it has been announced are re-establishing their natural outlets with southern Germany.

Lack of rolling stock is keeping down the receipts of coal from Belgium. Imports of British industrial coals are larger, while house coals are purchased only when needed, because of the high prices.

Deliveries of indemnity fuels during December amounted to 190,200 tons of coal, 361,900 tons of coke and 31,900 tons of briquets.

During November France exported 206,277 tons of coal as compared with 121,915 tons in October. Coke produced during November was 182,974 tons, a decrease of 7,249 tons when compared with the previous month, while 431,592 tons were imported as compared with 282,806 tons in October.

Foreign Coal Trade Notes

Denmark imported 2,571,139 metric tons of coal during the first ten months of 1923, according to the report of Consul General Letcher, at Copenhagen, to the Department of Commerce at Washington. This compares with 2,263,260 tons imported during the corresponding period of the previous year.

The Polish coal production for the first nine months of 1923 is reported at 27,803,816 metric tons, or an increase of about 1,700,000 tons over the corresponding period of 1922.

Assistant Trade Commissioner Cremer, stationed at Rio de Janeiro, re-

ports to the Department of Commerce at Washington that the Minister of Transportation and Public Works of Brazil has directed the general manager of the Central of Brazil Railway to take steps to enter into direct negotiations with the mining companies in the United States and England regarding coal supplies for that railway.

Export Clearances, Week Ended Jan. 26, 1924

FROM BALTIMORE		Tons
For Porto Rico:		
Am. SS. Delisle		447
For Italy:		
Ital. SS. Giovanni		10,913
FROM HAMPTON ROADS		
For Brazil:		
Br. SS. Pentoway, for Rio Janeiro...		4,977
For Italy:		
Ital. SS. Concordia, for Genoa.....		9,006
Ital. SS. Vallarsa, for Porto Ferrijo...		6,809
For Uruguay:		
Br. SS. Fantee, for Montevideo.....		6,278

United States Domestic Coal Exports In December

	(In Gross Tons)	1922	1923
Anthracite.....		381,758	328,945
Value.....		\$4,220,591	\$3,657,558
Bituminous.....		1,468,917	1,078,028
Value.....		\$9,437,765	\$5,506,443
Coke.....		123,442	44,951
Value.....		\$849,979	\$420,476

	Twelve Months Ended December	
Anthracite.....	2,365,587	4,544,766
Value.....	\$25,350,777	\$49,577,393
Bituminous.....	11,083,112	19,154,981
Value.....	\$65,891,740	\$104,546,585
Coke.....	456,733	1,104,770
Value.....	\$4,319,538	\$11,889,897

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Jan. 17	Jan. 24
Cars on hand.....	1,038	1,126
Tons on hand.....	69,403	77,883
Tons dumped for week.....	171,740	148,625
Tonnage waiting.....	12,000	27,000

Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	651	973
Tons on hand.....	42,050	61,850
Tons dumped for week.....	77,359	82,177
Tonnage waiting.....	3,018	21,520

C. & O. piers, Newport News:		
Cars on hand.....	1,031	958
Tons on hand.....	52,710	49,030
Tons dumped for week.....	76,100	82,081
Tonnage waiting.....	2,290	1,640

Pier and Bunker Prices, Gross Tons

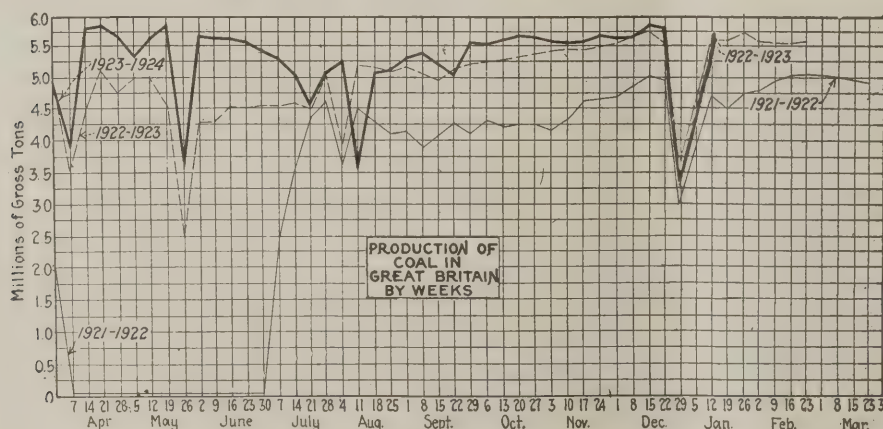
PIERS		Jan. 19	Jan. 26†
Pool 9, New York.....	\$5.00@	\$5.25	\$4.90@
Pool 10, New York.....	4.60@	5.00	4.65@
Pool 11, New York.....	4.50@	4.70	4.50@
Pool 9, Philadelphia.....	4.90@	5.20	4.90@
Pool 10, Philadelphia.....	4.50@	4.90	4.50@
Pool 11, Philadelphia.....	4.25@	4.60	4.25@
Pool 1, Hamp. Roads.....	4.75		5.25@
Pools 5-6-7 Hamp. Rds....	4.25@	4.35	4.50@
Pool 2, Hamp. Roads.....	4.50@	4.65	5.00@

BUNKERS		Jan. 19	Jan. 26†
Pool 9, New York.....	5.30@	5.55	5.20@
Pool 10, New York.....	4.90@	5.30	4.95@
Pool 11, New York.....	4.80@	5.00	4.80@
Pool 9, Philadelphia.....	5.15@	5.55	5.15@
Pool 10, Philadelphia.....	4.90@	5.20	4.90@
Pool 11, Philadelphia.....	4.65@	4.90	4.65@
Pool 1, Hamp. Roads.....	4.75		5.35
Pool 2, Hamp. Roads.....	4.50@	4.65	5.15

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to Coal Age		Jan. 19	Jan. 26†
Admiralty, large.....	28s. @ 29s.		29s. @ 30s.
Steam smalls.....	22s.		22s.
Newcastle:			
Best steams.....	24s. 6d. @ 25s.		25s. @ 25s. 6d.
Best gas.....	24s. 6d. @ 25s.		24s. 6d. @ 25s.
Best bunkers.....	25s.		25s. @ 26s.

† Advances over previous week shown in heavy type, declines in *italics*.



Traffic News

Rate Adjustment Hearing

A hearing will be held on Feb. 7 at New York City by the Coal & Coke Committee, Trunk Line Territory, on a carrier's proposal to adjust rates on anthracite from mines on the D. & H., D., L. & W., and the N. Y., O. & W. Rys. to stations on the Grafton & Upton R.R. It is proposed to reduce the rates on prepared sizes of anthracite from points on the D. & H. and D., L. & W. from \$5.04 to \$4.91 and on pea and No. 1 buckwheat coals to West Upton, Upton and Hopedale, Mass., from \$4.91 to \$4.79 per ton. Adjustments are proposed from points on the N. Y., O. & W. Ry to make rates similar.

M. & W. Removes Differential

Largely through the efforts of the Monongahela Coal Association the freight rate differential on carload shipments of coal over the Morgantown & Wheeling R.R., now a part of the Monongahela Ry., between Randall and Cassville has been removed. Heretofore coal shipped over the subsidiary of the Monongahela has had to bear a freight charge of \$47 per car. In the future, under the new ruling, coal shipped over the Morgantown & Wheeling will be subjected only to the same rate as coal shipped from points on the main line of the Monongahela.

Defers Rate Inquiry

The Interstate Commerce Commission has indefinitely postponed its investigation into rates on anthracite and on bituminous coal from points in Pennsylvania and West Virginia to New England and northern New York destinations. Hearings were to have been resumed Jan. 28, but were canceled because statistics that were to have been submitted were not ready. It is understood the investigation will be resumed about the middle of February.

Coal-Road Earnings Up

The Norfolk & Western Ry. reports gross earnings of \$8,074,152 in December, 1923, against \$6,960,753 in December, 1922, and \$7,218,894 in 1921. Net operating income amounted to \$2,377,969 in 1923, against \$642,677 in 1922 and \$2,138,886 in 1921. Gross earnings for the whole of 1923 totaled \$95,494,687, against \$90,314,743 in 1922 and \$80,760,590 in 1921. Net operating income totaled \$19,877,677 in 1923, against \$18,624,468 in 1922 and \$14,870,021 in 1921.

The Delaware & Hudson showed net operating income of \$531,443 in December, 1923, against \$74,892 in the same month in 1922 and \$153,771 in 1921.

Net operating income for the full year 1923 totaled \$6,512,344, against \$1,216,689 in 1922 and \$7,076,803 in 1921.

The Delaware, Lackawanna & Western reported net operating income of \$1,091,959 in December, 1923, against \$329,130 in 1922 and a deficit of \$73,349 in 1921. For the year, this road reported net operating income of \$13,443,543, against \$6,669,022 in 1922 and \$12,997,084 in 1921.

N. Y. Central Loadings Heavy

Average daily coal loadings for the second week of January on the New York Central lines amounted to 2,505 cars, which was an increase of 33½ per cent over the daily average for the month of December, according to a statement issued by the company. The average for the second week of January was larger than the daily average for any month of 1923 with the exception of January, when the country had not yet caught up with the shortage due to the prolonged miners' strike. The daily average coal loadings for the first week of January was 2,161 cars.

Northwest Wants Rate Decision

The long delay of the Interstate Commerce Commission in giving a decision on the Illinois-Minnesota rate case, which was heard a year ago in July, is causing much adverse comment among coal men in the Northwest. It is pointed out that \$35,000,000 is invested in the docks at the head of the lakes and that these docks are supposed to supply the Northwest. Many feel that they are being unfairly discriminated against by the commission and that a continued delay will make the dock trade suffer.

As the situation stands Illinois coal can be brought to Twin Cities for \$3.46 a ton, a distance of 700 miles. Eastern coal comes to Buffalo from the mines for \$1.82 and from Duluth to Twin Cities for \$1.76, or \$3.58 for the total rail haulage of 250 miles. To this must be added the water freight of \$0.45 a ton, making a total of \$4.03. The docks contend that they cannot exist long against this competition.

Even Duluth itself is not immune from the Illinois coal bugaboo. It is being sold there under the name of "Illinois lump," and the dealer charges \$11.25 a ton, or two tons for \$22. Householders buy it under the impression that it is "part anthracite," and it looks much like it in the medium sizes. Added to other Illinois advantages is that cars can be reloaded with grain or other material for the return trip.

Arguments will be heard Feb. 19, in Minneapolis, on the request that has

been made by the docks for \$1.66 increase in the anthracite rate to Twin Cities, all rail. Minneapolis independent dealers are opposing this, as they can at present undersell the Duluth coal.

Association Activities

The eleventh annual meeting and banquet of the Cincinnati Coal Exchange was held at the Hotel Gibson, Cincinnati, on the evening of Jan. 24. About 150 members of the organization and friends were present. Vice-President Edward Harper, in the absence of R. S. Magee, who is in California, presided. Colonel Charles A. Moriarity acted as toastmaster. A. Julius Freiberg, president of the Cincinnati Chamber of Commerce, of which the coal exchange is the largest subsidiary, was present and felicitated the coal men upon the work that had been accomplished during the year. One striking utterance was the statement that the onslaught of public opinion against coal, railway and other business interests should be met four-square. "When an issue develops," said Mr. Freiberg, "there is only one way to meet it, and that is to stand and fight." Other speakers of the evening were W. S. Battle, Jr., claim agent for the Norfolk & Western Ry.; W. C. Hull, assistant to the traffic vice-president of the Chesapeake & Ohio Ry., and J. M. Dewberry, coal and coke agent for the Louisville & Nashville. Tribute was paid to Victor White, Kuper Hood, Charles A. Tribbey and Jacob Brady, who died during the year.

The Southern Ohio Coal Exchange held its annual meeting at Columbus, Jan. 25, when it was voted that the exchange be represented in the four-state meeting between operators and miners at Jacksonville, Fla., Feb. 11. Dr. T. R. Biddle and J. S. Jones were chosen as delegates and James H. Pritchard and O. S. Newton as alternates. The following officers were elected: T. R. Biddle, president; George H. Barker, treasurer; W. D. McKinney, secretary, and James H. Pritchard, commissioner of mining.

Obituary

Ryburn Pinckard, superintendent and general manager of the Norton Coal & Coke Co., of Nortonville, Ky., died at Nortonville, Jan. 18. Mr. Pinckard was superintendent of the byproduct plant of the Woodward Iron Co., Birmingham, Ala., for several years, going to Nortonville about three years ago. He was 41 years of age and spent a great part of his life in the Birmingham district, where he was well known in industrial circles. Burial took place Jan. 20.

George W. Leckie, chief engineer of the Leckie Coal interests in southern West Virginia and Kentucky, died at his home at Welch, W. Va., on Saturday, Jan. 19. Mr. Leckie was born Feb. 2, 1881 at Shendoah, Pa., and after being graduated from Girard College, at Philadelphia, he entered the employ of the Wentz interests, spending fifteen years with that company at the Mary D. and Lehigh Collieries. In 1917 he was made chief engineer of the Leckie Coal companies and moved to Welch. He is survived by his wife, and by four children. Funeral services were held at the Presbyterian Church at Welch on Tuesday, Jan. 22, burial being at Bluefield, W. Va.

Coming Meetings

Rocky Mountain Coal Mining Institute, Winter meeting, Feb. 13-15, Albany Hotel, Denver, Colo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

American Institute of Mining and Metallurgical Engineers. Annual meeting Feb. 18-21, 29 West 39th Street, New York City. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

Northern West Virginia Coal Operators Association. Annual meeting Feb. 12, Fairmont, W. Va. Secretary, J. O. Caldwell, Fairmont, W. Va.

Upper Potomac Coal Association. Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

News Items From Field and Trade

ALABAMA

A spur track has been constructed to the mines of the **Hilliard Coal Co.**, about four miles from Jasper, Walker County, by the St. Louis & San Francisco R.R. The company has lately completed a large tippie at its mine.

The **Sunlight Mining Co.** has installed a large steam shovel and completed a large washery at its stripping operations in Walker County, near Jasper. Erection of a number of houses for employees also is contemplated at an early date.

COLORADO

The **Colorado State Land Board** has leased to the **Pacific Steel Co.**, of Los Angeles, Calif., 6,318 acres of state coal lands classified as Fort Lewis school lands, located in La Plata County, near the New Mexico-Colorado border. The **Pacific Steel Co.** made application to the board for the lease last September; the lease was approved by the Attorney General, but formal papers were not drawn and the lease signed until the early part of January. The company will pay to the state a royalty on all coal mined. State officials predict that this lease presages the exploitation of the hitherto undeveloped coal resources of La Plata County.

During the month of December **Colorado** mines produced **1,037,772 tons of coal**, this being 95,079 tons less than the production for the same month last year. The yearly production of 10,322,258 tons shows an increase of 318,648 tons as compared with the amount of coal produced during 1922. The average number of men employed in and around the mines was 13,232 and average number of days worked per mine was 160.9.

ILLINOIS

The U. S. Supreme Court has affirmed the decision of the Federal District Court at East St. Louis, in the case of **Walter G. Space vs. the Illinois Fuel Co. of Sparta, Space**, who resides in Minneapolis, brought suit for alleged breach of contract, alleging that the coal company contracted to ship him 12,000 tons of coal from the Sparta mine in 1920. The district court gave him a verdict for \$12,000, which was sustained by the Court of Appeals at Chicago. The judgment with interest now totals \$15,000.

January has been a good month for the miners in the immediate vicinity of Belleville. It has been a better month, in fact, than any in the last two years. All except eight mines in the subdistrict, where 10,500 men follow the occupation, are operating daily. The only mine in the vicinity which has not reopened is the Superior, owned by the Perry Coal Corporation.

Another petition in bankruptcy against the **Southern Gem Coal Corporation** was filed last week in East St. Louis. This time miners formerly in the employ of the company, and who have suffered by the fact that the company missed two payrolls, have filed an intervening petition claiming \$100,000. The first receivership, ordered upon petition of minority creditors, has been dissolved and another petition from the same source was expected.

With an output of 4,902 tons in four hours, the **Kathleen mine of the Union Colliery Co.** at Dowell established a new record on Jan. 12. The day's output required 101 railroad cars for transportation. The mine has a capacity of 8,000 tons daily.

INDIANA

Delegates representing the **Indiana Bituminous Coal Operators' Association** will attend the mine wage conference at Jacksonville, Fla., Feb. 11, unopposed, and with full power to act for the operators. It has been announced by Phil H. Penna, secretary of the association. Representing the operators will be M. L. Gould, president of the association; Alfred M. Ogle and E. D. Logsdon, of Indianapolis; Phil H. Penna, Will J. Freeman, John A. Templeton and Hugh Shirkie, of Terre Haute, and David Ingle, of Evansville.

Officials of District 11, United Mine Workers, have been notified that the **James Devenold mine**, near Burnett, employing about 150 men, has been closed down. The mine had been operating under the co-operative plan, under which the company was selling stock, valued at \$50 a share, to the employees. Pay day found the miners 25 per cent short in wages and the balance due was credited to them in the company's stock, it was reported. Later they learned the mine was not making expenses, which led to its closing.

The 1924 first-aid meet of **Indiana coal miners** is to be held June 28 in the fair ground at Princeton, according to Cairly Littlejohn, chief mine inspector of the State Department of Mines and Mining, who attended a joint meeting of miners and operators with representatives of the federal Bureau of Mines at Terre Haute recently to arrange for the meet. The election of officers of the Joseph A. Holmes Safety Association was held at this meeting and the following men were named: William Rohl, president of the local miners' union at Princeton, president; Alfred Taylor, secretary of the Princeton Chamber of Commerce, secretary; William H. Raney, superintendent of the General Fuel Corporation, Princeton, vice-president; W. W. Cox, superintendent of the Francisco Mining Co., treasurer. These men are to arrange for the state safety meet.

The **Shagley Coal Co.**, of Terre Haute, has filed preliminary certificate of dissolution.

KENTUCKY

Two or three coal-tax bills have been introduced in both the House and Senate of the **Kentucky General Assembly** since Jan. 19, providing for a tonnage tax on coal based on either 2½ or 3 per cent of the sales value of coal produced and sold. However, the coal interests are rather strong in the Legislature this year with the result that there will be no landslide for the interests that are endeavoring to shackle Kentucky operators with a tonnage tax. On Jan. 22 an effort in the House to give the farmer interests a large representation on the House Committee on Taxation and Revenue was defeated, by 64 to 33, in spite of efforts of the opposition to show that the committee was loaded with men favorable to the coal interests.

It was reported from Harlan, on Jan. 20, that the **R. Brown Coal & Coke Co.** had taken back its lease and operation rights sold some time ago to the Standard Harlan Coal Co., because of default in payment of \$25,000 due on the purchase price, along with interest. The property is on the Kellioka seam and was sold to the Standard for a reported price of \$75,000.

The **New Arjay Coal Co.**, Arjay, capital \$40,000, has been chartered by L. A. Bowling, W. B. Landrum and C. F. Wheeler.

The **Cowan Creek Coal Co.**, at Ice, Ky., which is controlled by Cincinnatians, recently installed Jeffery motors, and a new tramway which will increase the output of the mines ten cars a day.

A receiver has been named for the **Harlan Co-Operative Coal Co.**, operating 1,000 acres of coal property of the Darby by-product seam.

MASSACHUSETTS

Fuel Administrator Eugene C. Hultman in a communication to the mayors of cities and boards of selectmen in towns throughout the state urges that wherever the retail prices of anthracite appear to be unreasonable, the local authorities take immediate steps to bring about a reduction, by calling conferences with local dealers. He calls attention to the law cited by the Joint Special Coal Investigating Committee in its report, which gives the local authorities broad powers to regulate the retail coal industry. Mr. Hultman states that the retail price has decreased in a number of municipalities, owing to the drop in independent mine prices, the open winter and the accumulation of stocks by the local dealers.

On Jan. 1 there were 500,000 tons of anthracite in Massachusetts, and the movement into the state since that time has been normal.

Coal dealers of Greater Boston on Jan. 16 reduced the retail price of anthracite to \$15.50 a ton for egg, stove and nut sizes and \$12.50 for pea size. The new prices represent a cut of 50c. a ton. According to the dealers, the reduction was a result of the open winter.

MISSOURI

Fire of incendiary origin last week destroyed the tippie at the **Pierce Hess mine** near Bevier. About 100 men are out of work temporarily. The management of the mine changed hands Jan. 16, when H. B. Pierce sold his interest to Lewis Larsen, of Prairie Hill.

NEW YORK

Harry M. Taylor, president of the United States Distributing Corporation, says that because of the slight decline in the steam prices of anthracite and a corresponding advance in oil prices within the last month a number of plants in New York and vicinity which had been experimenting during the summer months with oil now are changing back to coal. He said that in the main they had found the experiment costly and unsatisfactory.

The Board of Directors of the **Pennsylvania Coal & Coke Corporation** on Jan. 22 declared the regular dividend of \$1 per share out of the accumulated earnings and surplus of the company, payable on Feb. 11. The gross earnings of the company and its subsidiaries for the twelve months ended Dec. 31 amounted to \$8,395,228, as against \$4,996,391 for 1922, and the net income, after charges but before federal taxes, was \$750,793, comparing with \$622,886 for 1922. The income account of the corporation shows gross earnings for December of \$519,098, as compared with \$676,838 for that month in 1922.

Announcement has just been made that the **Brazilian International Centennial Exposition**, recently held at Rio de Janeiro, has awarded the grand prize to E. I. du Pont de Nemours & Co. for its exhibit of dynamite, caps and fuse. The award is especially noteworthy in view of the fact that the du Pont exhibit won the grand prize in competition with products of the same type exhibited by other manufacturers.

Albert McColgan, sales agent of the **Pittsburgh & Ohio Mining Co.** at Buffalo, who has been with the company for seventeen years, has resigned his position, because of ill health. He was formerly connected with the trade at Detroit. His successor is Carl Fraser, who has for some time been his assistant.

The **Virginia Iron, Coal & Coke Co.** reports for the last quarter of 1923 a net income of \$75,371, equivalent, after the deduction of the preferred dividends, to 12c. a share on the \$10,000,000 common stock. This compares with a net income of \$170,413, or 1.07 a share on the common stock, for the preceding quarter, and a net revenue of \$114,984, or 52c. a share, for the second quarter of 1923. The net earnings for the twelve months ended Dec. 31, subject to inventory adjustment, were \$604,328, as compared with net earnings of \$561,983 for the year 1922.

The listing on the New York Stock Exchange of the 1,400,000 shares of no par value stock of the **Philadelphia & Reading Coal & Iron Corporation** has been approved by the Board of Governors of the exchange. The governors also approved the listing of the \$31,542,300 refunding mortgage 5 per cent bonds of the same company, due Jan. 1, 1973; also Reading Co. \$63,084,700 general and refunding mortgage 4½ per cent gold bonds, series A/, due Jan. 1, 1997.

OHIO

The friendly receivership of the **Maynard Coal Co.**, of Columbus, which was brought about recently by interested parties in order to preserve the assets of the company is progressing very satisfactorily, according to George H. Barker, one of the receivers and also vice-president of the corporation. Frank L. Stein, president of the Ohio National Bank, is the other receiver. Lack of funds, due to overproduction is given as the cause for the receivership. The assets are estimated at \$4,833,000 while the liabilities are approximately \$2,000,000. The company holds extensive dock properties at Duluth as well as large operating mines in the Pomeroy Bend field of Ohio and in the Hazard field in Kentucky. The company's annual production capacity is 1,250,000 tons.

The Nelly Coal Co., Macksburg Village, has been incorporated with a capital of \$10,000 to mine and sell coal. Incorporators are Elmer Hostetler, A. D. Kline, C. M. Dilley, H. E. Schulteis and George J. Ackerman.

The Hope Coal Co., Cleveland, has been chartered with a capital of 2,000 shares, no par value, designated to operate coal mines and sell coal and coke. Incorporators are C. H. Juddins, George R. Blackburn, C. G. Collins, Paul R. Brown and Hiland B. Wright.

Receivers for the Lexi Coal Co., Columbus, won their case in the Ohio Supreme Court when the receivers for the Ohio Consolidated Coal Co. attempted to have a judgment for \$32,000 against the Lexi Coal Co. for alleged breach of contract affirmed. The Court of Appeals had reversed the lower court and the Supreme Court affirmed the reversal.

Circuit Court Judges L. E. Knappen and A. C. Denison and District Judge A. M. J. Cochran at Cincinnati on Jan. 18 denied the petition of the Buckeye Coal & Railway Co. and the Sunday Creek Coal Co. of Ohio, asking that the 2c. per ton royalty on coal mined on certain lands conveyed by the Hocking Valley Ry. Co. as security for a mortgage be enjoined. The petition also asked that the lands of the Buckeye company be released from the mortgage given by the Hocking Valley Railway Co. to the Central Trust Co. of New York. The supplemental petition of the United States asking release of the lands of the Buckeye company from the mortgage lien and discharge from paying the royalty also was dismissed. Both the government and the Buckeye and Sunday Creek companies charged that the continuation of the royalty provision of the mortgage was in contravention of the former decree of the court, ordering the dissolution of the so-called coal trust.

Bids were received by the Board of Purchase of the City of Columbus, Jan. 23 for coal to be delivered before March 31 in the following amounts: 5,000 tons of nut, pea and slack for the Municipal Light Plant, Boblo Coal & Sales Co., Pittsburgh, \$1.35, and the Gene Miller Coal Co., of Columbus, \$1.40; 3,500 tons of nut, pea and slack for the Water Works Department, Boblo Coal & Sales Co., Pittsburgh, \$1.30; Gene Miller Coal Co., Columbus, \$1.40; 2,000 tons of nut, pea and slack for the Garbage Disposal Plant, Boblo Coal & Sales Co., of Pittsburgh, \$1.25, and the Gene Miller Coal Co., of Columbus, \$1.40; all bids are f.o.b. mines.

PENNSYLVANIA

The board of directors of the Central Pennsylvania Coal Producers' Association and the executive committee of the Association of Bituminous Coal Operators of the district held meetings Jan. 25 at the headquarters in the Lincoln Trust Building in Altoona and the decision was reached to enter into a general investigation of freight-rate schedules as they affect the district. No action was taken on the question of the coming wage conference with the United Mine Workers, although there was some discussion of the situation. A general meeting of the operators of the district will be held about March 1. The two boards received and accepted the resignation of John S. Sommerville and elected Edgar W. Tate of Pittsburgh, president of the Allegheny River Mining Co., to succeed him on the boards. Mr. Sommerville resigned his official connection with the Rockville Coal & Iron Co. and is locating in New York. President B. M. Clark, of Indiana, presided at the meeting, and others in attendance included Harry Boulton, John C. Forsythe, W. R. Craig, M. J. Bracken, James W. Cook, Rembrandt Peale, H. B. Scott, C. B. Maxwell, E. W. Robertson, J. William Wetter, G. Webb, Shillingford, A. M. Liveright, William Leamont, W. G. Calkins, F. D. Lambert, J. R. Caseley and R. H. Sommerville.

Governor Pinchot has announced that the thirty bituminous inspectors have followed the example of the twenty-two anthracite inspectors and have agreed to take a month's "leave of absence" without pay. In reality this means they will work during this period of a month without compensation, running the risk of getting the \$400 a month allowed by the state at a future date. The lay-off is occasioned by lack of funds in the State Department of Mines, whose appropriation for 1923-1925 was severely cut by Governor Pinchot.

Hyman Michaels Co., Chicago, dealers in new and relaying rails, have placed Al Michaels, assistant treasurer, in charge of their Pittsburgh offices. Mr. Michaels formerly was located in Chicago.

The following officers have been elected for the ensuing year by the Wilkes-Barre Mining Institute: John B. Tamblyn, president; J. S. Hammonds, Edward Flynn and Edward Griffith, vice president; F. M. Devendorf, secretary and treasurer. New members elected on the board are: Paul Warriner, of Lehigh Valley Coal Co.; Thomas Gambold, of Lehigh & Wilkes-Barre Coal Co.; E. S. Morris, of the East Boston Coal Co. and Henry Nothoff of Haddock Mining Co. A speakers' committee was appointed to arrange a program for the banquet to be held in Irem Temple Jan. 30.

The Lehigh Coal & Navigation Co. has awarded the contract for erection of a new breaker to supplant the present one at Lansford. The plant, which will be a steel and concrete structure, will involve an expenditure in the neighborhood of \$1,250,000. Work will be started in the early summer and the new plant is expected to be in operation in the early fall. During the course of construction the present breaker will be operated since the site for the new structure will be east of the old one. The capacity of the new plant will be about 5,000 tons of prepared coal daily. The plans call for a structure similar in design to the present Coaldale breaker.

The convention of the United Mine Workers of District No. 2 will be held in Altoona, March 11. This is the first time in many years that the convention has been held outside of DuBois. So far as the local district is concerned, no schedule of demands has been arranged. Work in District No. 2 has been in bad shape for the union workers, and operators have been suffering with them. What demand there has been for coal in the union section of the district has been supplied by working the men of some of the mines on part time, while many of the smaller operations have been closed entirely. If the convention in Indianapolis can present a plan which will improve conditions in the mining industry in central Pennsylvania, it will find a hearty welcome in this field both by the miners and the operators.

Joseph Linden, who for many years was mine inspector for the Carnegie Coal Co., Pittsburgh, has been appointed general superintendent of that concern, to succeed G. F. Osler, who resigned to become vice-president of the Pittsburgh Terminal Railroad & Coal Co.

VIRGINIA

W. W. Houston, coal broker and former manager for the Pan Handle Coal Co., Norfolk, has been elected chairman of the industrial committee of the Norfolk-Portsmouth Chamber of Commerce. Mr. Houston was chairman of the committee which last year raised a \$1,000,000 industrial revolving fund in the two cities.

WEST VIRGINIA

As the result of a conference held in Huntington on Monday, Jan. 21, between R. M. Lambie, chief of the West Virginia Department of Mines, W. J. Parker of the Pennsylvania Bureau of Mines, and H. E. Mathews, secretary of the Huntington Chamber of Commerce, it has been announced that the seventh annual International First-Aid and Mine-Rescue Meet will be held in Huntington, Sept. 11, 12 and 13. Arrangements will be begun immediately. Widespread interest is being evinced, which it is believed presages a large attendance and the sending of teams from many different sections of the country as well as from other countries.

A charter has been granted to the Mine-to-Consumers Coal Co., of Martinsburg. This concern is capitalized at \$25,000. Its incorporators are Solomon J. and Reuben Fine of Martinsburg; Nathan Fine, of Hancock, Md. and Harry Fine of Baltimore, Md.

In connection with the ejectment suits filed by the Francois Coal Co. against 19 miners formerly in its employ for the possession of company houses, Magistrate R. E. Kidd rendered a decision for the plaintiff in each of the 19 cases, in which the miners had signed written contracts with the company regarding possession of the mine houses. Only about 10 of the miners are affected as a number have already relinquished possession. Counsel for the United Mine Workers has taken an appeal to the Circuit Court of Harrison County. The Antler Coal Co.'s suit against several miners in its employ at Lumberport, in Harrison County, also has been tried and decision reserved.

According to figures compiled by the Kanawha Operators Association, 103,834-

836 tons of coal was produced in West Virginia during 1923, December tonnage in some instances being estimated. The N. & W. Ry. handled 28,818,430 tons of the state's output, and the C. & O. 28,831,600 tons. Transportation of 7,273,375 tons by the Virginian Ry. and of 4,533,981 tons by the Kanawha & Michigan brought the total production of southern West Virginia mines up to 69,557,386 tons. In the northern West Virginia field proper there was an output of 27,827,450 tons, supplemented by an output of 5,200,000 tons in the Northern Panhandle and 1,250,000 tons in the remaining districts of the state. It is shown by the association that 76,057,677 tons or 73.3 per cent of the total output, was produced at non-union mines, as compared with only 34.6 per cent of 92,047,487 tons produced in 1920.

W. E. Deegans and associates of Huntington have sold the New Pocahontas Coal Co., operating at Deegans, in McDowell county, to a group of southern West Virginia operators who have organized the Monarch Smokeless Coal Co. The deal follows closely upon the sale of the Deegans properties in the Logan district to the George M. and Herbert Jones interests. The new company formed to take over the company is capitalized at \$400,000. Such well known coal men as W. D. Ord, of Land-graff; James Elwood Jones, of the Pocahontas Fuel Co.; John J. Lincoln, of Elk-horn; Frank S. Easley, of Bluefield; I. J. Rhodes, of Welch, and Captain D. H. Barger, of Shawsville, are interested in the newly organized company. Included in the transfer were 1,350 acres of fine coal land, this lease representing a merger of the Atlas and Pando leases, a part of the lease running for a period of 20 years or more. The New Pocahontas company had been operating for a period of about eight years in McDowell and had one of the best plants in that section. Mr. Deegans and his associates still maintain their interests in the Margaret Coal Co. and the Frances Coal Co. now engaged in developing smokeless coal properties in the Greenbrier field on an extensive scale.

WASHINGTON, D. C.

Bids are being opened today (Jan. 31) by the U. S. Navy Department for transporting the following tonnages of Navy coal from Hampton Roads in vessels of American registry: On Feb. 12, 3,500 to 5,000 tons to the Portsmouth (N. H.) Navy yard; Feb. 25, 3,500 to 5,000 tons to the Boston Navy yard, and on Feb. 18, 3,500 to 10,000 tons to the Melville (R. I.) Naval fuel depot.

Bids will be opened by the U. S. Navy Department on Feb. 6 for furnishing and delivering at Sewalls Point 40,000 gross tons of bituminous coal from mines on the Navy acceptable list. Total delivery is to be completed by April 1.

CANADA

Premier Ferguson has returned to Toronto after a conference in Ottawa with Sir Henry Thornton and other C. N. R. officials, who assured him that they would reopen the question of freight rates on Alberta coal to Ontario points. The plan suggested involves a rail and water haul, instead of an all-rail haul, from Alberta. It is believed that the government is considering the advisability of transporting coal by ship from the head of the lakes to Toronto and distributing it from there to the various centres of southern Ontario. Shipments for more northern points could be landed at Parry Sound, Midland and other points on Georgian Bay.

The year 1923 was one exceptionally free of fatal accidents in the coal mines of British Columbia. Had it not been for the disaster of last February in the Cumberland Mines of the Canadian Collieries (D), Ltd., Vancouver Island, the record would have been so low as to stamp the year as one of the most gratifying in the history of coal mining in the province. As it is, in many respects the year stands alone. The Crow's Nest Pass field was free of fatal accidents, which, according to the records had never before been achieved. Neither were there any fatalities in the Nicola-Princeton field. Vancouver Island was not so fortunate, but some of the collieries in this field have a clean record in this regard. The Extension Collieries of the Canadian Collieries (D), Ltd.; the Nanose Collieries and the East Wellington Colliery Co. are those ranking in this class. William Sloan, Minister of Mines, forwarded congratulatory messages to the collieries which have been without fatal accidents at the close of the old year.

New Equipment

Lightweight Welder for 500-600 Volts

This lightweight resistance arc welder for 500-600 volt direct-current service is virtually an enlarged model of the Ohio Brass Co. 250-volt machine, with slight modifications necessary for the higher voltage.

It is made portable, having four carrying handles that fold down out of the way when not in use. The machine without accessories weighs only 170 lb. It can easily be conveyed to a bond welding job and then transported as the work progresses. It also can be used for various other jobs around the repair shop and mines.

Plug connections are used on the ebony asbestos panel board for both the trolley cable and welding connections. A magnetically operated switch, enclosed inside the frame, is connected to make contact when the electrode touches the work. It opens as the arc is broken. A pushbutton snap switch adjacent to the electrode handle is provided for completely de-energizing the magnetic switch-closing coil, thus making the electrode absolutely dead.

With the snap switch open safe replacements of electrodes may be made and the electrode may be handled without danger of accidental ground. The magnetic switch is connected into the line on the trolley side, so that when it is open all parts of the machine are dead except for the one connection from the trolley plug socket to the top of the switch. With this assembly it is never necessary for the operator to operate any knife switches on the 500-volt cir-

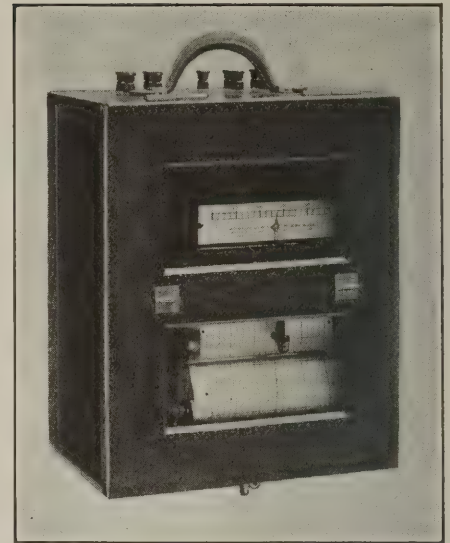
cuit except when they are completely de-energized.

The frame is of a substantial welded construction and affords ample ventilation for the resistance elements. The resistance consists of nickel-chromium wire rigidly supported in special refractory cement, and will not sag. These resistance elements are joined in such a manner that with the three selective single-pole knife switches and two welding cable connections, 14 values of welding current are available—from 30 to 210 amperes. The resistance units are insulated from the frame with mica tubes and washers.

Actually this welder will operate efficiently on voltages as low as 400 and one of the welding plug connections provides for cases where the voltage is comparatively low. Regular welding accessories are provided with the welder, such as welding cable and electrode, operator's helmet, wire brush and trolley contact and cable. A slow burning fuse is furnished in the trolley contactor, the time element being such that the current will be entirely cut off before damage is done to the machine.

Portable Recording Instrument of Great Accuracy

Among the recent developments by the Westinghouse Electric & Mfg. Co. is a new portable recording instrument known as Type R. It is made for applications where records as accurate and reliable as those obtained with large switchboard instruments are necessary. Such applications include analysis of



Portable Recording Wattmeter

This meter is one of a new type designed to give greater accuracy in testing, including as a new feature an electric self-winding clock mechanism.

motor operation, typical consumption curves of large industrial consumers, and records of power distribution.

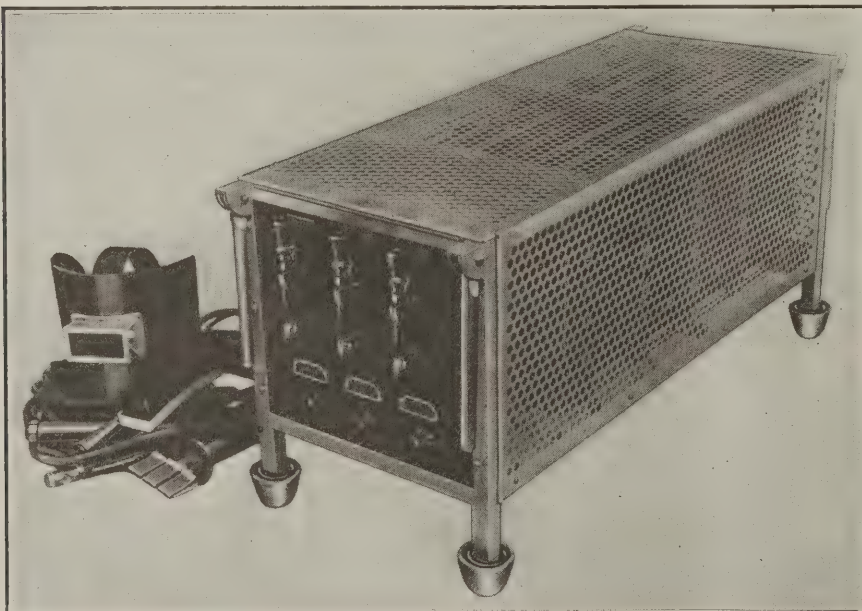
The Type R instrument is an adaptation of the switchboard recording instrument, with the element as a whole mounted in a portable carrying case. An electric self-winding clock is used for speeds up to 24 in. per hour. For slower speeds, up to 4 in. per hour, a hand-wound clock can be used.

Alternating-current ammeters, alternating- and direct-current voltmeters, and single and polyphase wattmeters are made in these portable recording instruments.

To Prevent Slippery Floors

To prevent slipping and at the same time add durability to floor surfaces, the Abrasive Co., of Bridesburg, Philadelphia, Pa., has developed Sans-Slip, an abrasive in loose granular form especially adapted for combination with cement. This is an aluminous oxide material quite similar in character to that used in the manufacture of grinding wheels. The angular formation of the grain presents sharp fractures which readily bond with plastic cement and consequently prevent slipping. The material, it is asserted, ranks between the diamond and sapphire in the scale of hardness, which gives some idea why cement laid with it resists wear to a considerable degree and largely prevents "dusting" of the surface.

The application of Sans-Slip in cement work entails no extra labor to speak of. Before the final set of the top surface of the cement, it should be sprinkled over the surface and lightly troweled in. For ordinary non-slip and durability purposes from $\frac{3}{4}$ to 1 lb. per square foot of surface is sufficient. One pound equals about 14.5 cu.in. Its specific gravity is about 3.8. It has pronounced surface capillarity qualities but is non-absorbent; causes no discoloration after it is applied, and can hardly be detected with the eye.



Welding Outfit for Mine Repair Work

An important safety feature—always essential on high-voltage welders—is a magnetic switch to cut off the current when renewing electrode or changing the welding current.

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, *President*
E. J. Mehren, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

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On the Keeping of Good Company

ANTHRACITE operators would do well to get out their musty copy books and read what is said as to the desirability of keeping good company, for a person is known by his associates, and if they betray him by their behavior no rectitude of the individual can possibly save him from censure and public reprobation.

The older companies of the anthracite region employ perhaps 1,000 persons to inspect their coal. They maintain their standards year in and year out. When the public can be induced to accept any coal not actually fireproof these companies, nevertheless, maintain their standards, sometimes at a considerable disadvantage because the condemnation of coal by their inspectors means running the coal back through the breaker and interfering with the flow of fresh coal from the mine.

Similarly the larger companies resist the opportunity to sell coal at the market price. When other concerns are making big profits the company coal is sold at the circular rate. The public may bid high, but, undisturbed by such possibilities of abnormal profit, the rates of the larger companies are unchanged except to accord with such variations as occur in the wage scale.

However, the public still condemns the anthracite industry for selling fire-proof coal at fancy prices, and the industry will not be able to avoid the aspersion unless it cleans house of all those who are guilty of dishonest practices. Honest men cannot mix with dishonest and retain a good name. Certainly honest coal and dishonest coal cannot be sold from the same bin by the same dealer and not bring dishonor on the man who provides the clean coal as well as on the man who has provided the fireproof article.

The anthracite industry cannot hide this fact from its eyes. It must drive out dishonest coal—coal loaded unwashed from rock piles, coal improperly cleaned after coming from the mine.

Seeing that one anthracite operator cannot compel another to clean his coal it is necessary or at least advantageous to get the U. S. Government to provide the necessary inspection. It would be costly for the federal authorities to do this properly. The U. S. Bureau of Mines could not afford to hire men to inspect every car of coal coming from the anthracite region—it would take a small army of 1,000 men—but every company could continue its own inspection and the federal tests could be supplementary and most diligent with those individuals who have no inspectional force of their own and who showed a disposition to put poor coal on the market.

The police force shows little interest in the conduct of reputable citizens and quite a keen desire to know what the crooks are doing. The U. S. Bureau of Mines would put most of its effort where it is needed—with the crooked fly-by-nights who buy a culm bank and not a washer or who erect a washer that merely pretends to clean the coal.

With the Bureau ready to fix the rating of any company according to the quality of the coal produced or ready to refuse to give its approval to coal that was below certain standards, the probability is that the companies would employ more inspectors rather than less and the result would be a more uniformly good product.

There are many difficulties, doubtless, and the plan is conceded to be only roughly outlined, but the anthracite companies should get behind some plan for putting the industry on a high plane. They should not so much be advocates of a high standard for any one company, though that is important, but rather press for a general high level that would clear the industry of fraud and deceit. Till that is done the public will laugh at propaganda and say: "Read their high sounding professions and burn their coal—if you can."

Let There Be Peace

A SENSE of injustice pervades the union mining field. The scales in the non-union regions prevent many union mines from working. Unfortunately, no lower wages can help that situation, for competing non-union fields can get a little lower scale merely by asking it—without asking it—if the union regions should obtain a reduction. Consequently a lower wage scale would not help matters.

Furthermore, owing to unsteady work, the miners are not making any too much money the year around with the wages they now have. The cost of living and the rising wages of others also do not favor a decrease in wage. Consequently a wage reduction does not seem possible.

The public would not stand for the profiteering that would follow a strike nor for any increase of price due to a wage advance, so a change in wage either way would be extremely unpopular. After all, in a democratic country we have to be bound by public sentiment, whether just or not, whether satisfactory or deplorable.

Mr. Lewis and his henchmen are taking the right course. Any opposition to their stand for the present wage would be looked upon as an incitement to strike and would bring public reprobation on those who attempted it, whether miners or operators. Let us keep the hands of Congress off the industry by going quietly about our business, lest the public try to make it theirs.

Whether Secretary Hoover is right or wrong in trying to induce the mine operators of western Pennsylvania to attend the meeting at Jacksonville, Fla., as expressed in his letter to C. J. Goodyear, acting commissioner of the Pittsburgh Coal Producers' Association, Jan. 26, certain it is that he is right in saying we should try to get a settlement with the union and that the sentiment of the public is not favorable to a suspension with all that it means to the common welfare.

The story of the negro whose lawyer said he "could

not be jailed for that" and who, being already in jail with the doors locked on him, answered convincingly "But, here I is, boss; here I is," certainly is in point. We may prove our case to our own satisfaction. But the public, what does the public think, and what may the public do? The answer may have to be "But, here I is, boss; here I is," if a suspension ensues resultant on an ill-advised action of the operators or miners.

Complete Mechanization

SO LONG as the "worker" really has to labor and not merely direct the forces of nature to do his work we shall find slackers. So much work is today directional and not actual that the "man with the hoe" is disappearing. The time is coming when we shall say as we arise in the morning not "What must I do today?" but "What must I make steam, electricity or compressed air do for me today?" Time will make us all masters of machines, and what unrelenting masters will we be! We will set the governor, and our machine will do to a turn just what we have determined. We will run the motor at the speed for which it is planned. We will load the belt with all it will carry away.

We shall not slack, for we will be masters and not men. The psychology of the laborer often is to shirk but the idea in the mind of the master is to drive. How evident in the past has been that passion! Mechanize thoroughly, therefore, till all are drivers and none, or at least few, are among the driven. The day of the piece worker nears its end, for the machine will set the pace and not the man. The wage will depend not so much on the industry of the workman as on his intelligence, inventiveness and capacity for management. Complete mechanization will speed that happy day.

Here If Anywhere

GOOD management has made the large central-station power plant triumph in places over the isolated station though the latter has a considerable advantage at the mines. There, if anywhere, it should be possible to wage a successful competition against the encroachments of purchased power. At the coal mines no freight charges on the fuel have to be met, the inferior unsaleable coal can be utilized, plenty of water can frequently be obtained for cooling purposes, space can be found for impounding water and for all the other needs of a power house large enough for a mine.

It is easy to see why the isolated station fell before the onslaughts of central stations in cities where space was at a premium and boilers and engines had to be sunk into basements and buried a hundred feet underground. It can be readily realized how difficult it was to find space to stock fuel in urban regions, and where condensing water had to be obtained from city mains which led it in from points perhaps fifty miles away it was not difficult to explain why condensing was costly or imperfect and its efficiency low. When to this consideration is added the fact that the fuel must be transported in wagons on city streets or in the case of non-urban installations had often to be unloaded, stored and removed from storage by inefficient and inadequate equipment it is clear that the isolated plant away from the mines had a hard road to travel.

But at the mines the freight, land, water and storage

problems are all as a rule favorable. The central station sometimes has to pay freight and the operator's profit on coal and always has to meet the losses of main-line transmission to the mine and yet has to compete with isolated stations that pay no freight and have only the inevitable local transmission losses.

Nothing but bad management has made the isolated plant give way. Nothing but old-fashioned equipment, meager talent, bad mine management, failure to provide recording gages and a lack of operating statistics has rendered the blandishments of purchased-power salesmen successful. Had the plants been well managed they would have held their own and every now and again, as in this week's issue of *Coal Age*, we read of some fit plant well handled and hear that it more than holds its own.

Its stand is economically sound, as reasonable as that of the farmer. He doesn't take his potatoes all the way to market and buy another sack of spuds to bring back home with him. No, he consumes all the potatoes his family needs and the overplus and the better potatoes he sells in the market, thus saving transportation and distribution charges on his home consumption.

That many operators are not convinced that purchased power pays is evidenced by the report of the U. S. Bureau of Census. As recently as 1919, the stationary motors using purchased power aggregated 889,171 hp. and the aggregate of all the power around the mines was no less than 3,055,195 hp. or almost four times as great.

More Government Monopoly

A REPRESENTATIVE from Dayton, Ohio, R. G. Fitzgerald, has introduced into the U. S. House of Representatives a bill giving the government monopolistic control of workmen's compensation in the District of Columbia. No company, if the bill passes, may be a self-insurer nor may it cover its risks by insuring with any private insurance company. Its advocates hope that this bill will be the opening wedge for legislation of like kind in other states. It is true that seven states and Porto Rico likewise have such monopolistic measures and nine states have provisions under which the state insures those who desire state insurance. The latter, however, permit self and company insurance to compete with the government. Often, despite lower state rates firms prefer company insurance because of the better service afforded by such insurers.

The U. S. Chamber of Commerce is backing the bill introduced by Charles L. Underhill, which permits only of self and company insurance, for it has by referendum definitely concluded to oppose the entrance of the government into business. The backers of the Fitzgerald bill say that no private company should be allowed to make a profit on a matter so vital to the individual of small means as is workmen's compensation.

That sounds somewhat convincing till one reflects that the farmer, the doctor, and a number of persons are making a profit out of the vital needs of individuals of small means.

How far will the government go in the matter of monopolistic business? If this bill is allowed to pass we may find government bureaus, state and federal, monopolizing the main industries of the nation. This is an entering wedge to more than workmen's compensation insurance—a step indeed toward Sovietism in the Republic. The Fitzgerald bill should never be allowed to take its place in the statute books of this nation.



With Hand Shoveling 10 Tons per Man and 26 Tons per Loader Already Attained

One Panel Working 65 Men Will Yield 1,000 Tons of Coal per Day—Portable Conveyors Transport Coal from Face to Heading—Pillar Points Protect Faces and Projecting Roof Against Caves

BY ALPHONSE F. BROSKY
Assistant Editor, *Coal Age*, Pittsburgh, Pa.

ENTIRELY without any prior notification to the mining public the West Virginia Coal & Coke Co. answers conclusively the old question: How can the average daily output per man employed be increased? It has succeeded in increasing the efficiency of labor and in improving the equipment used in the mining of coal. It has concentrated operation and limited the activities of mining to small areas that accordingly are rapidly exhausted.

This it has done by introducing a modified longwall system of mining, by loading coal mechanically and using conveyors to afford a means of continuously transporting coal from the working face to the tipple. It purposes thus to eliminate much deadwork and many delays in mining, loading and transportation. That these changes offer excellent opportunities for reduced expense can be judged by what the company has obtained from them.

In one section of its No. 9 mine at Norton, seven miles from Elkins, W. Va., on the Coal & Coke division of the Baltimore & Ohio R.R., it has already succeeded in obtaining more than 10 tons per man employed for all operations from the face to the railroad car. According to the U. S. Coal Commission the highest daily output per man thus far obtained in all bituminous mines is 4.19 tons as of 1921. Depending upon conditions and with some changes in its new methods

of mining, this company expects, in varying degrees, to increase a miner's daily output to a maximum greater by several times than that now generally obtained.

FACE ARRANGED LIKE TEETH OF CROSS CUT SAW

No. 9 mine originally was opened up for room-and-pillar mining. However, a right section extending north from the main heading to the outcrop, composed of panels set off by cross and parallel headings, is now being won by a modified system of longwall mining. The plan of mining is called the "V" system because the faces constituting the working front of a panel are arranged in points as on a saw. As portable conveyors are used to transport coal from the working faces to the main panel headings and as it is the purpose also to use loading machines, it was decided several years ago that fairly long working faces should be used or the maximum advantage would not be obtained from this equipment.

Experiments have been made extending over a period of nearly three years. In some of these the faces have been laid out perpendicular to the direction of retreat and in others they have inclined at 45 deg. to each other in a saw-tooth front. Experience has proved to the satisfaction of the company that the last-mentioned arrangement of faces is best suited to the conditions that exist in this mine. Nevertheless the working layout should not be definitely fixed but should be modified with such flexibility as to meet with great nicety the varied conditions which other mines may present.

When conveyors are used to carry coal to the railroad, no such complicated structure as the tipple at No. 9 mine of the West Virginia Coal & Coke Co., shown in the headpiece, will be needed. It will be changed to a light timber construction costing about one-seventh as much as an ordinary tipple.

The "V" system proper, as used in this mine and shown in Fig. 1, is developed in the advance by single gallery entries which split the panel into pillars. These are drawn back on an even front, all the tooth points lining up at right angles to the direction of the galleries. Pillar drawing follows closely on the heels of gallery driving and these two practically simultaneous operations may be performed either "advancing" or "retreating," using those terms in a broad sense.

Toward each gallery two faces converge to form a "V" at an angle of 45 deg. As these faces are practically joined one to another, the resulting layout is like the cutting edge of a saw. Each gallery serves as an exit for the coal slabbed off a pair of faces. Single lateral entries are driven at intervals to connect the single gallery entries with a double entry, driven, as is customary, to provide means of transportation and ventilation to the panel. In a 6-ft. seam of clean coal the output per day will be about 1,000 tons.

A panel is 320 ft. wide and about 1,350 ft. long. Galleries are driven 8 ft. wide on 80-ft. centers and intersect lateral entries on 200-ft. centers. The working faces at 45 deg. to each other are about 87 ft. long. Three galleries and one panel entry, which serves the same purpose as a gallery, split a panel into four pillar units of eight working faces, each gallery giving access to two faces.

The length and width of the pillars are not limited to the dimensions already given. Their length is determined by the transportation needs, as in room-and-pillar or any other system of mining, and their width is decided by the length and number of faces desired, remembering that the portable conveyor units are

sectional and can be lengthened or shortened at will.

Only a brief description of the conveyor will be given here, those points being mentioned that are necessary to explain its use in this system of mining. Details and applications of this conveyor will appear in a later article.

The Movor steel pan-belt conveyor is assembled into any desired length by joining sections which are generally 6 ft. long. Each section is composed of two distinct elements, a structural steel frame and a belt of steel pans joined by through axles, to which are fastened carrying wheels. These sectional elements are readily coupled to, or uncoupled from, the end of a conveyor unit.

Each element may be moved independently, and the elements are so light that two men can carry them from place to place. A drive section may be inserted at any point and is sufficient to actuate a 100-ft. conveyor unit. For greater lengths two or more drive sections are necessary.

Each face, gallery and lateral entry of a panel has its own conveyor unit. Face units may be shifted bodily sidewise toward the face or lengthwise to adjust their position relative to the gallery as the pillars retreat toward the lateral entry. In a single panel, eight face conveyors empty in pairs onto four gallery conveyors, which in turn connect with a common lateral conveyor leading to mine cars on the main panel entry.

Retreating faces and advancing galleries, each in adjoining panel blocks, move as a continuous process in the same direction at the same rate. It already has been pointed out that this general direction may be, in the broad sense of the terms, either that of advancing

or retreating. In beginning to develop a panel, after the galleries have been driven from one lateral entry to the other, the faces start to retreat, and the galleries are driven on through the second block of the panel toward the second lateral entry at a rate equal to that of the retreat of the faces in the first block.

A 6½-ft. undercut, which is the depth now being used, will advance the faces 18 ft. in the direction of retreating. This means that as the faces retreat in the first block the gallery conveyors will be shortened 18 ft. each time a cut is made. Each section of the conveyor is 6 ft. long, so three sections are removed from each gallery. These are placed in the advancing galleries of the second block to extend the gallery conveyor units that are employed in their driving.

By the time the galleries in the second block are driven through to the second lateral entry, the first block is finished and the pillars in the second block are started on a retreat. Thereafter the gallery conveyors move toward the second lateral entry. The direction of travel of the conveyors is reversed simply by reversing the direction of the current through the motors. The

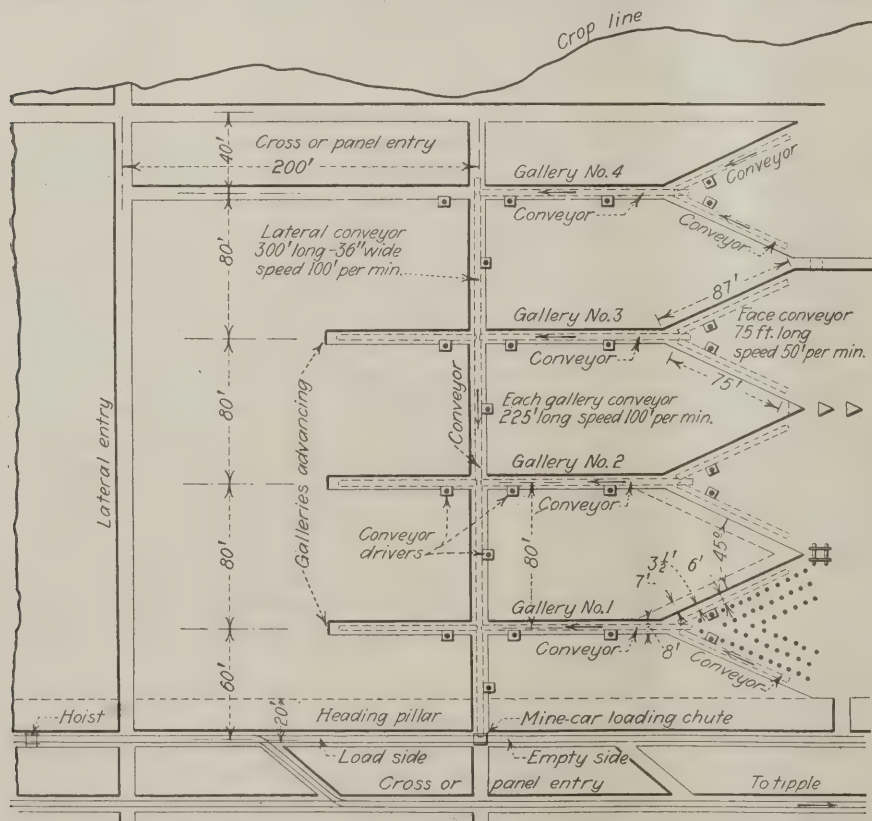


Fig. 1—Working Method, Pillar Protection and Conveyor Layout

When the roof settles it caves, but fall is kept from the pillars by timbers and stumps of solid coal. Conveyors not only take coal away from the faces but are used also in developing the galleries shown. The equipment required is one lateral conveyor, 300 ft. long, four cross conveyors aggregating 800 ft. in length and eight face conveyors of a total length of 600 ft. The aggregate length of conveyor needed is 1,700 ft. On the lateral conveyor are five drive sections, on the cross conveyors eleven drive sections, on the face conveyor eight drive sections, or 24 in all.

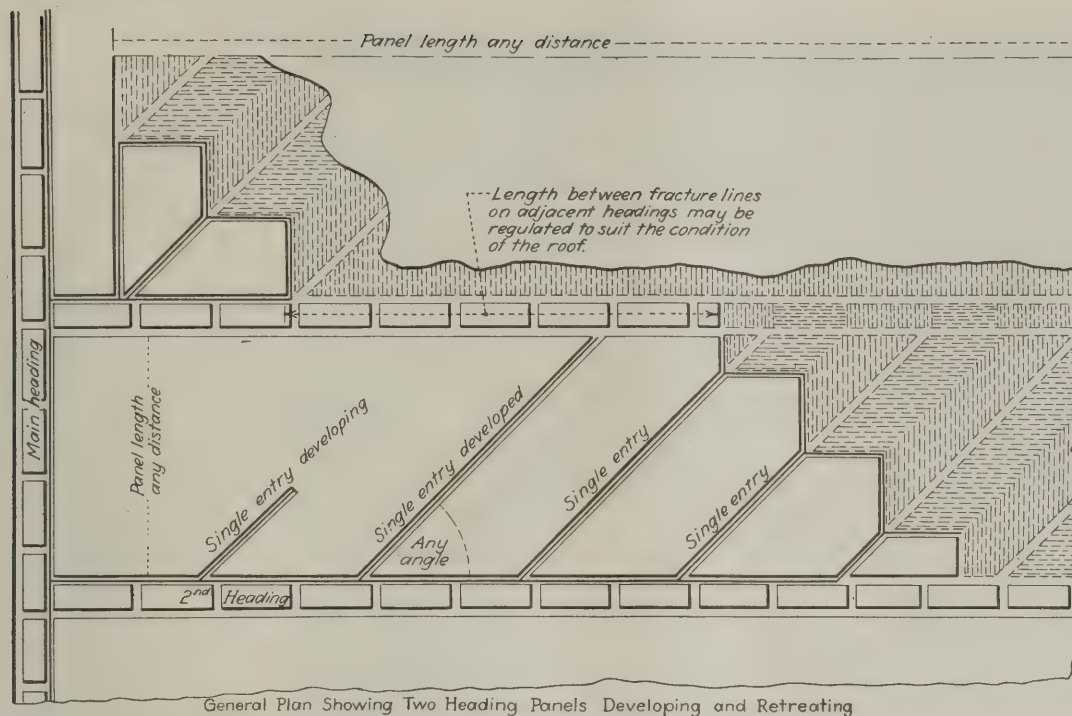


FIG. 2

Another System

Though the angle between the faces in No. 9 mine is 45 deg., that angle may be opened or closed to meet any particular condition. The more fragile the roof, the less the angle between the faces. The length of the retreating faces may be varied to suit the needs of the roof. In each case the point of retreat for the men, if retreat indeed should be necessary, is in a recess in the face well protected on either side by solid pillars.

cycle is repeated until the panel is extracted. The success of the "V" system of mining is dependent on the use of these portable conveyor units, which also may be used in connection with other systems of mining.

A development which would produce only a small tonnage with the room-and-pillar system will with the "V" system afford a large output. Consequently a large tonnage per panel can be obtained in a short time and at low cost. The following account will illustrate this point:

At 5 p.m. on Dec. 12 of last year No. 1 panel in the right section of No. 9 mine reached its mining limit, having been worked to the crop. A panel in another section of the mine had already been prepared for mining by this system. The development that had been done in it consisted of the driving of the customary double entries by which it was flanked, the driving of the first lateral entry and of four galleries. This second panel, as described above, was ready for operation when the first panel was mined out.

Beginning at 5 p.m. on Dec. 12 the conveyors at the faces and in the lateral entry and those in the

galleries of the first panel at the time the latter was completed were moved a distance of 2,500 ft. and set up in the second panel. On the morning of Dec. 14, forty hours later, these conveyors were in operation in the second panel, where eight faces were started off four galleries.

On that day 200 tons of coal was mined. By Dec. 18, four days after starting the panel, the production had grown to 916 tons, the average daily production for the week following that day being 930 tons. Truly that is a remarkable feat—finishing one panel on Dec. 12, moving the conveyor equipment 2,500 ft. to another panel and in one week's time getting out a daily output in excess of 900 tons! This feat probably is without parallel in the history of coal mining.

Within and between the points at the end of two adjoining pillars is an open triangular area, the roof above which must be supported by timbers. Their size and the centers on which they are placed depend, of course, upon the tendency of the roof to fall. Especially is that true under conditions met in No. 1 panel, which was recently completed, where the cover decreases

FIG. 3

Cut Shot Down

Sometimes small lumps roll out and bury the conveyor, but the latter is capable of digging its way out. Note the arrangement of conveyor and timbers with respect to each other and the face. Experience has shown that the timbers need not be as large as those shown in the illustration. At present no timbers are recovered. They are cut with an ax and allowed to break when no longer needed.



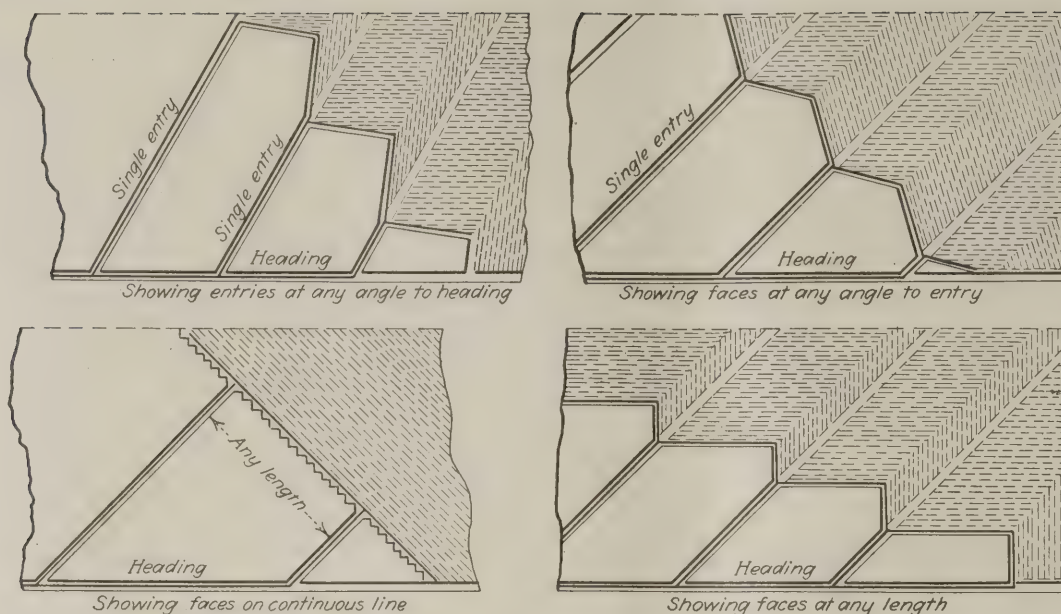


FIG. 4

Four Suggested Systems

Here also the retreating faces may be varied so that the roof may be adequately supported. One system in the lower left corner shows a continuous face with conveyors delivering to the gallery conveyors. In the system in the lower right corner the retreating faces are of unequal length, each gallery having one short and one long face feeding coal to it and one face delivering direct to the heading.

from a thickness of 150 ft. above No. 1 gallery to 25 ft. above No. 4 gallery, the latter being near the crop.

Several of the illustrations show rather big timbers for holding the roof, but experience has taught that these are a necessity only under unusual roof and that small props are sufficiently strong for most purposes. Generally a split post equivalent to a 6-in. round post is placed on 3-ft. centers. The last rows of timbers are placed alongside and nearly touching the face conveyors.

Cribs have not been effective as a protection of pillar points in this mine. Being brittle and following the laws of caving, the roof breaks without letting the cribs take the weight gradually. For the same reason packwalls are of little value.

The average depth of undercut, with a 7½-ft. cutter arm, is about 6½ ft. A fall occurs about every four cuts, or every 72 ft. of advance or retreat of the gallery leading to the face. During the first and last cuts of a cycle great care must be exercised to keep the timbers as close as possible to the face to protect men and equipment from dangers incidental to a fall, which, however, never occurs without ample warning.

No attempt is made to recover timbers. At the end of a cycle of four cuts, when a fall is desired, a closely supervised crew of timbermen cut notches in as many of the timbers as possible between the line where the next break is desired and the last fall. In this and other work performed in connection with this system of mining over a period of nearly three years no accidents of any kind to employees have occurred.

When the roof falls it may break at, or encroach slightly on, the saw-tooth point of each pillar. At least that has been the experience in the No. 9 mine. In such cases no traveling way is kept open at pillar points where the two adjacent working faces meet.

One of several schemes may be adopted, as in Fig. 1, to stop the fall from encroaching any appreciable distance past the points of the pillars. The roof may be such that it can be controlled by a "breaker" row of timbers. In that case the recovery is about as near 100 per cent as can be attained by any method of mining. The management anticipates more easily controlled roof in a section of this mine where the cover is thicker and where timbers are expected to hold the roof while practically all the coal is removed.

Nevertheless conditions have been encountered in which the break occurred at or on the points of the pillar. As the roof is hard and fragile, tending to break rather than bend and to cave rather than subside, a protecting pillar frequently is left as a continuation of the points of the main pillar, but the roof does not rest long enough on these to cause a squeeze. This pillar may be solid and narrow or it may be in the form of a chain of square or triangular stumps as indicated in Fig. 1. These latter are formed by cutting through the pillar at short distances behind the point. They afford a convenient passageway between working places. In any case, the coal lost in thus protecting the points of the pillar is but a small part of that recovered and the percentage of recovery consequently is high.

The roof will break in a span of about 80 ft. and will not hang as a body on the protecting pillars. An ideal working condition exists at the faces in that the roof is supported as a beam by the ends of the pillar, aided by the timbers in the triangular space. Within this space, consequently, there is no overhanging ledge, as in caving systems where straight faces are maintained, nor is there a tendency to creep, such as is manifest in the subsidence systems of longwall mining.

More space can be left, therefore, between the last row of timbers and the face, giving ample room for the conveyor and for loading by hand or by machines. Timbers within the triangular space take care of whatever subsidence takes place between the pillar points, and any caving that might occur in the gob is so far removed that it will not menace the men and the equipment at the faces.

The possibility of wide variations is suggested in the length and angle of the faces to meet conditions brought about by various thicknesses of cover and characters of roof. Thus it is pointed out that a tender roof under light cover will allow the working of faces that are longer and joined in a narrower angle than those under heavy cover and strong roof.

Several of these variations are indicated in Figs. 2 and 4. In the main the system is best adapted to work under light cover and tender roof, and experience in other modifications of longwall mining cannot be entirely relied upon in judging the limits under which a successful application can be made.

FIG. 5

Loading Out

A loader has a "cinch" in loading out 25 tons of coal per shift as compared with work in a room, for he does not have to exert himself by throwing coal long distances or to any considerable height. Note how several men work together, making the labor of loading more congenial than when in a room alone or in pairs. Furthermore the most careful man in the crew is sure to see that the place is safe. At least one man is likely to have a "hunch" for timbering, though some may be willing to take chances to see the coal fly.



Let us now turn to the details of the mine work at the face.

The Lower Kittanning seam is being worked in No. 9 mine. Its maximum thickness is 7 ft., but not all the coal is merchantable. About 18 in. above a bottom of hard shale occurs a 6- to 14-in. parting of hard fireclay which splits the clean coal into two benches, aggregating 5 ft. in thickness. Above the upper bench is an 18-in. bed of roof coal that is left in place. Above this is a hard, easily broken and non-flexible shale and sandstone which remain up until a break and fall are desired.

A description of a working place in various stages of mining by the "V" system may aid the reader to visualize actual conditions at the faces. Let us assume that the night shift is so far spent that the face conveyors have been shifted toward the faces and rows of timbers set behind them to make ready for the mining of the next cut. Standing then at the mouth of a

gallery one sees two diverging and long open alleys which are fenced on one side by a row of timbers and about 6 ft. away on the other side bounded by a face of coal.

Nearly touching the former in each alley is a face conveyor 20 in. wide, leaving a working space from 3 to 4 ft. wide between the face and the conveyor, which is sufficient when a longwall machine is used for undercutting. When the face is shot down the coal rolls outward, so that in places the conveyor may be covered with coal. By day one will notice four or five men, one of whom is a "strawboss," at work on each face, shoveling or lifting lumps of coal onto the conveyor.

Immediately after the faces are cleaned up one observes a roof span 11 or 12 ft. wide supported by solid coal on one side and a row of timbers on the other, indicating the depth of cut cleaned up, and showing that there is sufficient width for the use of a



FIG. 6

Shifting Conveyor Towards Face

After each cut the face conveyor must be shifted sideways the depth of the cut and moved in the direction of the gallery a distance equal to the length of three sections of the conveyor. A prop puller does this admirably. The seam is in two parts. The coal is shot and the upper bench removed, the parting of clay is then shoveled over the conveyor into the goaf and then the lower bench is fed to the conveyor.



FIG. 7

Well-Loaded Conveyors

Because this lateral conveyor must dispose of all the coal coming from four gallery conveyors it should be made about twice as wide as the experimental conveyor shown here. In this system entries can be kept tidy at all times. Electric lights make the lateral, the galleries and the faces safer places in which to work.

special type of loading machine. All this can be viewed from the mouth of the gallery, for faces as well as the various conveyor entries are illuminated by electric lamps on a line circuit.

Modern mining must embody the principles which other industries long ago put into practice but which, by reason of the difficulty of application, mine managers are only beginning to utilize, namely, ample illumination, segregation and judicious division of labor and, most important, intelligent supervision as regards efficiency and safety. A crew of ten men or more working together as "buddies" are more cheerful and willing than they are when working alone in one-man places. And rest assured that ten men will not jointly run risks by unsafe practices even though they might do so as individuals.

Longwall mining machines are better than shortwall machines for undercutting the coal because the former require less working space and cut in any direction. Consequently, when the longwall machine is used, the conveyor can be shifted toward the face on the completion of the loading of a cut and a row of timbers placed behind it, leaving a roof span of 6 ft. over the men who do the cutting. When a shortwall machine is used this roof span may be 9 ft. wide.

The two benches of merchantable coal, separated by the clay parting are shot down as a unit. If after shooting the conveyor is partly buried in coal it is capable of digging its way out. The top bench of coal is loaded out first, after which the parting is broken up and shoveled over the conveyor into the gob between the timbers. At least two-thirds of a loader's time is utilized in gobbing the parting, seriously affecting his actual capacity for loading clean coal, for it should be remembered he does not have any time during which he is waiting for cars and consequently whatever time is spent shoveling clay is time lost to shoveling of coal.

Depending on the depth of the cut, four or five loaders are employed on each face. Thirty-two loaders working in a panel of eight faces can produce 830 tons of coal per shift. Forty loaders are expected to produce 1,050 tons per shift. In either case the average output per loader per shift is 26 tons. In a seam of equal thickness, free of partings, the output per loader per shift should be increased to 30 tons or more. At the present time

from 50 to 65 men are employed in a section, the output per man being about 10 tons per day or 1.25 tons per man-hour, for all day and night employees.

It is not to be supposed, with the many savings this system of mining affords, that advantage will not be taken of even greater gain by the use of loading machines. A machine will be developed, requiring not more than 24 in. clearance, that will be light enough and easily moved from place to place. Such a machine will load coal from the end of the pile, its long axis being parallel to the face when loading coal, and will advance from the gallery toward the point of the pillar. Modifications of longwall mining, conveyors, and loading machines undoubtedly will make possible even at the present time the economic mining of some seams 3 ft. thick in competition with mining by other methods in seams much thicker.

In Fig. 1 is shown the general arrangement for transporting coal from the faces to the tippie. As already noted, conveyors carry coal to the loading point, where it is loaded into mine cars. To do this one

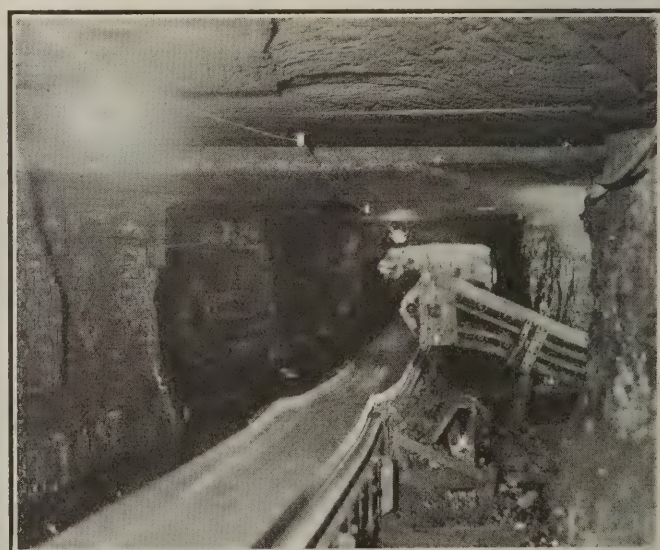


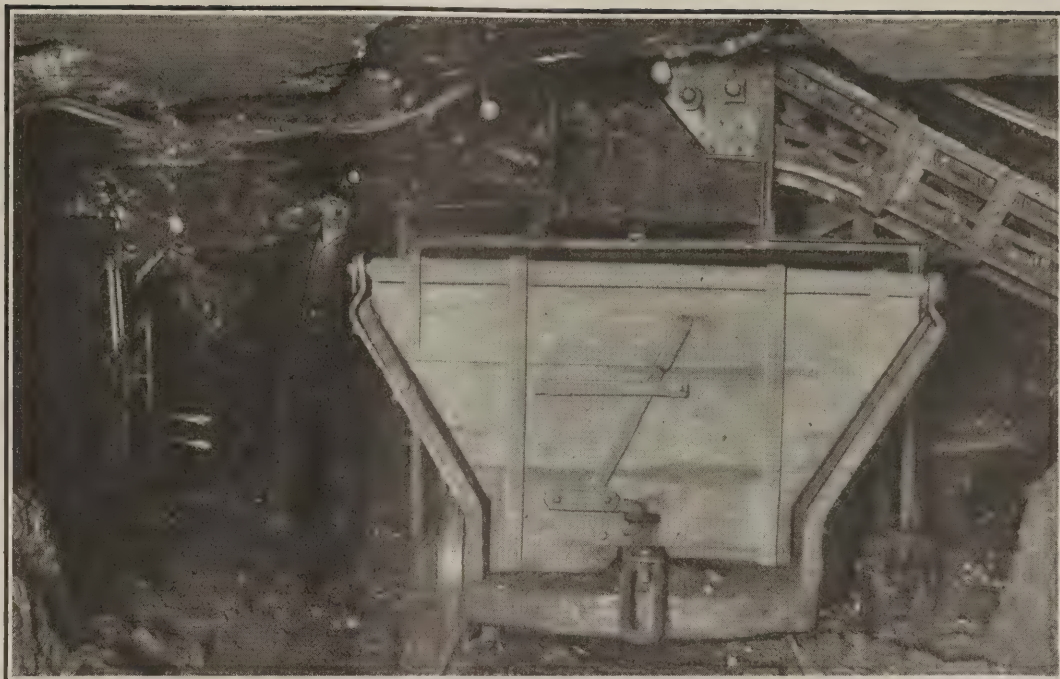
Fig. 8—Gallery Boom Feeds Lateral Conveyor

In order to discharge onto another conveyor, the end of the Mover conveyor is curved upward by the addition of a curved section as shown. Coal does not spill at discharge points.

FIG. 9

Lateral Conveyor Loading Mine Car

A chute which is swung as a cradle by a lever diverts the coal coming from the conveyor either into the back end of the mine car shown or into the front end of the one behind it. The switchboard on the left controls the lateral and gallery conveyors and also the remote-controlled hoist by which the mine cars are moved.



man equipped with a rope hoist to move the trips is required. The conveyor is not stopped while the mine cars are being shifted. The trimmer manipulates a lever-operated chute on a cradle axle that causes the discharge of coal to change direction, without spillage, from the rear end of a loaded car to the front end of an empty car.

Directly behind the trimmer is a switchboard, by which he can control the movements of the hoist and the main conveyor. Gallery and lateral conveyors are controlled from the switchboard, which also is arranged to stop face conveyors. The latter, however, can be started only by "straw bosses" and only also when the gallery and lateral conveyors are in motion. The switches for starting the face conveyors are located at the face at a point near the gallery.

A 10-ton locomotive hauls a trip of twenty-five 2.4-ton mine cars to the loading point, where it is uncoupled and run to the storage track, where the loaded trip is standing. This it hauls to the tippie, which is 3,000 ft. distant. The average time of a round trip between those points is 15 minutes. The average time of loading a trip, including incidental delays, is about the same, so the locomotive is on the go all the time. A trip has been loaded in 10 minutes, or at the rate of 6 tons per minute.

Absolute control and continuity of operation of loading and transportation in the panel are assured. Delays are minimized and mine cars are idle only a small fraction of the loading time, each making at least five trips to the tippie in one shift. The company will soon open up a mine in the Upper Kittanning seam, in which conveyors will be used to transport coal from face to tippie. Many savings will result therefrom, for mine-car haulage will be eliminated and no roof will have to be brushed or bottom lifted to make good haulage grades.

Many advantages accrue from using this system of mining instead of room-and-pillar mining. Some of these are self-evident, others have already been elaborated in the preceding text. For brevity I shall set them down without explanation as they were given to me by the company. They are:

- (1) Higher percentage of recovery; (2) no necessity for supporting roof in first mining; (3) better supervision of labor; (4) better and more simplified ventilation and drainage; (5) no abandoned workings where gas and water may accumulate; (6) miners' lamps eliminated by use of electric lighting; (7) no abandoned working places where equipment may be lost; (8) harmony due to psychology of grouped labor; (9) greater safety due to the operation being by groups; (10) no shotfiring during working hours; (11) no explosives handled by inexperienced men.

The advantages over ordinary longwall mining are:

- (1) Miners and equipment are protected on either flank by solid coal; (2) ability to change direction and length of faces; (3) length of working face greater than width of panel; (4) rapid recovery due to angle of faces; (5) entry development without need of mine cars; (6) adaptation to either advance or retreat; (7) quick development possible for new properties; (8) increased tonnage per employee; (9) no tracks or trolley wires near men at working faces; (10) loading operation easier into conveyors than into cars; (11) greater economy in equipment for a given output; (12) greater capacity in a given area; (13) miners not delayed by inadequate transportation facilities; (14) workers less dependent on other operation forces; (15) distribution of labor more flexible; (16) use of light, portable and self-contained conveyors; (17) less possibility of accident by reason of the removal of the haulage hazard.

RESUME STUDY OF MINE EXPLOSIONS.—George S. Rice, of the Bureau of Mines found on his trip to Europe that research into the causes and prevention of mine explosions had been virtually stopped in Europe during the war-time period and had not been fully resumed in Continental countries, except that in France the fundamentals of safety explosives are being studied. In Great Britain, research along this line has been resumed at the Eskmeals experimental station and also at several of the universities. In the study of the use of stone dust English investigators have attained greater progress than that achieved in the United States.

How Output of Men in Mines Varies with Size of Plant, Seam Thickness and Labor Relations

In Some Well Managed Mines Four Times as Much Is Done per Man as in Others—Low Tonnages per Man in Union Mines—Man in Big Mine Has Slightly Larger Capacity

By HOWARD N. EAVENSON

Pittsburgh, Pa.

A STUDY of the data presented in this article will show that with the proper organization and with carefully planned mining methods, the average quantity of coal loaded per day, where this quantity is not restricted by outside regulations, can be increased at least 25 per cent without a corresponding increase in the day labor needed.

The information contained in this article was collected at the request of the U. S. Coal Commission and is published with the permission of that body and of the various companies furnishing the data. For obvious reasons, the names of the companies are not given. No data were obtained from states south of Virginia or west of the Mississippi River.

The data covering the labor, in man-hours, required to produce a ton of bituminous coal have been collected with the idea of showing what is being done at some well-managed plants and not to show the average labor required by all mines, which undoubtedly is considerably higher than the average of the figures shown. Almost all the figures were obtained by a questionnaire addressed to the companies whose records are given. When they were obtained from other sources the com-

Article to be presented at the New York meeting of the American Institute of Mining and Metallurgical Engineers, in February.

TABLE I—SUMMARY OF LABOR DATA EMPLOYED IN BITUMINOUS MINES

MAN-HOURS REQUIRED PER NET TON							
	Load- ing	Cut- ting	Total Loading & Cutting	In- side	Out- side	Total Day- men	Total Labor
Minimum.....	0.36	0.014	0.43	0.17	0.03	0.27	0.84
Maximum.....	2.01	0.86	2.01	1.23	0.66	1.45	3.38
Average, 1921.....							1.91
As between Union and Non-union Mines for Mines Given							
Union:							
Minimum.....	0.55	0.07	0.68	0.24	0.03	0.27	1.14
Maximum.....	2.01	0.86	2.01	0.95	0.45	1.40	3.38
Non-union:							
Minimum.....	0.36	0.014	0.43	0.17	0.07	0.34	0.84
Maximum.....	1.43	0.25	1.42	1.23	0.66	1.45	2.39
As Regards Size of Mine—Less than 1,000 Tons Output per Day							
Minimum.....	0.46	0.016	0.50	0.17	0.07	0.41	1.10
Maximum.....	2.01	0.86	2.01	1.23	0.66	1.45	3.06
Average, 1921.....							1.83
Between 1,000 and 2,000 Tons Output per Day							
Minimum.....	0.36	0.014	0.43	0.26	0.08	0.37	0.84
Maximum.....	1.28	0.14	1.41	0.87	0.34	1.37	2.25
Average, 1921.....							1.72
Over 2,000 Tons Output per Day							
Minimum.....	0.43	0.03	0.46	0.24	0.03	0.27	1.13
Maximum.....	1.14	0.16	1.26	0.64	0.24	0.79	1.95
Average, 1921.....							1.72
As Regards Thickness of Seam Worked							
Seams 48 in. and less in thickness:							
Minimum.....	0.39	0.03	0.43	0.17	0.07	0.42	0.84
Maximum.....	1.77	0.25	1.79	0.845	0.665	1.20	2.51
Average, 1921.....							2.41
Seams 49 in. to 72 in. in thickness:							
Minimum.....	0.36	0.018	0.43	0.26	0.07	0.35	0.90
Maximum.....	1.6	0.85	1.77	1.23	0.52	1.45	2.49
Average, 1921.....							1.86
Seams 73 in. to 110 in. in thickness:							
Minimum.....	0.43	0.014	0.48	0.24	0.08	0.33	0.95
Maximum.....	2.01	0.16	2.01	0.98	0.34	1.18	3.06
Average, 1921.....							1.54

Note.—Average 1921 figures are calculated from data in report of U. S. Coal Commission.

pany was asked to verify them. Because much work was needed to compile these figures the data were requested for only one or two months at each plant, and

TABLE II—PRODUCTION DATA, WEST VIRGINIA MINES

Mine	Can Loaders Load More with Full Car Supply?	Remarks				
1	Yes	Loaders drill and shoot, timber and clean coal, no track work (8 hr.)				
2	Yes	Loaders drill and shoot, timber and clean coal, no track work. (8 hr.)				
3	Yes	Loaders drill and shoot, timber and clean coal, no track work. (8 hr.)				
4	Yes	Loaders drill and shoot, timber and clean coal, no track work. (8 hr.)				
5	Yes	Loaders drill and shoot, timber and clean coal, no track work. (8 hr.)				
6	Yes	Loaders drill and shoot, timber and clean coal, no track work. (8 hr.)				
7	Yes	Loaders drill and shoot, timber and clean coal, no track work (8 hr.)				
8	Yes	Loaders drill and shoot, timber and clean coal, no track work (8 hr.)				
9	Yes	Loaders shoot, but do not drill coal, do no track work or timbering; clean coal. (9 hr.)				
10	Yes	Loaders shoot, but do not drill coal, do no track work or timbering; clean coal. (9 hr.)				
11	Yes	Loaders shoot, but do not drill coal, do no track work or timbering; clean coal. (9 hr.)				
12	Yes	Loaders shoot, but do not drill coal, do no track work or timbering; clean coal. (9 hr.)				
13	Yes	Loaders drill and shoot, timber, but do not lay track.				
14	Yes	Loaders drill, shoot, and timber.				
15	Yes	Loaders drill, shoot, and timber, no track. (9 hr.)				
16	Yes	Loaders drill, shoot, and timber, lay room track.				
17	...	Loaders drill, shoot, and timber, lay room track.				
18	...	Loaders drill, shoot, and timber, lay room track.				
19	Yes	Loaders drill timber, lay track and clean dirt; do not shoot.				
20	Yes	Loaders drill timber, lay track and clean dirt; and shoot coal				
21	Yes	Loaders load coal only.				
22	Yes	Loaders load coal only.				
23	Yes	Loaders load coal only.				
24	Yes	Loaders load coal only.				
25	Yes	Loaders timber and lay straight track; do not drill or shoot.				
26	...	Loaders timber, drill, shoot coal, lay track and clean dirt.				
27	...					

TABLE II (CONTINUED)—PRODUCTION DATA, WEST VIRGINIA MINES

Mine	Load- ers	Ma- chine Men	Man Hours per Net Ton				Total All Men	Greatest Tonnage Loaded in One Day
			Total Ton- nage Men	In- side	Out- side	Total		
1	0.48	0.03	0.51	0.40	0.19	0.59	1.10	25.4
2	0.43	0.03	0.46	0.36	0.15	0.51	0.97	26.0
3	0.50	0.05	0.55	0.45	0.22	0.67	1.23	34.0
4	0.46	0.04	0.50	0.41	0.19	0.60	1.10	34.0
5	0.44	0.04	0.48	0.32	0.12	0.44	0.93	32.0
6	0.39	0.04	0.43	0.30	0.12	0.43	0.84	34.0
7	0.61	0.07	0.68	0.48	0.25	0.73	1.41	43.0
8	0.60	0.06	0.65	0.47	0.25	0.72	1.37	41.0
9	0.50	0.05	0.55	0.32	0.16	0.48	1.03	35.1
10	0.59	0.04	0.63	0.38	0.08	0.45	1.08	32.4
11	0.43	0.05	0.48	0.33	0.15	0.47	0.95	38.5
12	0.61	0.06	0.67	0.31	0.11	0.41	1.08	44.4
13	0.65	0.08	0.73	0.55	0.09	0.64	1.36	39.0
14	0.49	0.09	0.57	0.87	0.51	1.37	1.94	37.8
15	0.65	0.07	0.72	0.43	0.19	0.61	1.34	70.0
16	0.63	0.11	0.74	0.95	0.30	1.25	1.99	81.0
17	0.80	0.06	0.85	0.17	0.24	0.42	1.27	
18	0.57	0.07	0.64	0.36	0.29	0.65	1.29	
19	1.04	0.02	1.06	0.758	0.32	1.08	2.14	33.0
20	0.75	0.09	0.84	0.64	0.35	0.99	1.83	19.0
21	0.46	0.06	0.52	0.73	0.14	0.87	1.38	55.0
22	0.53	0.10	0.63	0.70	0.36	1.06	1.69	30.0
23	0.65	0.15	0.80	0.93	0.52	1.45	2.25	27.5
24	0.51	0.07	0.58	1.23	0.19	1.42	2.00	48.0
25	0.76	0.12	0.88	0.63	0.16	0.79	1.67	27.3
26	0.63	0.12	0.75	0.42	0.11	0.53	1.27	29.0
27	0.44	0.08	0.52	0.54	0.29	0.83	1.36	

In June, 1922, at Mine No. 16 in Logan Co., one man loaded 572 mine cars holding 743.6 net tons coal in 222 hr. spent in the mine. Loader worked in two entries 18 ft. wide, coal averaged 44 in. thick; he drilled and shot his coal, but neither picked out impurities nor set timbers. Roof conditions in these working places were not favorable with considerable water present. Besides this, he did 2 days or 18 hr. of day work; his total earnings for the month, including pay for water at face, were \$528.50. Average loading per hour = 3.4 tons or 2.5 mine cars.

the figures represent in each case a month chosen because the car supply was good and the work was practically steady. In most of the West Virginia and Kentucky mines these conditions were best met in May and June, 1922.

The mines for which the figures are given are arranged by states and as to whether the mine operates under union or non-union conditions. The union and

TABLE II (CONTINUED)—PRODUCTION DATA, WEST VIRGINIA MINES

Mine	County	Union or Non-union	Name of Seam	Thickness, Inches	Month	Production Net Tons	No. Days Worked	Avg. Prod. per Day
1 Raleigh		Non-union	Beekley	60.0	May, 1922	43,627	22.2	1,965
2 Raleigh		Non-union	Beekley	60.0	June, 1922	43,698	19.2	2,276
3 Raleigh		Non-union	Beekley	54.0	May, 1922	15,132	25.0	605
4 Raleigh		Non-union	Beekley	54.0	June, 1922	15,419	21.5	717
5 Raleigh		Non-union	No. 3	45.0	May, 1922	37,616	25.4	1,481
6 Raleigh		Non-union	No. 3	45.0	June, 1922	33,143	20.8	1,593
7 Raleigh		Non-union	No. 3	54.0	May, 1922	11,955	25.4	471
8 Raleigh		Non-union	No. 3	54.0	June, 1922	11,821	20.6	574
						31,735-M 941-P		
9 Logan		Non-union	Island Creek	79.0	Mar., 1922	32,676	26.0	1,257
						42,258-M 7,483-P		
10 Logan		Non-union	Island Creek	81.0	Mar., 1922	49,741	26.0	1,913
						30,783-M 1,987-P		
11 Logan		Non-union	Island Creek	75.0	Mar., 1922	32,770	25.9	1,267
12 Logan		Non-union	Island Creek	77.0	Mar., 1922	40,146 ⁴	26.0	1,544
						2,925-P 38,385-M		
13 Raleigh		Non-union	Beekley	60.0	Mar., 1922	41,310	24.8	1,669
14 Mingo		Non-union	Thacker	66.0	Mar., 1922	27,001	24.0	1,125
15 Logan		Non-union	Island Creek	46.0				
16 Logan		Non-union	Eagle	60.0	June, 1922	37,255 ⁴	26.0	1,433
			Island Creek	43.0				
			Eagle	72.0	June, 1922	11,026 ⁴	26.0	424
						12,170-M 4,732-P		
17 McDowell		Non-union	Sewell	40.0	Mar., 1922	16,902	24.0	704
18 Mercer		Non-union	No. 3 Poca.	52.0	Mar., 1922	17,416 ⁴	25.0	696
19 McDowell		Non-union	No. 4 Poca.	73.7	May, 1922	23,655	27.0	876
20 McDowell		Non-union	War Creek	50.0	May, 1922	19,000	27.0	704
21 Mingo		Non-union	Thacker	51.0	May, 1922	21,273 ⁴	27.0	788
22 Mingo		Non-union	Thacker	52.0	June, 1922	4,032	26.0	155
23 Mingo		Non-union	Alma	57.0	June, 1922	5,146	24.0	214
24 Mingo		Non-union	Thacker	49.0	June, 1922	11,847	25.0	474
						74,402-C 1,100-S		
25 Marion		Union	Pittsburgh	96.0	Nov., 1921	75,502	25.0	3,020
26 Marion		Union	Pittsburgh	85.0	Mar., 1922	25,585	23.0	1,112
27 McDowell		Non-union	No. 3 and No. 4 Poca.		May-June, 1922	1,027,795		

¹ 49,253 tons machine coal; large part of this was cut by loaders, by punching machines. ² 65 per cent. robbing, no machines used. ³ 45 per cent. robbing, no machines used. ⁴ All machine coal. M, machine mined; P, pick mined; C, coal; S, slate.

TABLE III—PRODUCTION DATA, KENTUCKY MINES

Mine	Eastern or Western Kentucky	Union or Non-union	Name of Seam	Thickness, Inches	Month	Production Net Tons	No. Days Worked	Aver. Prod. per Day
						6,232-C 352-S		
1	Eastern	Non-union	Miller Cr. No. 1	47	Aug., '21	6,584 14,835-C 2,442-S	24.25	272
2	Eastern	Non-union	Miller Cr. No. 1	48	Aug., '21	17,277 17,643-C 6,611-S	23.75	727
3	Eastern	Non-union	Elkhorn	89	May, '22	24,254 16,138-C 4,906-S	27.0	898
4	Eastern	Non-union	Elkhorn	96	June, '21	21,044 12,800-C 4,804-S	26.0	809
5	Eastern	Non-union	Elkhorn	89	June, '21	17,604 34,580-C 3,878-S	26.0	677
6	Eastern	Non-union	Elkhorn	96	Mar., '22	38,458 21,377-C 3,698-S	27.0	1,424
7	Eastern	Non-union	Elkhorn	110	June, '21	25,075 23,487-C 3,540-S	26.0	964
8	Eastern	Non-union	Elkhorn	101	May, '22	27,027 24,859-C 3,182-S	27.0	1,001
9	Eastern	Non-union	Elkhorn	91	Mar., '22	28,041 20,153-C 3,184-S	27.0	1,039
10	Eastern	Non-union	Elkhorn	74	June, '21	23,337 5,028-C 1,070-S	26.0	898
11	Eastern	Non-union	Elkhorn	100	June, '22	6,098 26,418-C 4,722-S	25.0	244
12	Eastern	Non-union	Elkhorn	80	Mar., '22	31,140 13,829-C 1,346-S	27.0	1,153
13	Eastern	Non-union	Elkhorn	83	June, '21	15,175 34,440-C* 2,376-S	26.0	584
14	Eastern	Non-union	Pond Cr.	60		36,816	20.0	1,841
15	Eastern	Non-union	No. 6	70	May, '22	57,020*	21.4	2,664
16	Eastern	Non-union	No. 6	70	Aug., '21	58,553*	25.5	2,296
17	Western	Union	No. 9	58	May, '22	22,163*	24.8	894
18	Western	Union	No. 11	72	May, '22	20,757*	27.0	769
19	Western	Union	No. 11	72	May, '22	38,651*	24.1	1,604
20	Western	Union	No. 9	57	May, '22	63,700*	26.0	2,450
21	Western	Union	No. 9	53	May, '22	40,810*	24.5	1,666

Coal Loading—At mines Nos. 15 and 16 in Perry County; Loader A in 25 days loaded 709 net tons coal; average, 28.5 tons per day; Loader B in 21 days loaded 539 net tons coal; average, 25.5 tons per day. C, coal; S, slate. * All machine coal.

TABLE II (CONTINUED)—PRODUCTION DATA, WEST VIRGINIA MINES

		Men Working per Day					Average Production Net Tons					Total All Men		
Mine	Loaders	Mach. Men	Total Tonnage Men	Inside	Daymen		Total All Men	Loaders	Mach. Men	Total Tonnage Men	Daymen		Total All Men	
					Outside	Total					Inside	Outside		Total
1	118.0	8.0	126.0	98.0	46.0	144.0	270.0	16.7	491	15.59	20.1	42.7	13.64	7.28
2	121.0	8.0	129.0	103.0	44.0	147.0	276.0	18.8	569	17.64	22.1	51.7	15.48	8.25
3	38.0	4.0	42.0	34.0	17.0	51.0	93.0	15.9	302	14.40	17.8	35.6	11.86	6.54
4	41.0	4.0	45.0	37.0	17.0	54.0	99.0	17.5	350	15.93	19.4	42.2	13.28	7.24
5	81.0	8.0	89.0	60.0	23.0	83.0	172.0	18.3	370	16.64	24.7	64.4	17.84	8.61
6	77.0	8.0	85.0	59.0	23.0	82.0	167.0	20.7	398	18.74	27.0	69.3	19.43	9.53
7	36.0	4.0	40.0	28.0	15.0	43.0	83.0	13.1	235	11.77	16.8	31.4	10.95	5.67
8	43.0	4.0	47.0	34.0	18.0	52.0	99.0	13.3	287	12.20	16.9	31.9	11.04	5.80
9	69.0	8.0	77.0	44.0	23.0	67.0	144.0	18.2	204	16.32	28.6	54.7	18.76	8.73
10	125.0	10.0	135.0	80.0	16.0	96.0	231.0	15.3	324	14.17	23.9	119.6	19.93	8.22
11	60.0	8.0	68.0	47.0	19.0	66.0	134.0	21.1	296	18.63	27.0	66.7	19.20	9.45
12	105.0	10.0	115.0	53.0	18.0	71.0	186.0	14.7	309	13.43	29.1	85.8	21.75	8.30
13	120.0	15.0	135.0	101.0	17.0	118.0	253.0	13.9	207	12.36	16.5	98.2	14.14	6.60
14	68.0	12.0	80.0	122.0	71.0	193.0	273.0	16.5	187	14.06	9.2	15.8	5.83	4.12
15	103.4	11.9	115.3	67.8	30.0	97.8	213.0	13.9	241	12.43	21.1	47.8	14.65	6.73
16	29.8	5.0	34.8	44.6	14.2	58.8	93.6	14.2	170	12.18	9.5	30.0	7.21	4.52
17	70.6	4.0	74.6	15.3	21.5	36.8	111.4	10.0	254 ²	9.44	46.0	32.8	19.13	6.3
18	49.6	6.0	55.6	31.6	25.7	57.3	112.9	14.0	104 ³	12.52	22.0	27.1	12.15	6.16
19	114.0	2.0	116.0	83.0	35.0	118.0	234.0	7.68	976	7.52	10.55	25.03	7.42	3.74
20	66.0	8.0	74.0	56.0	31.0	87.0	161.0	10.67	176	9.51	12.57	22.71	8.09	4.37
21	45.1	6.0	51.1	71.6	14.0	85.6	136.7	17.5	263	15.42	11.0	56.3	9.20	5.76
22	10.4	2.0	12.4	13.4	7.0	20.4	32.8	15.0	155	12.5	11.6	22.1	7.60	4.72
23	17.4	4.0	21.4	24.8	14.0	38.8	60.2	12.3	107	10.00	8.6	15.3	5.51	3.55
24	30.1	4.0	34.1	73.3	11.0	84.3	118.4	15.7	237	13.90	6.5	43.1	5.62	4.00
	106-P 181-M													
25	287	44.0	331.0	238.0	66.0	304.0	635.0	10.5	90 ¹	9.12	12.7	45.8	9.93	4.75
26	87.0	16.0	103.0	58.0	15.0	73.0	176.0	12.78	139	10.80	19.17	74.13	15.23	6.32
27								19.0	200					

non-union mines in the list are generally considered to be equally well managed.

The production per month in a few cases includes the slate which has to be loaded and hauled out of the mine, for this needs almost as much handling as coal. Where this is the case that fact is noted.

The number of days worked includes only the total time in which the tippie operated; not the number of days on which the mines ran. This makes the output per day appear slightly higher than it should be in these cases, but does not affect the item of "days worked," as the total days worked per month for each class, or the average number of each class working

TABLE III (CONTINUED)—PRODUCTION DATA, KENTUCKY MINES

Mine	Can Loaders Produce More with Full Car Supply?	Remarks
1		Loaders with exception of machine, load drill and shoot coal
2		All loaders timber, lay track and clean dirt
3	Yes	Same as No. 1
4	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
5	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
6	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
7	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
8	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
9	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
10	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
11	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
12	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
13	Yes	Loaders drill, timber, lay track and clean dirt; do not shoot
14		Loaders load only, but clean 8-in. laminated coal.
15		Loaders timber and lay straight room track only
16		Loaders timber and lay straight room track only
17	Yes	Loaders drill, clean coal, set timbers and pay for one-half shooting
18	Not this month	Loaders drill, clean coal, set timbers and pay for one-half shooting
19	Yes	Loaders drill, clean coal, set timbers and pay for one-half shooting
20		Loaders drill, shoot coal, timber, but do no track work
21		

Working time was 8 hr. per day. In addition to loading coal, the loader only lays "jumpers" in the face of his room. Drilling, shooting, timbering and straight track work is done by the company. Loader E earnings, in month given (January, 1921) were \$547.80.

TABLE III (CONTINUED)—PRODUCTION DATA, KENTUCKY MINES

Mine	Loaders	Man-hours per Net Ton				Total	All Men	Greatest Tonnage Loaded in One Day
		Mach. Men	Total Tonnage	Inside	Outside			
1	0.794	0.12	0.91	0.59	0.32	0.91	1.82	29.0
2	0.76	0.11	0.87	0.52	0.29	0.81	1.68	30.0
3	0.65	0.018	0.67	0.51	0.19	0.70	1.37	39.8
4	0.82	0.09	0.91	0.52	0.15	0.67	1.58	29.9
5	1.02	0.02	1.04	0.59	0.18	0.77	1.81	24.45
6	0.955	0.017	0.97	0.52	0.15	0.67	1.64	30.5
7	0.887	0.016	0.905	0.533	0.21	0.74	1.64	32.3
8	0.74	0.016	0.756	0.50	0.17	0.67	1.43	36.4
9	0.83	0.023	0.85	0.58	0.15	0.74	1.60	28.85
10	1.04	0.018	1.06	0.58	0.214	0.81	1.86	35.35
11	1.15	0.035	1.21	0.98	0.196	1.18	2.39	25.55
12	0.87	0.014	0.88	0.478	0.18	0.66	1.54	26.2
13	0.835	0.027	0.86	0.616	0.137	0.75	1.61	31.6
14	0.36	0.07	0.43	0.31	0.16	0.47	0.90	42.0
15	0.47	0.08	0.55	0.37	0.20	0.57	1.13	39.0
16	0.54	0.10	0.64	0.40	0.24	0.64	1.28	41.0
17	0.83	0.11	0.94	0.47	0.12	0.59	1.53	24.3
18	0.63	0.09	0.72	0.30	0.12	0.42	1.14	24.8
19	0.75	0.09	0.84	0.38	0.16	0.54	1.38	22.4
20	0.78	0.09	0.867	0.32	0.114	0.431	1.29	
21	0.80	0.10	0.893	0.26	0.10	0.374	1.27	

Loader C in 25 days loaded 706 net tons coal; average, 28.3 tons per day; Loader D in 26 days loaded 710 net tons coal; average, 27.3 tons per day; Loader E in 22 days loaded 913 net tons coal; average, 41.5 tons per day. Total, 119 days loaded 3,577 net tons coal; average, 30.1 tons per day.

TABLE III (CONTINUED)—PRODUCTION DATA, KENTUCKY MINES

Mine	Loaders	Mach. Men	Men Working per Day				Total	All Men
			Total Tonnage	Inside	Outside	Total		
1	27.0	4	31.0	20.0	11.0	31.0	62.0	
2	69.0	10	79.0	47.0	26.0	73.0	152.0	
3	73.0	2	75.0	57.0	22.0	79.0	154.0	
4	83.0	1	84.0	53.0	15.0	68.0	152.0	
5	86.0	2	88.0	50.0	15.0	65.0	153.0	
6	170.0	3	173.0	92.0	27.0	119.0	292.0	
7	107.0	2	109.0	64.0	25.0	89.0	198.0	
8	93.0	2	95.0	63.0	21.0	84.0	179.0	
9	108.0	3	111.0	76.0	20.0	96.0	207.0	
10	117.0	2	119.0	67.0	24.0	91.0	210.0	
11	35.0	2	37.0	30.0	6.0	36.0	73.0	
12	125.0	2	127.0	69.0	26.0	95.0	222.0	
13	61.0	2	63.0	45.0	10.0	55.0	118.0	
14	81.7	16	97.7	72.4	36.2	108.6	206.3	
15	158.0	28	186.0	123.0	66.0	189.0	375.0	
16	155.0	28	183.0	114.0	69.0	183.0	366.0	
17	92.0	12	104.0	53.0	13.0	66.0	170.0	
18	60.0	8	68.0	29.0	12.0	41.0	109.0	
19	150.0	18	168.0	77.0	33.0	110.0	278.0	
20	238.0	28	266.0	97.0	35.0	132.0	398.0	
21	166.0	20	186.0	57.0	21.0	78.0	264.0	

TABLE IV—PRODUCTION DATA, MARYLAND MINES

Mine	County	Union or Non-union	Name of Seam	Thick-ness, Inches	Produc-tion Net Tons 15,107-C 142-S	No. Days Worked	Aver. Prod. per Day
1	Allegany	Union	Sewickley	36	15,249 15,354-C 1,162-S	24	635
2	Allegany	Union	Pittsburgh	96	16,516	27	612

TABLE IV (CONTINUED)—PRODUCTION DATA, MARYLAND MINES

Mine	Loaders	Men Working per Day				Average Production Net Tons per Day			
		Machine Men	Total Tonnage	Inside	Outside	Machine Men, Two Men	Total Tonnage	Inside	Outside
1	140	2	142	20	20	40	182	4.53	635
2	154	0	154	63	17	80	234	3.97	612

TABLE IV (CONTINUED)—PRODUCTION DATA, MARYLAND MINES

Mine	Loaders	Man Hours per Net Ton				Total All Men	Greatest Tonnage Loaded in One Day
		Mach. Men	Total Tonnage	Inside	Outside		
1	1.77	0.03	1.79	0.25	0.25	0.50	2.29
2	2.01	....	2.01	0.82	0.22	1.05	13.9

TABLE IV (CONTINUED)—PRODUCTION DATA, MARYLAND MINES

Mine	Can Loaders Produce More with Full Car Supply?	Remarks
1		Loaders, with exception of machine, load, drill and shoot coal
2		All loaders timber, lay track and clean dirt
		Loaders drill, shoot coal, timber, lay track and clean dirt

TABLE V—PRODUCTION DATA, OHIO MINES

Mine	County	Union or Non-union	Name of Seam	Thic-ness, Inches	Month	Produc-tion Net Tons	No. Days Worked	Aver. Prod. per Day
1		Union	No. 8	66	Mar., '22	32,500*	26.0	1,250
2	Belmont	Union	Pgh. No. 8	60	Mar., '22	21,281	23.0	925
3	Belmont	Union	Pgh. No. 8	60	Mar., '22	10,436	24.25	422
4	Belmont	Union	Pgh. No. 8	60	Mar., '22	12,562	22.75	552
5	Belmont	Union	Pgh. No. 8	60	Mar., '22	23,299	24.12	965
6	Belmont	Union	Pgh. No. 8	60	Mar., '22	19,327	24.0	805
7	Belmont	Union	Pgh. No. 8	60	Mar., '22	8,601	24.37	352
8	Belmont	Union	Pgh. No. 8	60	Mar., '22	30,968	22.75	1,361
9	Belmont	Union	Pgh. No. 8	60	Mar., '22	44,987	21.50	2,092
10	Jefferson	Union	Pgh. No. 8	60	Mar., '22	18,059	22.37	807
11	Jefferson	Union	Pgh. No. 8	60	Mar., '22	13,197	22.25	593
12	Jefferson	Union	No. 6	48	Mar., '22	12,553	22.75	551
13	Jefferson	Union	No. 6	48	Mar., '22	26,447	23.12	1,143

* All machine coal.

TABLE V (CONTINUED)—PRODUCTION DATA, OHIO MINES

Mine	Can Loaders Produce More with Full Car Supply?	Remarks
1		Loaders drill and shoot but do no timbering or track work
2	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
3	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
4	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
5	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
6	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
7	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
8	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
9	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
10	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
11	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
12	Yes	Loaders drill, shoot, lay track, set timber, and clean coal
13	Yes	Loaders drill, shoot, lay track, set timber, and clean coal

TABLE III (CONTINUED)—PRODUCTION DATA, KENTUCKY MINES

Mine	Loaders	Mach. Men	Men Working per Day				Total	All Men
			Total Tonnage	Inside	Outside	Total		
1	10.07	136	8.77	13.6	24.73	8.77	4.39	
2	10.54	145	9.20	15.47	27.96	9.92	4.78	
3	12.30	898	11.97	15.75	40.77	11.37	5.83	
4	9.75	809	9.32	15.26	53.93	11.90	5.32	
5	7.87	676	7.69	13.54	45.13	10.41	4.42	
6	8.38	949	8.23	15.48	52.74	11.97	4.88	
7	9.01	964	8.84	15.06	38.56	10.83	4.87	
8	10.76	1,001	10.54	15.89	47.67	11.92	5.59	
9	9.62	692	9.36	13.67	51.95	10.82	5.01	
10	7.67	898	7.55	13.40	37.42	9.87	4.28	
11	6.97	244	6.59	8.13	40.66	6.78	3.34	
12	9.22	1,153	9.08	16.71	44.35	12.14	5.19	
13	9.57	584	9.27	12.98	58.4	10.62	4.95	
14	22.5	230	18.84	25.4	50.8	16.95	8.9	
15	16.9	190	14.32	21.7	40.4	14.10	7.1	
16	14.8	164	12.55	20.0	33.3	12.55	6.3	
17	9.7	149	8.60	16.9	68.8	13.54	5.3	
18	12.8	192	11.31	26.5	64.1	18.76	7.1	
19	10.7	178	9.55	20.8	48.6	14.58	5.8	
20	10.3	175	9.21	25.3	70.0	18.56	6.2	
21	10.0	167	8.96	29.2	79.3	21.35	6.3	

per day, were reported. It is hardly likely that any error introduced by this factor will be as great as the variation in production is from month to month, even at the same plant.

The number of machine men working per day includes both machine runners and helpers, and in computing the average production per day, the number of crews, each of two men, is used as the divisor and the number of man-hours per ton includes the time of

both men. The coal produced per machine sometimes includes all coal produced, both pick and machine, as data were not always available for separating this. Wherever it could be segregated, it is so shown and computed.

The number of man-hours per ton is computed from the actual number of hours in the working day at each plant and not from the time actually spent at the face. Usually the loader does not stay at the face all

TABLE V (CONTINUED)—PRODUCTION DATA, OHIO MINES

Men Working per Day										Average Production Net Tons per Day									
Mine	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders
			Inside	Outside	Total							Inside	Outside	Total					
1	148	22	170	58	228	257	8.4	114.0	7.35	21.5	43.1	14.37	4.9						
2	128	18	146	36	182	208	7.2	102.0	6.33	25.7	35.5	14.91	4.4						
3	85	8	93	26	119	131	5.0	106.0	4.5	16.2	35.17	11.1	3.2						
4	70	6	76	25	101	111	7.88	184.0	7.26	22.1	55.2	15.8	4.97						
5	129	20	149	43	192	213	7.48	96.5	6.48	22.44	46.6	13.5	4.06						
6	99	14	113	38	151	170	8.13	115.0	7.12	21.18	42.37	14.12	4.73						
7	54	6	60	26	86	92	6.52	119.0	5.86	13.54	58.66	11.0	3.82						
8	148	22	170	60	230	266	9.19	123.0	8.00	22.68	45.36	15.12	5.25						
9	222	24	246	72	318	360	9.42	174.0	8.50	29.06	110.10	23.24	6.23						
10	120	14	134	42	176	196	6.72	115.0	6.02	19.21	40.35	13.02	4.12						
11	66	10	76	20	96	106	8.98	118.0	7.80	29.65	59.30	19.77	5.59						
12	82	12	94	57	120	132	6.72	91.0	5.86	9.67	27.50	7.15	3.22						
13	105	16	121	71	188	211	10.88	122.0	9.46	16.09	63.5	12.84	5.44						

TABLE V (CONTINUED)—PRODUCTION DATA, OHIO MINES

Man Hours per Net Ton										Greatest Tonnage Loaded in One Day									
Mine	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders
			Inside	Outside	Total							Inside	Outside	Total					
1	0.95	0.14	1.088	0.31	0.557	1.64	24.1												
2	1.11	0.156	1.264	0.31	0.225	0.536	1.80												
3	1.6	0.14	1.77	0.36	0.227	0.72	2.49												
4	1.01	0.86	1.10	0.36	0.14	0.59	1.61												
5	1.06	0.165	1.23	0.36	0.19	0.57	1.82												
6	0.98	0.139	1.12	0.38	0.14	0.53	1.52												
7	1.22	0.14	1.36	0.35	0.18	0.73	2.09												
8	0.87	0.129	1.00	0.35	0.07	0.35	1.28												
9	0.85	0.09	0.94	0.28	0.20	0.62	1.94												
10	1.19	0.14	1.32	0.42	0.14	0.41	1.43												
11	0.89	0.14	1.02	0.27	0.14	0.41	1.43												
12	1.19	0.17	1.36	0.83	0.29	1.12	2.48												
13	0.73	0.13	0.85	0.50	0.13	0.62	1.47												

TABLE VI—PRODUCTION DATA, PENNSYLVANIA MINES

Mine	County	Union or Non-union	Name of Seam	Thickness, Inches	Month	Production Net Tons	No. Days Worked	Aver. Prod. per Day
1	Somerset	Non-union	Pittsburgh	70	Mar., '22	22,027	23	958
2	Somerset	Non-union	C/C	48	Mar., '22	16,184	24	674
3	Somerset	Non-union	C/C	51	Mar., '22	31,147	23	1354
4	Somerset	Non-union	C/C	45	Mar., '22	26,645	25	1066
5	Somerset	Non-union	E/C	41	Mar., '22	16,097	25	644
								14,534-P
6	Westmoreland	Non-union	Pittsburgh	85	Jan., '23	23,904	26	919
								28,135-P
								9,378-M
7	Westmoreland	Non-union	Pittsburgh	86	Mar., '23	37,513	24	1563
8	Greene	Non-union	Pittsburgh	76	Dec., '22	38,771*	25	1551
9	Fayette	Non-union	Pittsburgh	84				
10	Somerset	Open-shop	B	42	Mar., '23	41,777	27	1547
11	Somerset	Open-shop	B	44	Mar., '23	42,210	27	1556

*All machine coal.

TABLE VI (CONTINUED)—PRODUCTION DATA, PENNSYLVANIA MINES

Men Working per Day										Average Production Net Tons per Day									
Mine	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders
			Inside	Outside	Total							Inside	Outside	Total					
1	171	All Pick	171	51	23	74	245	5.602											
2	102	3	105	45	56	101	206	6.61	449	5.602	18.78	41.65	12.94	3.91					
3	181	3	184	79	7	79	263	7.48	903	7.36	17.14	12.03	16.67	3.27					
4	171	17	188	81	30	111	299	6.23	135	5.67	13.16	35.53	9.60	3.56					
5	95	20	115	68	21	89	204	6.80	64	5.70	9.47	30.67	7.24	3.16					
6	72	8	80	36	30	66	146	12.8	140	11.5	25.5	30.6	13.9	6.3					
7	142	5	147	99	67	166	313	11.0	156	10.63	15.8	23.3	9.41	5.0					
8	177	18	195	142	66	208	403	8.8	172	7.95	10.9	23.5	7.46	3.8					
9																			
10	242P		242	139	36	175	417	6.4		6.4	11.1	43.0	8.84	3.7					
11	232	23	255	119	34	152	407	6.7	135	6.10	13.1	47.1	10.30	3.8					

TABLE VI (CONTINUED)—PRODUCTION DATA, PENNSYLVANIA MINES

Man-hours per Net Ton										Greatest Tonnage Loaded in One Day									
Mine	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders	Mach. Men	Daymen			Total All Men	Loaders	Mach. Men	Total All Men	Loaders
			Inside	Outside	Total							Inside	Outside	Total					
1	1.428		0.425	0.192	0.617	2.045	17												
2	1.21	0.036	0.534	0.665	1.20	2.45	16.1-P												
3	1.07	0.018	0.466		0.466	1.55	25.25-M												
4	1.28	0.127	0.607	0.225	0.833	2.247	17.15-P												
5	1.18	0.25	0.845	0.261	1.11	2.51	18.55-M												
6	0.61	0.11	0.695	0.31	0.26	0.575	21.0-P												
7	0.73	0.10	0.752	0.51	0.34	0.850	15.85-M												
8	0.91	0.09	1.01	0.73	0.34	1.07	40-M												
9	0.45						32-P												
10	1.25		0.72	0.18	0.905	2.16	34												
11	1.19	0.12	0.61	0.17	0.777	2.11													

TABLE VI (CONTINUED)—PRODUCTION DATA, PENNSYLVANIA MINES

Mine	Can Loaders Produce More with Full Car Supply?	Remarks
1	Yes	Loaders drill, shoot coal, timber, lay track and clean dirt
2	Yes	Loaders drill, shoot coal, timber, lay track and clean dirt
3	Yes	Loaders drill, shoot coal, timber, lay track and clean dirt
4	Yes	Loaders drill, shoot coal, timber, lay track and clean dirt
5	Yes	Loaders drill, shoot coal, timber, lay track and clean dirt
6	Yes	Loaders drill, shoot coal, timber, lay straight track
7		Loaders drill, shoot coal, timber, lay straight track
8		Loaders drill timber and lay track
9		Loaders lay track and set timbers
10		Loaders drill, shoot coal, timber and lay room track
11		Loaders drill, shoot coal, timber and lay room track

At Mine No. 9, in Fayette County, pick miner loading average for past years is 11 net tons daily; loader average after air-puncher mining machine is approximately 17 net tons per day; loader average after electric shortwall, mining machine is approximately 20 net tons per day. Pick miners lay track, set timbers and drill holes; machine loaders lay track, set timbers but drill no holes—neither class handles much slate. Roof coal or draw slate are left up in working places. Empty cars are delivered to the face of working places.

TABLE VII—PRODUCTION DATA, VIRGINIA MINES

Mine	County	Union or Non-union	Name of Seam	Thickness, Inches	Month	Production Net Tons	No. Days Worked	Aver. Prod. per Day
1	Dickinson	Non-union	Upper-Banner	66	May, '22	65,572*	26	2522
2	Dickinson	Non-union	Upper-Banner	45	May, '22	14,674*	27	543

*All machine coal.

Men Working per Day										Average Production Net Tons per Day									
—Men Working per Day—										—Daymen—									
—Daymen—										—Daymen—									
Mine	Loaders	Mach. Men	Total Tonnage Men	Inside	Outside	Total	Total All Men	Loaders	Mach. Men Two Men	Total Tonnage Men	Inside	Outside	Total	Total All Men					
1	242	20	262	203	43	246	508	10.4	252	9.625	12.4	58.7	10.25	5					
2	70	10	80	29	5	34	114	7.7	109	6.78	18.7	109.0	15.91	4					

the time that the mine works; in most mines the actual time at the face does not average over seven hours. All labor required in producing coal is included in the figures, whether employed inside or outside. The figure in the column headed "Greatest tonnage loaded in one day" is the largest quantity loaded during that month.

In the accompanying tables the figures under total labor are not the sums of figures in the previous columns; each item is the minimum or maximum of

the figures in its class. For all the mines given the data can be summarized as shown in Table I.

The production per loader in mines Nos. 9 and 27 is the average production of thousands of men in different states and in many mines under different conditions. There is no doubt that this rate can be equalled in nearly all mines with approximately the same coal thicknesses, and it should be excelled in many mines with better roof conditions.

In comparing the day labor required in the Illinois, Indiana and Ohio mines with those in eastern Kentucky, West Virginia and Pennsylvania it must be remembered that pillar withdrawal is practically unknown in the former three states, though largely practiced in the latter ones.

Estimates show that in the latter mines the inside day labor could be reduced from 25 to 50 per cent, which would affect not only the slate, timber and trackmen but the men engaged in transportation, if the same methods of mining were practiced. This increase in day labor required for pillar withdrawal is, of course, balanced against the increased yield of coal per acre.

If all of the best performances could be grouped at one plant it would be possible, by present methods,

TABLE VIII—PRODUCTION DATA, INDIANA MINES

Mine	County	Union or Non-Union	Name of Seam	Thickness, Inches	Month	Production Net Tons	No. Days Worked	Aver. Prod. per Day
1	Knox	Union	5	78	Dec., '22	89,262*	16.0	5579
2	Knox	Union	5	78	Mar., '23	59,165*	14.0	4226
3	Sullivan	Union	6	60	Mar., '22	13,596	18.62	730

* Local union has limit of four cars per man per day.

TABLE VIII (CONTINUED)—PRODUCTION DATA, INDIANA MINES

Men Working per Day				Average Production Net Tons per Day			
Daymen				Daymen			
Mine	Loaders	Mach. Men	Total Tonnage Men	Mine	Loaders	Mach. Men	Total Tonnage Men
1	516.0	48.0	564.0	1	165	72	237
2	326.0	44.0	370.0	2	127	48	175
3	75.3	11.5	86.8	3	86.5	41	127.5

TABLE X (CONTINUED)—PRODUCTION DATA, ILLINOIS DISTRICTS

District	Man-hours per Net Ton			Total All Men
	Loaders	Mach. Men	Tonnage Men	
1			1.96	3.38
2			1.14	1.94
3			1.15	1.82
4			0.85	1.51
5			?	1.81
6			0.90	1.61
7	0.78	0.07	0.86	1.71
7	0.78	0.08		1.71
State†	1.40		1.54	2.71
State†	0.86	0.08		1.78

† Second set of figures for each year include mines from Districts 1, 2, 3, 4, 5, 6, 7.

Note—The unit figures for 1920 are all slightly higher than the actual figure, as, the tonnages include some mines not reporting the days worked. All base data from coal operators' associations' bulletins.

District 1.—No. 2 seam is worked almost entirely by longwall, pick miners in small shaft operations that could not compete with the rest of the state if they were not so close to Chicago. The seam is from 2 ft. 6 in. to 4 ft. 0 in. thick, averaging about 3 ft. 4 in. and has irregular streaks of dirt and sulphur in it, as thick as 4 in. Roof conditions are poor. Grades are slight in most of the district.

District 2.—No. 1 seam averages 4 ft. thick and is much broken by small faults, slips and clay veins. It has numerous sulphur bands locally. The roof is usually good, the fireclay bottom heaves badly when wet. No. 2 seam, is the same as in District 1. No. 5 seam is from 4 to 8 ft. thick, averaging 4 ft. 8 in., with discontinuous bands of pyrites over the middle of the seam. The gray fireclay bottom heaves badly when air slaked. In local sections, a thin layer of iron pyrites on top of the coal keeps the roof up.

District 3.—No. 5 seam is the same as in District 2. No. 6 seam averages about 6 ft. thick and has a band of iron pyrites about 2 in. thick, in the lower part of the seam. It has a hard clay bottom and a shale top that disintegrates with exposure.

District 4.—No. 6 seam is about the same as in District 3 and furnishes nearly all the production in this district.

District 5.—No. 6 seam is about the same as in Districts 3 and 4, except that the roof is always shale and falls easily; the bottom is soft fireclay. No. 7 seam is from 2 ft. 6 in. to 7 ft. 6 in. thick and averages about 5 ft. 6 in. It contains numerous bands and lenses of sulphur. The roof, not generally good, is a black shale; the bottom is soft fireclay. The two seams share in the district's production.

District 6.—No. 6 seam supplies almost all the production in this district and averages about 7 ft. thick. It has a quantity of impurities. Its roof and bottom are as in District 5.

District 7.—Normally District 7 supplies about 40 per cent. of the state output. No. 5 seam averages about 4 ft. 6 in. thick with, usually, a good roof and bottom. The quality of this coal is best in this district. No. 6 seam reaches a maximum thickness of 14 ft. varying from 8 to 12 ft. over large areas. It always has the parting of iron pyrites; in the thickest coal that parting is sometimes 4 in. thick, and while the top is not good, usually a foot or more of coal is left up for support. This district has a number of large mines, some of them the largest producers in the world.

to produce a ton of coal with 0.644 man-hour of labor, or slightly less than 77 per cent of the best total figure shown by these data.

GEORGE OTIS SMITH, Director of the Geological Survey states that activities in which topographic maps are essential are mining operations, and oil and water power development. Co-operative topographic mapping with the Geological Survey has been requested by states for the following purposes: California, oil; Colorado, coal; Idaho, phosphate; Kentucky, oil and coal; Louisiana, oil fields in the northern part of the state; Texas, oil; Utah, coal; West Virginia, coal and oil.

AS NEW MINING DISTRICTS are opened up in Alaska, additions, betterments, and extensions of the Alaskan railroad will be required, according to Colonel Steese, of the Alaskan Engineering Commission. The railroad has a mining department under a consulting geologist of the Bureau of Mines who has a general supervision over mining activities in their relation to railroad operation. The commission has closed the Eska coal mine and abandoned the Chickaloon mine to encourage private investment. The coal reserve of the railroad will be exhausted this year and a small reserve of 10,000 tons is recommended. There has been constructed a four-mile spur connecting newly developed coal mines in Moose Creek, which it is estimated will save the cost of its construction in two years through the lower cost of coal. Mining supplies are carried by river boats operated by the Commission from Nenana to Fort Gibbon and Holy Cross.

The Miner's Torch

Who Furnishes the Inspiration?

IN MY Christmas stocking this year I found a book of Proverbs. I have just been looking at it and out of curiosity turned to the index to see what subject was allotted the most space. Of course, it was money. Here are the first three quotations on that subject:

"A man without money is a bow without an arrow."

"A man without money is like a ship without sails."

"A man without money is like a bird without wings; if he soars he falls to the ground and dies."

One of these quotations is from the Dutch, one from the Roumanian and the third is marked anonymous. All of them could easily have been written by the same author and I have seen at least a score of variations on the same theme in English and American literature.

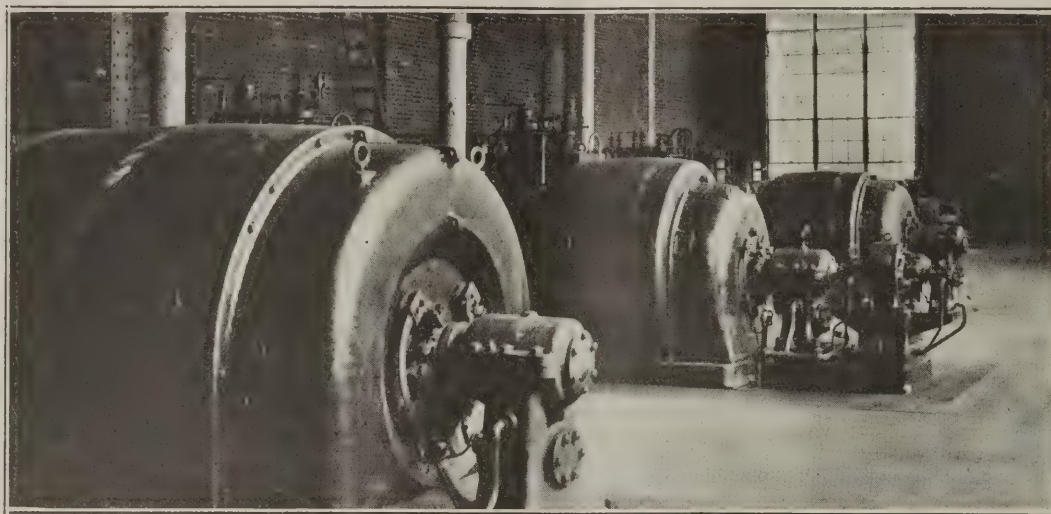
I hate to question the wisdom of the ages, as it were, but here goes. It is my conviction that the most overrated influence in the world today is that which is credited to money. You men who are living in mining camps, look around a little and see if all of the men and women who are "getting on," as it were, must give the credit for their "soaring" to money.

I did that very thing years ago when I first went to live in mining camps—I mean that I did the looking around, not the soaring—and I discovered that generally the person who was accomplishing the most good in the camp was an old maid or a widow or a married woman without children of her own who was taking an interest in all of the young people of the camp, and unconsciously exerting a wonderful influence on their lives, and doing it mostly on a limited allowance.

Picture to yourself a neatly furnished home with a piano, bookcases filled with books and here and there on the wall an attractive picture. Into this home are welcomed the boys and girls who have no similar attractions in their own homes and almost before they realize it they develop an interest in music, find pleasure in books and pictures, and come to look upon neatly kept homes as the kind that can alone fulfill their ideals. One house such as I have described owned by one lone woman who has a little love for her fellows can have a tremendous influence on the lives of half of the children of a mining village.

Poor cooking and badly furnished homes and dirty children do not necessarily point to underpaid workers, at least not in mining camps. Compare the incomes of the women who inspire the children in any camp with the incomes of the fathers of the children who need and profit by the inspiration, and see if you can still take the proverb seriously.

The good Lord furnished a few women of this character to each settlement, even though the settlement appears God forsaken to the outsider, and that explains largely why all of the children don't turn out to be anarchists and heathens even in the towns where small provision has been made for the comfort and education of the inhabitants. Many a man who has sprung from lowly surroundings should give most of the credit for his achievements to some woman whom he has entirely forgotten.



*Turbine Room of the Power Plant**

This Mine Power Plant Produces Power Cheaply

Tests Show Cost to Be 0.43c. per Kilowatt-Hour Under Full-Load Conditions, 1.9c. on Idle Days—Many Automatic Mechanical and Electrical Features in the Plant—Stokers Feed Crushed Refuse With Washed Slack

BY C. L. MOORMAN

Chief Engineer, Consolidated Coal Co., St. Louis

A MINE-OPERATED power plant near Staunton, Ill., supplying power to three mines of the Consolidated Coal Co. of St. Louis has now been in operation for a little over a year and has convinced the company that a privately owned plant can produce power at low cost. Unusual economy in the production and distribution of electrical energy has been obtained, although the plant is not markedly conspicuous in size when compared with the large public-utility power houses of the country. Nevertheless, it produces power during 8-hour full-load periods at a cost of 0.43c. per kilowatt-hour, which is far below the cost at which power could be purchased. The average cost per kilowatt-hour for a 24-hour period is 0.74c. when the mines are operated at full time and 1.9c. on idle days, these figures being based merely on the direct operating charges.

This company owns and operates, among many others, three mines known as Nos. 7, 14 and 15, located approximately at the three points of an equilateral triangle about three miles on a side, the areas allotted to the various shafts being so large that they meet each other. These mines have a combined daily capacity of 13,000 tons. Each mine has a large coal-washing and screening plant in addition to the customary raw-coal screening facilities all of which require a considerable amount of power for their operation.

With the rapidly increasing use of electrical power

*Steam at 175 lb. pressure and 100 deg. superheat is delivered to these three turbo-generator sets from four water-tube boilers each rated at 600 hp. and fired by automatic stokers. The three generators have a capacity of 3,500 kw. and deliver 2,300-volt 60-cycle three-phase electrical energy which is stepped up to 13,000 volts for transmission.

to drive underground locomotives and coal-cutting machinery and the substitution of motors for steam drives in the operation of preparation machinery, shops, washeries, pumps, etc., it was found that the use of steam-engine driven direct-current generators at each mine was proving not only uneconomical but inadequate.

Early in 1921 work on the construction and equipment of the central power-generating station at Mine No. 15 was undertaken. This plant was designed to furnish necessary electrical power for operation of the three mines under normal conditions with ample power surplus available for any prospective increase in the number or size of motor-driven machines or other facilities.

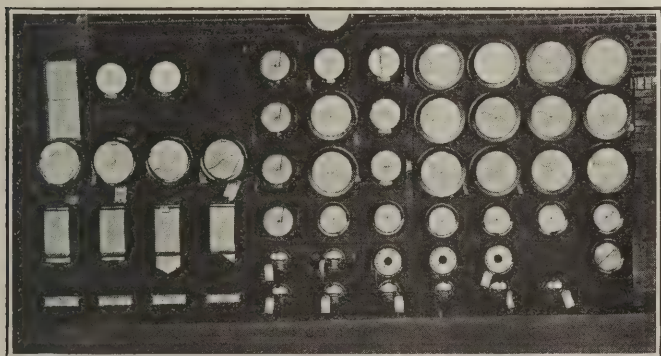
Appearance and utility were both considered in the design of the building, its equipment and appurtenances. A heavy structural steel framework rests on massive reinforced-concrete foundations. Pressed-brick walls enclose the steel supports and steel-framed windows and doors provide openings. The buildings are 89 ft. wide, 117 ft. long and 49 ft. from floor to roof, the basement under the whole being 15 ft. deep. A tapering white concrete chimney 11 ft. in diameter at the top, 240 ft. high, embellishes and adorns an exterior already pleasing.

Equipment comprises four water-tube boilers each of 600 normal rated horsepower fired by automatic stokers and furnishing steam at 175-lb. pressure and 100-deg. superheat to three turbo-generators which deliver 3,500 kw. of 2,300-volt 60-cycle three-phase electrical energy.

For transmission this energy is stepped up to 13,000 volts and again transformed back to 2,300 volts at the

distant mines. At this voltage it is used to drive motor-generator sets some of which are located above and some below ground. These convert the energy into direct current at 250 volts. To supply power to various above-ground motor drives, several transformer banks are employed which reduce the pressure of the alternating current to 440 volts. The ventilating fans at each of the mines are driven by 2,300-volt alternating-current motors capable of 50-per cent speed reduction.

A recently erected preparation plant at Mine No. 15 is furnished with picking tables where pieces of coal containing impurities are separated from the run-of-mine coal as it is spread out and conveyed into railroad cars for shipment. A portion of these separated lumps having bands of sulphur or slate or pieces of coal with slate or pyrites adhering to them are crushed and conveyed to the boiler room and utilized to make steam instead of being thrown out to waste piles as is the custom at many mines, thus effecting a material reduction in cost of power by use of a fuel which is so low grade as to be without market value. The stokers also



BOILER-ROOM INSTRUMENT BOARD

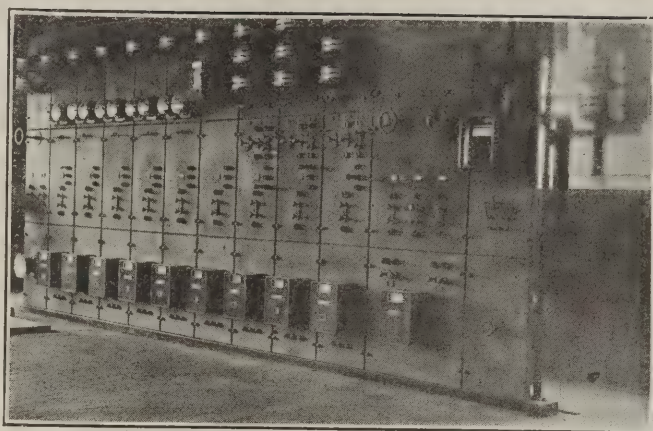
Here automatic weighing devices record the exact quantity of coal consumed by each boiler, the temperature fluctuations, the flue-gas composition, the pressures of steam, water, draft and vacuum; the steam and water flow and the chemical and mechanical changes in converting latent coal energy into power.

use at times of heavy load No. 5 washed slack and raw screenings together with the refuse.

The power plant is equipped with a complete outfit of measuring and recording instruments, regulatory and control devices. As the fuel passes from overhead coal bunkers into chutes leading to stokers it is automatically weighed and recorded so that the quantity of coal burned under each boiler is determinable at any time. In the turbine room is located a group of indicating and recording instruments, the antennas of which reach out to every part of the plant where the various changes taking place are shown and charted.

Instruments automatically chart pictures of diagrams of temperature fluctuations, flue-gas composition; steam, water, draft and vacuum pressures; also the quantities of steam and water flow, and make graphic records of chemical and mechanical changes that occur in converting coal into heat and electrical energy.

These records assist the engineer in controlling the temperatures of the feed water entering and leaving the heaters and of the cooling water entering and leaving the condensers. They aid him by recording the air temperatures inside and outside the plant, in standardizing the cooling of the air discharge at each generator, and in maintaining below fixed levels the temperature of the oil in bearings and of the exhaust steam leaving each turbine. He is enabled also to regulate the combustion temperatures of the furnace gases in the first and last stages of the boiler.



AUTOMATIC SWITCHBOARD WHICH CONTROLS DISTRIBUTION

From here the operator has control over the distribution of power to all the mines. Each feeder circuit starts from the plant from a full-automatic circuit-breaker switch.

Pressure-record charts show steam pressures in the main header and in two branches, pressure of feed water to boilers and of make-up water to heater, of water ejected by condenser pumps and air pumps, of vacuum obtained in each condenser, of draft in each boiler and in breeching. Quantity charts indicate how much steam is flowing from each boiler, how much is used by the hoisting engine and by the fan engine, how much water is passing to boilers from the heaters and the quantity of make-up water entering the cooling pond. Indicating meters and gages are installed throughout the plant, supplementing the recording instruments.

For control and distribution of electrical power an automatic switchboard is used at the main plant, others being placed at the substations at Mines Nos. 7 and 14. Switches, fuses, circuit breakers, relays and all the intricate and heavy apparatus for controlling the power output are set up in a walled-off corner of the basement of the plant. On the main floor are a series of light slate panels on which are mounted push buttons, switches and instruments which function to control and show the pressure and quantity of current being de-



NEW POWER PLANT SERVING THREE CONSOLIDATED COAL CO. MINES

It was built a year ago at Mine No. 15 in Macoupin County, Ill. The stokers handle practically all of the crushed refuse from the picking tables, burning also washed and raw slack, which is delivered into the boiler-room coal hoppers through the long conveyor shown in the picture.

livered by the generators and also the quantity sent out over the transmission lines.

By means of push buttons on an automatic switch-board the operator closes a circuit to magnetically operated switches in the basement which instantly put power on any desired feeder line. The installation of indicating and recording instruments for the electrical end of the plant also is very complete and in combination with those at the substations permits a correct determination to be made of the output of each generator and of the consumption of electrical energy at each and every point of delivery.

Water for boiler use is obtained from a reservoir about one mile distant, through a 4-in. pipe; a motor-driven centrifugal pump at this pond is started and stopped by throwing a switch at the power plant.

A daily record form is filled out by the operating engineers on which is shown the economy obtained for each twenty-four hour period, this being a résumé of various chart readings and the conclusions based thereon. On this form is recorded how much and what kind of fuel is used and how much water is converted into steam, giving the evaporation of water per pound of fuel; how much steam is used to drive generators and the weight of steam used for each kilowatt-hour of electrical power produced.

Tests show that power is being produced at this plant at an average cost of 0.43c. per kilowatt-hour during the 8-hour hoisting period with full-load conditions. The cost averages 0.74c. for a 24-hour period when the mine works full days and reaches a maximum of 1.9c. during idle days. These figures cover the wages paid to operatives, fuel cost at market price, upkeep, lubricants and all other direct operating charges, but not interest, depreciation, overhead or profit.

Wages of the operating force total about \$2,000 per month, maintenance and repair men's wages are about \$500; lubricants, repair parts, waste and all other material cost about \$1,500; an aggregate monthly cost of \$4,000 for wages and maintenance, averaging \$133.33 per day. Fuel is charged to the plant at an average price of \$1.50 per ton, and the quantity consumed varies from 75 tons on days when none of the mines is working to 131 tons when all three are operating.

About 40 per cent of steam production at the plant is used for hoisting, ventilating, heating, pumps and other auxiliaries connected directly with mining coal at Mine No. 15, the balance going to turbines for generation of current.

Investigate California Coal Deposits

Although coal has been known for a long time to be present upon the Middle Fork of the Eel River, Mendocino County, Calif., no serious efforts have been made to develop the deposit. According to C. McK. Laizure, a thorough investigation of the beds is now under way. A. L. Fisher, of San Francisco, has put a crew of men at work driving a slope on the dip of the bed. The slope is more than 500 ft. long and exposes a coal vein 12 ft. thick. The coal is of the sub-bituminous type and is comparatively low in ash and of excellent quality. Although not conclusively proved it is believed that the inclosing formations are Cretaceous. The Camp Carbon coal mine is at an elevation of 1,800 ft. and six miles from Dos Rios, the nearest railroad point. It is expected that the coal will find important application in the industrial development of California. The property is under option to the Carbon Co., of Oakland, Calif.

Coal Companies Lead in Tree Planting

DURING the spring of 1923, says the *New York Central Lines Magazine*, thirty-eight coal companies set out more forest trees than any other group of tree planters in Pennsylvania. The trees planted aggregated 1,137,175, which is sufficient to reforest 1,200 acres of idle land. As showing the great interest taken in this direction, it is only necessary to state that eight years ago the mining companies planted only 7,600 trees. Of the thirty-eight companies, the Clearfield Bituminous Coal Corporation led with 163,000 trees.

The forestry department of that company was organized in the spring of 1920. The corporation's coal holdings amount to 150,000 acres, of which 24,000 acres are owned in fee and available for reforestation. A survey of this surface proved that 2,000 acres were covered with virgin timber, 16,000 acres with natural reproduction, 4,000 acres barren, 1,000 acres semi-barren near mines, and 1,000 acres of farm land. With this acreage the following forests were established:

Name	Acreage	County
Peale	15,000	Centre and Clearfield....
Bigler	1,700	Clearfield
Patton	4,500	Cambria
Total		21,200

The rest of the acreage is scattered in small tracts near the corporation's mines, notably at Sample Run and Barr Slope, Indiana County, Pa. To the north, east and south are extensive forest lands under state control.

A study of the soil and geographic location of the various tracts, indicated that the best results would obtain by planting white, Norway, Scotch and pitch pine; Norway spruce and European larch, and 431,000 seedlings supplied by the state have been set out since the spring of 1921. Unfortunately, however, the department is unable to furnish more than 50 per cent of annual requirement; and in order to make up the deficiency and to carry out properly the extensive plans contemplated it has become necessary for the corporation to establish its own nursery near the mining town of Clymer, Indiana County, Pa.

Planting seedlings on barren land and watersheds is but a small part of the work accomplished by the corporation's forestry department. In the Peale forest of 15,000 acres particular care is given to natural reproduction and underplanting. Fire lanes have been cut, old roads opened and a fire tower erected and connected with state towers by telephone. In the important work of protection against fire, the forester is receiving the hearty co-operation of the State Forestry Department and the Pennsylvania Fire Protective Associations.

The Peale forest is made up of 2,000 acres of virgin timber, the rest of the area consisting of forest growth in various stages of development. There is also in this forest a large quantity of sound dead timber, that fire killed many years ago. This virgin and dead timber forms the source of the present mill supply. When this is gone the second growth will be ready for the mill, and there is enough of it to supply the mines until the seedlings planted today reach maturity. In cutting the timber the selective method is employed, which is most essential where conservation is the main objective. In three years this forest has produced 3,032,751 board feet of lumber, of which 50 per cent was used for mining purposes and the rest for new construction and repair work. The corporation, with a confidence born of past achievement, may well look forward to the day when its timber supply will largely exceed the demand.

News Of the Industry

Miners Want Four Years' Contract on "Best Terms Obtainable"

Convention Gives Union Negotiators Much Freedom for Coming Wage
Conferences—Lewis Beats Down Rebels—Klansmen
Lose—Howat Thrown Out

By E. W. DAVIDSON

The United Mine Workers are ready. In a two weeks' convention at Indianapolis, Ind., marked by much hullabaloo from a comparatively small radical wing, they built the platform on which they will stand when they meet the bituminous-coal operators in wage-scale sessions opening at Jacksonville, Fla., Feb. 11. The platform calls for a four-year contract under "the best agreement possible to obtain . . . on a basis of no reduction in wages," and gives the union's negotiators more latitude than they have ever had in recent history, requiring only that they submit to the rank and file on referendum whatever agreement they can win from the operators.

The tone of the convention was not militant. When President Lewis and Secretary Green declared the union is weakened and years for a period of peace, they were applauded. Therefore demands for more pay and attacks upon the administration's program for a four-year contract were set upon solidly. The union will fight if necessary, administration spokesmen said, but if it can retain for a term of years the present scale, which is "the best that ever prevailed in the industry," it will be happy to have peace and recuperate for whatever battle may be necessary later.

Committee Has Broad Powers

The scale committee's report, adopted without a change, creates a big policy committee with practically unhampered powers to give to the negotiators. Also, a pertinent clause permits outlying districts to make agreements with their operators before a basic scale is made in the Central Competitive Field, if the chance arises and the union policy committee thinks best.

The convention had the usual outbursts. A small radical element led by such men as John Hindmarsh and John Watt, both of the Springfield district of Illinois, campaigned against the administration on all occasions, great and trivial. But they lost miserably on such radical issues as recognition of Soviet Russia by the United States and alliance of the Mine Workers with one great labor party in this country.

They lost their battle for Myerscough and Howat and on everything strictly radical and were a menace to the Lewis forces only when they allied themselves with the members who think Lewis is too domineering.

On three points during the convention the administration was staggered. It barely saved itself in the battle which preserved the president's right to appoint organizers. The large element which tries biennially to change the constitution so as to permit election of organizers by districts won its point by a standing vote and lost by only 157 in the only roll call of the convention. It was a close shave for the administration.

The second staggering blow was dealt in the Ku Klux Klan battle. The administration tried rather halfheartedly to lift the union ban against Klansmen on the ground that the ban

is unenforceable. The anti-Klan forces, however, beat down the proposal. This issue was called "the most delicate of the convention."

The third was the fight to get more delegates into the convention from the big locals such as those in Illinois. The rebels led this fight and fell but 12 votes short of getting a roll call on it. They charged a miscount and yelled for 45 minutes or until the adjournment that day.

Convention Has "Atmosphere"

All the way through the two weeks of deliberation in old Tomlinson Hall the rebels continuously rebelled, President Lewis continuously defied them with such famous phrases as "You may meet in Hell before I'll change the rule," the 1,900 delegates all continuously strove to make at least one speech to be reported back home, and the heavy odors of fried onions and hot dogs from the hallways and of stale fruit from the great market downstairs continuously filled the place. For once the voices of speakers from the rostrum reached every corner of the hall, thanks to a "magnavox" installed by the telephone company, and it must be said that white mule was conspicuous for its absence. In every other particular the convention was conventional.

An effort to change the constitution

What the Miners Want

The report of the Scale Committee adopted by the miners convention unchanged, follows:

"(1) We recommend to the convention, in lieu of all resolutions relating to wages and working conditions that have been presented, that the properly accredited representatives of the organization be authorized and instructed to secure the best agreement obtainable from the operators in the Central Competitive Field on the basis of no reduction in wages and that any agreement so secured be submitted to a referendum vote of the membership for ratification.

"(2) We recommend that the next wage scale cover a period of four years, beginning April 1, 1924, and ending March 31, 1928.

Policy

"(1) For the purpose of meeting in a practical and constructive way all unforeseen emergencies which may arise a Policy Committee composed of the Scale Committee of

the Central Competitive Field, three representatives from each outlying district, the members of the International Executive Board and the International officers, be authorized to take such action for the protection of our best interests as circumstances may require and to advise the membership on unexpected developments which may arise and which cannot now be foreseen.

"(2) The committee recommends that the outlying districts be authorized to enter into wage-scale negotiations with their respective operators when the opportunity presents itself, it being understood, however, that no outlying district will conclude an agreement until after an agreement for the Central Competitive Field has been secured, or permission to do so has been granted by the policy committee.

"(3) The committee recommends that all contracts in the bituminous district run concurrently and expire on the same date."

to strip President Lewis of the power to arbitrarily remove district officers and appoint others was reported unfavorably by the constitutional committee and was beaten by vote.

An effort to get the constitution changed to make all agreements national instead of determined from a basic agreement made in the Central Competitive Field was killed.

The big fight to strip President Lewis of the power to appoint organizers started Tuesday forenoon. Some feel Lewis uses organizers to maintain "his machine." Secretary Bittner of the committee, defending a negative report on the matter, denied there are "hundreds" of such men on the payroll and that organizers work for the "machine." He said union-fighting operators would be pleased to see organizers elected by the rank and file.

Lewis made little attempt to defend himself, evidently thinking it better generalship merely to tell the convention he was willing to leave the matter to the delegates. It appeared to be a disappointment to the Lewis faction, however, when the debate was brought to an abrupt end by John Watt, of Springfield, Ill. Watt got recognition on the floor, and then, proceeding to the platform as if to make a speech, merely moved that debate cease. The motion was seconded by a roar from the rebels, and the committee's report went to a vote. The rebels won, 760 to 734, but the administration obtained a roll call by a standing vote of 689.

Lewis Has Close Call

The Lewis administration won the roll call, 2,263 to 2,106, or by a narrow margin of 157. The States of Indiana and Illinois, the Canadian delegation and scattering sections in Pennsylvania and elsewhere voted against Lewis. It was noticeable, however, that Frank Farrington, president of the Illinois miners, who until last year was a bitter opponent of Lewis, voted for the administration. Wednesday afternoon a delegate rose to protest the roll call, saying he could prove that illegal votes had been cast for the administration. President Lewis sternly declined to recognize him.

During Wednesday afternoon the administration defeated a long list of resolutions aimed to shear the headquarters officers of many powers. A resolution requiring merely a majority vote of the executive board to call a general strike was defeated. A two-thirds vote of the board is now required.

Almost a riot ensued when the committee reported against a resolution changing the basis of representation in the convention. The resolution would have changed back to the old plan of allowing a delegate in the convention for every 100 members of each local. The present arrangement, put through with a fight at the last convention of 1922, permits only one delegate for every 500 members in the big locals but one for each local smaller than that. This was aimed at such regions as recalcitrant Illinois, where many locals are big. The present plan has a decided effect on aye-and-no voting, because it reduces the number of delegates, but of course it has no effect on roll calls, for one vote always is cast

Main Acts of Convention In Its Final Week

Adopted scale committee's report unchanged, calling for four-year agreement with operators on best terms obtainable.

Refused to remove constitutional membership bar against Klansmen.

Preserved president's power to appoint organizers after bitter fight. Administration won, 2,263 to 2,106, in only roll call of the convention.

Defeated many other resolutions to shear Lewis of power.

Refused to reinstate Howat and Myerscough.

Rebels failed by only 12 votes to get roll call on resolution permitting more delegates from big locals such as those in Illinois. Near riot followed.

Elected Van A. Bittner and Thomas Kennedy delegates to International Mining Congress in Prague next June.

Chose Indianapolis over St. Louis for 1926 convention.

for every 100 members in each local, no matter what the size of the convention.

The standing vote on this question supported the administration, 785 to 692. Of course a howl arose. On a motion for a roll call the count was 558. Since this lacked but 12 of enough to get a roll call, the convention fell into a roar of protest against the tellers' count in spite of President Lewis' best efforts. Alex Piazza, of District 5, was knocked down by somebody unknown.

Rebels Howl for an Hour

Every time Lewis recognized chairman Van Bittner, of the constitution committee, so that the committee report could proceed, the rebels howled. For nearly an hour this thing kept up. Then Lewis got silence just long enough to declare: "You may shout until you meet each other in hell and you won't change the rule of this convention!"

Although the dangerous resolution to permit Ku Klux Klan members to be United Mine Workers was just ahead and might easily have been railroaded through during the hubbub, this was not done. A few innocuous sections of the committee's report were adopted amid the noise and at 5 o'clock the gavel closed the day's doings. There followed much rebel talk in the halls about a demand for the election of tellers from the house instead of continuing with the Lewis appointees.

Thursday morning Secretary of Labor James J. Davis made the address reported in another column, advocating a settlement running for a term of years, urging the miners' union to maintain a research bureau to gather statistics on coal from the labor standpoint, favoring selective immigration to protect miners and other American labor from a flood of cheap foreign workers, and answering hotly the jeers of the rebel element in the convention who booed him when he began.

In the afternoon the main business of the convention—the scale report—came up, with the resulting acceptance of the most important section, which empowers the miners' scale committee to get "the best agreement obtainable" from the operators, instead of filling up the platform with demands for more pay and shorter hours.

Frank Farrington, chairman of the committee, prefaced his reading of the report by saying he knew it would not appeal to those of "extreme and impossible views" but that it was the best thing that could be adopted for the benefit of the whole union organization in all its ramifications.

The report, giving the miners' representatives free power to obtain the best agreement possible, recommending a four-year contract running concurrently in all districts, creating a miners' policy committee and authorizing outlying districts to start negotiations "when opportunity presents itself" and make agreements either after the Central Field agreement has been made or before with the permission of the policy committee, was greeted at once by the attack of the six-hour-day and five-day-week element.

Illinois Leads Attack

About all of the attack came from Illinois, Farrington's own district, which is now largely out of his control. Delegate Hindmarsh made a long speech for shorter hours, declaring the miners' union is moving backward instead of forward by not demanding the six-hour day and five-day week. He had a great deal to say about the 7-hour day in England. William Roy, of Ohio, asked him if American miners would like to have a 7-hour day under the low wages and hard conditions of the Britons. William Mitch, of Indiana, said the British miners have lost heavily in the past four years and that wages in some of the 13 districts of England are lower than the cost of living.

"The boys back home in this country," said Mitch, "would rather strike to prevent a reduction in wages, if a strike were forced upon them, than to strike for a shorter working day." A section of the convention yelled "No!"

The broken condition of the British miners was pictured by Vice-President Philip Murray, who said they had taken three reductions and got only one small increase, along with their 7-hour day, in the past four years. He quoted Frank Hodges, secretary of the British miners, to the effect that the Britons should at once adopt the militant policy of the American miners.

"Four years of peace will enable the United Mine Workers, as the only constructive force in the coal industry, to put forth a program that will save its membership," said Murray after he had spoken of the "chaotic and diseased" condition of the industry because of overdevelopment and overmanning.

"If we struck, what would be the cost? Every strike has brought thousands of men into the industry and it would do it this time. In 1922, when the men of the coke field struck with the rest of the country, they mostly went elsewhere to work and new thou-

sands are now in there taking their places."

He said the 6-hour day proposal would only be trading ground at best, for non-unionism is a menace that makes the short day an utter impossibility.

Frank Farrington, once a power behind the move for the 6-hour day but now lined up with Lewis against it, admitted it would be suicidal to unionism. He granted that about eight years ago he was one of the pioneers for it and sent out a circular to his members favoring it. But it is pure theory nowadays, he argued, and is fit only to be used "for grandstanding."

"West Virginia," he said, "is now able to produce 100,000,000 tons of coal, or one-fifth of the whole normal need of the country. There are enough non-union men in the land to produce all of the coal the country needs. The situation down in that West Virginia region is so severe that you have heard a man from there say he doubted if any agreement could be made with operators that did not cut wages."

Then Farrington touched upon the weakness of the union. When the 1922 strike started, he said, Districts 29 and 17, both in West Virginia, were 100 per cent strong. Now, he doubts if there is a single due-paying member of 29 left, and 17 has lost about 14,000 men. In such a field the 6-hour day would make it impossible for the union regions to sell any coal at all in competition with the non-union mines.

"There are other things to be said against the 6-hour day," finished Farrington, "but it is not advisable to say them because they would only become arguments in the mouths of the common enemy, the operators."

Lee Hall, president of the Ohio district, whose bailiwick voted in its state convention for shorter hours and 25 per cent more pay, declared he favored a shorter day, but there are times when such a demand cannot be made. Other benefits for the union miners in various districts are more to be desired.

Union Weary of Strikes

"We're weary now, after having suffered from the five months' strike of 1922," said International Secretary William Green. "Let us fight only when we want to. We don't want to now, even though there are a lot of non-union operators who would like to have us do it. Let us have a spell of peace. When the time comes and the necessity confronts us, then we can do our fighting."

A West Virginia delegate declared he thought there certainly would have to be a fight if a reasonable agreement were to be made for West Virginia. He feared a reduction in wages. President Lewis answered that the scale for West Virginia would be the scale for the whole Central Field. The union spent a million dollars protecting its frontier there in 1922 and would continue to protect it.

The defenders of the 6-hour day from Illinois pointed to the advancement of machinery in mining, which is helping the "big fellow" among the mines to swallow up the little mining businesses, thus throwing more men out of jobs. It was argued that the shorter work-

John Lewis' Keynote

Looking forward to April 1, President Lewis said this to the miners' convention: "In every moral and economic way the country and the mine workers would profit by a settlement for a term of years at a wage scale which, at the very worst, would be the best that ever prevailed in this industry. I know my people will fight if necessity arises, but I would be a false leader indeed to lead them into battle unnecessarily. I know that the mass of my people desire peace. Securing a four-year contract would be one of the greatest accomplishments in the history of this organization."

day is the only defence against this movement that can be raised so long as mines remain in private ownership.

A number of questions were asked. Ohio delegates were assured they could, under the proposed plan of settlement, go home after the basic scale was fixed, and make the best deals they can with their district operators to get a scale for the removal of roof slate, which now has to be loaded out free.

"In case there is a strike," asked another, "will there be a referendum to the members before any settlement is signed?" Farrington said that would lie with the policy committee. This was hooted by the rebels.

Finally the case had been set up so strongly by the administration that the first section of the report was adopted readily by a show of hands and the convention adjourned for the day, leaving the balance of the report to be acted upon later.

On Friday morning the balance of the scale committee's report was adopted without change and without a roll call. However, it gave another opportunity for vocal attack by the rebel element mainly on the ground that four years is so long a period that too many things may happen in that time.

"We could get away with anything during the war in Illinois without getting docked; now we can't get away with anything," complained Thomas Parry, of Divernon, Ill., opposing the four-year plan because it would perpetrate "obnoxious" conditions now in

effect in that state. "Why, we can't even load out a piece of impurity the size of my fist," he declared. Vice-President Harry Fishwick, of the Illinois district, tried to get the Parry remarks expunged from the record as not representing the opinion of the organization.

Martin Flyzik, of Washington, defending the report, pointed out that the outlying districts have lost ground in point of wages and need four years to recover. The whole union needs exactly the same thing. After the four years, then it should be ready to fight again. He has seen wages forced down in the outlying fields such as his own where a reduction to \$6.25 was accepted last spring after a long and unsuccessful strike, and he wanted protection for four years against any further reductions.

A peace speech by President Lewis wound up the debate. He pointed out that it took eight months of effort, beginning in December, 1921, to get the settlement that finally ended the 1922 strike in August, 1922, and that after another long effort, a settlement was made to continue the agreement until April, 1924; but in neither case were the miners able to get a long-term agreement. The industry knew not what was going to happen after a period of but a few months and therefore there could be no stability.

Lewis Makes Peace Speech

"It is obvious," said Lewis, "that in every moral and economic way the country and the mine workers would profit now by a settlement for a term of years at a wage scale which at the very worst would be the best that ever prevailed in this industry. I know my people will fight if the necessity arises, but I would be a false leader indeed to lead them into battle unnecessarily. We suffered some inconvenience in the strike of 1922 and many a man has not yet got out of the debt incurred then. I know that the mass of our people desire peace. Securing a four-year contract to begin April 1, 1924, would be one of the greatest accomplishments in the history of this organization."

"Someone gets up here and fears that another war might occur during the period of a four-year agreement and that the contract would not permit the loading out of impurities then. God forbid such reasoning will prevail in the consideration of matters of such consequence as this. In 1917, although we had a contract, your representatives in a logical presentation of the case to the operators, were able to open that contract to meet the conditions prevailing. In another war the coal industry would meet the situation in just as intelligent a way."

"Arguments for a four-year contract at no reduction in wages are such that it is not advisable to voice them here when my words are to be carried far and wide. Those reasons ought to be obvious to all well-informed United Mine Workers. When 29 district presidents unanimously favor this report it should be accepted."

An anthracite delegate asked whether the next anthracite agreement would be made to run concurrently with the

Illinois Operators Against 4-Year Plan

No important operator in Illinois favors the four-year agreement which the miners are asking. They regard the four-year plank as union trading ground. A considerable number, however, talk favorably of a two-year continuance of present wages, though there are more who are willing to grant only one year. A considerable group demand a wage cut. The Illinois delegation goes to Jacksonville uninstructed and will take its position after it has "talked with our Eastern neighbors."

bituminous agreement. Lewis replied that since the situations regarding the two kinds of coal are so different—less than 16 per cent of soft coal going into domestic use while more than 60 per cent of hard coal does—the officers are unable now to make a ruling on the question. The decision would be determined by conditions as they arise. Someone wanted to bar anthracite delegates from any forthcoming referendum vote on a bituminous scale. This was squelched. Then the scale committee report went through.

A victory for the anti-Klan men ended a two-hour battle to change the constitution so as to remove the clause barring proven Klansmen from the United Mine Workers. This, according to Secretary Van Bittner, of the constitution committee, and other speakers, was "the most delicate question before the convention." In all the bitter debate that followed, not one speaker frankly defended the Ku Klux Klan though there were many shouts and much muttering from all parts of the floor.

The convention elected Thomas Kennedy, of Pennsylvania, and Walter Nesbit, of Illinois, delegates of the United Mine Workers to the International Mining Congress in Prague next June. No other candidates ran close to these, although John Hindmarsh, Frank Ledvinska, Fred Mooney and Andrew McGarry were runners up.

Alexander Howat Squelched

A decisive blow at radical strength in the union was delivered by the administration on Saturday, Feb. 2, when the convention wound up in a blaze of excitement. The drives to get Alexander Howat, of Kansas, and Thomas Myerscough, of Nova Scotia, back into the union crumpled against the stone battlements of Lewis' strength. The appeals and grievances committee, after agreeing earlier in the convention to reconsider the cases of the two rebel leaders, ousted for defiance to headquarters, finally reported against them Saturday morning. President Lewis refused Myerscough permission to speak. Then the convention upheld the committee by a show of hands.

Howat, determined not to be sat upon so firmly, waded up an aisle toward the platform, demanding a chance to talk. Amid wild disorder, sergeants-at-arms grabbed the man and dragged him out of the hall. The roar of the rebels was threatening, but Lewis warned the convention that "any attempt to rush the stage or to force the chairman to do otherwise than refuse Howat a voice under the law of the organization, would fail." This warning, backed up by the massing of loyal Lewis men, stopped an abortive rush and left the convention in loud confusion which lasted until Lewis whacked the gavel block, ending the 29th consecutive and sixth biennial convention of the United Mine Workers.

Howat, who is not even a Mine Worker and of course not a delegate, then went outside and held a rump convention. There he made his speech.

The 1926 convention of the union will be held in Indianapolis, as the last two have been. St. Louis was voted down.

Secretary Davis Faces Down Miner Rebels

Urges Long-Term Contract Without Wage Cuts—Wants Miners to Have Research Bureau and Joint Interpreters of Contracts

Facing the booing of a small radical element in the miners' union convention at Indianapolis, Jan. 30, James J. Davis, Secretary of Labor, went out from Washington advocating several things. He urged the union to create a bureau of research to gather data on coal from the labor standpoint, to secure for the industry joint interpreters of contract in each region; he declared for a long-term wage contract without wage reduction to give the coal industry a chance to "recover"; he argued for the passage of a new check on immigration before next July 1, when the 3-per cent immigration law goes off the

Secretary Davis' speech, in which he waved one of the radical handbills and declared he was always ready to face any issue so long as the opposition would listen to facts.

After his speech of one hour and twenty minutes, Lee Hall, district president from Ohio, proposed a resolution condemning the anti-Davis handbill as "a slanderous, untrue, un-American, dirty sheet," promulgated by men "without honor or principle and too cowardly to sign their own names." The resolution passed with four rising to vote against it.

Secretary Davis, in advocating a new immigration law to stop a flood of aliens ready to burst upon this country July 1, when the present law expires, said it is possible for more than a million a year to come and that they would create chaos here, working for little and displacing American labor. Had it not been for the 3-per cent immigration law now about to run out, he declared, between three and five million more men than are now out of employment would be jobless, with consequent disorder all over this land.

"Do you need more miners," he asked, "when you've already got 244,000 more than the industry can give five and a half day's work to?"

"No!" shouted back the convention.

He revealed that even under the 3-per cent law, foreign labor is stealthily sneaking into the United States in large numbers. "Bootlegging" of foreigners goes on all the time, netting the "bootleggers" from \$250 to \$2,500 a head for every alien brought in against the law. Asiatics come in through Canada and Mexico, he said, and about 30,000 a year get here by violating the seaman's act. Mexicans, he said, are brought in by trainloads, especially during periods of strike or impending strike, as in the case of Colorado and Utah coal mines.

He denied the accusation in the rebel handbill that he favored the Rosenbloom and Kelly bills now before Congress, saying he has a better one himself, and denied also that his plan for alien enrollment in this country would result in deportation of every alien who might strike. He defended the enrollment plan, saying it would enable this country to reach all its aliens to instruct them in their rights and duties as Americans and would be a thing of value to them rather than a detriment. We enroll all Americans for voting and enroll all Americans for schooling, so why should Americans protest against enrollment of aliens within our borders?

He denied the charge that he favors cutting of wages, saying if wages were reduced \$1 a day for the 41,000,000 gainfully employed workers in this country, the reduction of \$41,000,000 a day in the nation's buying power would be disastrous to industry.

Secretary Davis declared for government rehabilitation of injured workmen to reduce pauperism and de-



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James J. Davis

Some of the mine workers' delegates did not want to hear the Secretary of Labor and tried to hoot him down, but wiser counsel ultimately prevailed.

statute books, and favored not only selective immigration from transoceanic and adjoining nations but also enrollment in this country of all aliens.

Secretary Davis was greeted in Indianapolis by a convention full of posters and fliers denouncing him as an enemy of labor and one who would like to see miners' wages reduced: The rebel plan in the meeting evidently was to hoot him down. Realizing this, President Lewis in the chair, declaring Secretary Davis to have been "always square to the United Mine Workers of America," asked for Mr. Davis "that privilege which you would grant any honorable man." This merely drew a chorus of "Boos!"

"The honor of your organization is at stake," roared Lewis. "You are standing before the entire nation and this organization is going to be judged by the acts of this convention. If there are any men here so devoid of the natural instincts of a gentleman that they cannot accord the courtesies due the Secretary of Labor, let them leave the hall at once." Of course nobody left. Instead they merely "moored" occasionally during the beginning of

pendency in this country. An average of \$400 will add an average of 20 years of independent useful life to such men, he said. "Isn't that a better way to get labor than to import it?" he queried. Two mine explosions killing nearly 100 men within a week reminded him of the necessity also of more effort to make the coal mines of this country safe.

Advocating research bureaus among labor unions he said:

"Your organization has now reached the stage where you should create your own permanent research bureaus, which would furnish your own and joint conference assemblies with specific and reliable details of the local variations in your cost of living as compared with the city centers furnished by the Department of Labor—also the coal markets, their sources of supply, the way and wherefore of the variations in freight rates, costs of production, selling prices both wholesale and retail, profits and evidences of profiteering, if any, and by whom.

"Such research work covering a period of coal shortage would quickly expose the spot-coal gamblers, who are the worst menace of the industry and therefore its worst enemies because their piratic activities besmirch the reputation of the industry and create the unwarranted impression that the coal business is a 'hold-up' game of conspiracy between employers and employees.

Would Eliminate Spot Gamblers

"Continued harmony in the industry for, say, 5 years would eliminate for the time being all the spot or short coal gamblers and pave the way for the solution of most of your troubles.

"I congratulate you on the way you resolved last Saturday to handle another disturbing factor in the coal industry and which can be remedied only by the co-operation of your officials and members. It is that of the sporadic local strike. Scores of these petty affairs occur every year, and as a direct result public confidence is shaken in the integrity of joint contracts.

"Now I know from personal experience in dozens of cases that come to the Conciliation Service of the Department of Labor that your leaders generally disapprove and do all they can to prevent these illegal petty strikes in violation of your agreement; yet some of the rank and file in too many instances proceed without the sanction of their district and national officials.

"Of course I understand that these petty strikes are intended as protests and to convey the idea of lack of local confidence that they are getting a square deal; but they should understand that neither the interpretation of the contract nor the decision of any local dispute rests with the local union, and the failure of so many local unions to appreciate this, by taking matters into their own hands, brings down upon the whole organization official and public censure.

"Now it strikes us that there is a simple way to correct this evil by the appointment of a joint interpreter of the agreement in each mining district and sub-district, this interpreter to have the sole power to interpret the application of the terms of the agreement



Edgar W. Tait

President, Allegheny River Mining Co., recently elected member of Board of Directors, Central Pennsylvania Coal Producers' Association and of the Executive Committee of the Association of Bituminous Coal Operators of Central Pennsylvania.

to any local dispute—in other words, have the final decision when all the other machinery for adjustment has failed. Understand that this interpreter does not make nor change any part or verbiage of any joint agreement; he merely decides what it means in relation to any dispute, and the virtue of his services lies in its promptness which begets the confidence of all employed.

"The idea of such an interpreter was developed during the war period, and has been continued partly in the copper and oil industries of the Rocky Mountain and Pacific Coast States, with the result that not a single shift has been lost in either industry for six years over any local dispute once the agreement has been made, and I am glad to note that District 17, in West Virginia, is working under the same idea with similar flattering results. Why not expand the idea and clean out the cobwebs of petty strikes that put your organization in such bad light in the minds of so many people?

"The way to hold the confidence of the American people is to keep your contract. Yes, make it the most sacred instrument of your organization.

"Let me again emphasize the fact that the chief needs of the coal industry are: (1) Peace for a term of years, and you will (2) eliminate the spot coal gambler; (3) create your own permanent Research Bureau; (4) appoint interpreters of your local agreements, and (5) you will remove the cause for any petty local strike.

"Thus demonstrating to the country at large that the problems of the coal industry can best be solved jointly by your employers and yourselves."

At the wind-up of his reply to the radical attack on him in the convention by men "more loyal to other flags than to that of this nation" Secretary Davis called Lewis the "greatest president the United Mine Workers ever had" and shook hands with him on the stage. Then the Hall resolution condemning the handbill passed with a whoop.

Two Big Strip Pits Developed In Ohio and Montana

What is considered the biggest slack coal deal in the history of the State of Ohio, involving between 1,100,000 and 1,500,000 tons and approximately \$2,250,000, was closed Jan. 17 with the signing of a contract by the Blanchard Zanesville Mining Co. and the Ohio Power Co. The coal is to be shipped from the Big Muskingum stripping mine of the coal company at Ellis, Ohio, six miles north of Zanesville, to the new plant of the power company at Philo, Ohio, ten miles south of Zanesville.

The contract covers a period of ten years, and the coal is to be shipped at the rate of 300 to 450 tons daily. Extensive improvements at the Big Muskingum mine have been begun in preparation for handling the big output which the shipment of 300 tons of slack daily will entail. Improved types of tippie equipment, including a long picking table and cleaning plant and shaker screens, are to be installed.

This mine came into production in August, 1923, the present maximum output being 1,000 tons daily. New producing units will be installed as soon as practicable and this production will be doubled and eventually tripled. As shipments to Philo may be made by rail or water the loading plant will include a four-track railroad tippie and river tippie. Owing to the great saving in freight it is intended to ship practically all of this coal by river.

The Northern Pacific R.R. has a 600-acre tract of sub-bituminous coal, which is an extension of the Sheridan-Wyoming field located 35 miles south of Forsythe, Mont. This company is in a position to open up seven other similar tracts if it so desires. The coal is 30 ft. thick and will yield from the tract mentioned as much as 26,000,000 tons, the mining of which will require the removing of only 45,000,000 tons of cover. It proposes to strip at the rate of 1,000,000 tons of coal per year for railroad fuel.

Brydon Asks to Be Heard on Stream-Pollution Bills

When the Rivers and Harbors Committee of the House of Representatives met Jan. 30 to consider bills relating to pollution of coastal and navigable waters and inland streams by oil and acidulous materials, Harry L. Gandy, executive secretary of the National Coal Association, appeared as the representative of John C. Brydon, president of the association, and presented a statement by Mr. Brydon on the bills. Six bills were before the committee, two of which, the Bland bill and the Rosenbloom bill, have a direct bearing on the bituminous coal industry.

Mr. Brydon's statement, after reciting at considerable length the effect on the coal industry of the enactment of these measures, asked that the industry, through the National Coal Association, be given an opportunity to be heard through witnesses and briefs in the event that serious consideration be given the Bland and Rosenbloom bills.

Drop Gouge Charge Against Madeira-Hill Co.

The Federal Trade Commission has dismissed the case against the Madeira-Hill Co. involving charges of conspiracy to increase the prices of certain sizes of anthracite through pyramiding, according to an announcement by the commission Feb. 2.

The commission said no evidence was adduced showing the Madeira-Hill corporation had an agreement with wholesale customers to sell anthracite at stated prices. The wholesalers mentioned by the commission included Pattison & Browns, Inc., the Titan Fuel Corporation, Hartwell-Lester, Inc., C. P. Brodhead and Lynn M. Ranger.

The original action was instituted on request of the President to consider findings of fact of the U. S. Coal Commission, together with assertions by Governor Pinchot of Pennsylvania, that the passing of anthracite through numerous hands before it reached the consumer was a device by which the price was unduly raised.

The commission immediately went over the whole situation with the Coal Commission, and then instituted its own investigation, using statistics gathered by the Coal Commission in arriving at its final decision.

"For the purpose of expediting the disposition of this complaint," a formal statement by the Trade Commission said, "the commission adopted the hitherto unusual procedure of itself hearing, under oath, the testimony of the witnesses adduced by the commission's attorneys in support of the complaint and of the respondents' denial.

"It very quickly appeared that the general statements made in the report of the United States Coal Commission were not applicable to Madeira-Hill & Co., and that the charge in the complaint that Madeira-Hill (the respondent operator) has assured the Pennsylvania Fair Practices Committee that it would sell the grades of coal in question at \$10.50 per ton, f.o.b. mine, and had in fact sold such coal at a higher price, was not substantiated by proof.

"The chairman of the Fair Practices Committee was called and denied absolutely that there had been any agreement between Madeira-Hill and his committee as to the price at which the company was to sell his coal. He stated unequivocally that Madeira-Hill had appeared before his committee, produced their costs of production and requested that the sum of \$11.50 per ton be fixed at which they should sell the sizes of anthracite referred to; that his committee fixed \$10.50 and that Madeira-Hill did not, at any time, agree with or assure his committee that it would sell said coal at the price so fixed.

"Of course, any declarations which might be made by Madeira-Hill, as to the existence of an agreement or arrangement with the wholesaler respondents, could be binding only as to the party making the statement.

"Not only were there no corroborative statements from the wholesalers, with the possible exception of Ranger, but their denial of such arrangement was complete and explicit. In

oral testimony, Ranger himself strenuously denied the existence of such an arrangement and insisted that the arrangement in accordance with which he says in one of his letters he paid an additional \$2.50 per ton to Madeira-Hill, was the arrangement created by the original order and accepted and did not refer to any agreement for a division of profit."

Saunders Named President of United Engineering Society

William L. Saunders, chairman of the Naval Consulting Board and deputy chairman of the Federal Reserve Bank of New York, has, it is announced, been elected president of the United Engineering Society, succeeding J. Viopond Davies. Mr. Saunders is chairman of the Board of the Ingersoll-Rand Co. and a director of other large corporations.

He was twice mayor of Plainfield, N. J., and is a past president of the American Institute of Mining and Metallurgical Engineers, New York Chamber of Commerce, and Manufacturers Export Association. He also is a member of the American Society of Civil Engineers, American Society of Mechanical Engineers and the Iron and Steel Institute.

The report of the retiring president showed that the total membership of the four founder societies which compose the United Engineering Society and which embrace the civil, mining, mechanical, and electrical engineering groups is 54,224. Membership of the associate societies aggregates 25,615.

George H. Pegram, chief engineer of the Interborough Rapid Transit Co., was chosen first vice-president, and J. V. W. Reynders, vice-president of the American Institute of Mining and Metallurgical Engineers, was named second vice-president. Other officers elected are: Alfred D. Flinn, secretary; Joseph Struthers, treasurer; Henry A. Lardner, assistant treasurer.

Byproduct Coke Output in 1923 Made New Record

A new record in the output of byproduct coke was established in 1923, according to the U. S. Geological Survey, which reports that the total production of all coke during the year has been exceeded but twice in the history of the country. The 2,999,000 tons reported by producers for December brought the year's output of byproduct coke up to 37,527,000 net tons. This was an increase of 6,693,000 tons over the 1920 output, hitherto the maximum. The combined production of beehive and byproduct coke was about 55,487,000 tons, an amount almost equal to that of 1917 and only 1.8 per cent less than the record set in the war year 1918.

Production from byproduct ovens passed the production of beehive ovens in November, 1918, and since that date byproduct coke has been continuously in the lead. In 1923, 67.6 per cent of the total was contributed by byproduct ovens and 32.4 per cent by beehive ovens.

OUTPUT OF BEEHIVE AND BYPRODUCT COKE IN THE UNITED STATES

Year	Net Tons Produced			Per cent of Total Output	
	Beehive	By-product	Total	Beehive	By-product
1913	33,584,830	12,714,700	46,299,530	72.5	27.5
1915	27,508,255	14,072,895	41,581,150	66.2	33.8
1917	33,167,548	22,439,280	55,606,828	59.6	40.4
1918	30,480,792	25,997,580	56,478,372	54.0	46.0
1919	19,042,936	25,137,621	44,180,557	43.1	56.9
1920	20,511,092	30,833,951	51,345,043	40.0	60.0
1921	5,538,042	19,749,580	25,287,622	21.9	78.1
1922	8,573,467	28,550,545	37,124,012	23.1	76.9
1923	17,960,000	37,527,000	55,487,000	32.4	67.6

The recovery in coke production was associated with great activity in the iron industry and with a shortage of household fuel.

In comparison with 1922, both branches of the industry reported a great increase in output. For byproduct coke the increase amounted to 8,976,000 tons, or 31 per cent. Production of beehive coke showed a still larger increase because the strike in the Connellsville region had artificially restricted operations the year before.

PRODUCTION OF BYPRODUCT COKE, BY STATES, IN 1922 AND 1923

State	(In thousands of net tons)		Increase (+) or Decrease (—)	
	1922(a)	1923(b)	Tons	Per Cent
Alabama.....	3,493	4,335	+842	+24
Colorado.....	365	448	+83	+23
Illinois.....	1,983	3,162	+1,179	+60
Indiana.....	3,995	4,970	+975	+24
Kentucky.....	457	435	-22	-5
Maryland.....	590	864	+274	+46
Massachusetts.....	407	604	+197	+48
Michigan.....	1,142	1,650	+508	+45
Minnesota.....	462	693	+230	+50
New Jersey.....	791	893	+102	+13
New York.....	1,495	1,782	+287	+19
Ohio.....	4,912	6,247	+1,335	+27
Pennsylvania.....	7,152	9,312	+2,161	+30
Tennessee.....	27	124	+97	+369
Washington.....	6	31	+25	+417
West Virginia.....	502	924	+422	+84
Missouri, Rhode Island and Wisconsin.....	772	1,053	+281	+36
Total.....	28,551	37,527	+8,976	+31

(a) Final figures. (b) From monthly reports furnished by operators.

PRODUCTION OF BEEHIVE COKE, BY GROUPS OF STATES, IN 1922 AND 1923

	(In thousands of Net Tons)		Increase 1923	
	1922a	1923b	Tons	Per Cent
Pennsylvania & Ohio	6,939	14,484	7,545	109
West Virginia.....	418	1,037	619	148
Ala., Ky., Tenn., & Ga.....	432	1,079	647	150
Virginia.....	379	721	342	90
Colorado & New Mexico.....	207	371	164	79
Washington & Utah.....	198	268	70	35
	8,573	17,960	9,387	109

(a) Final figures. (b) Estimated from railroad shipments.

The only new plant to start operation in 1923 was that of the Weirton Steel Co. with 37 ovens, which began producing in July. On Jan. 1, 1924, there were approximately 709 ovens under construction, of which 541 were additions to existing plants and 168 were at 7 small new plants.

At 100 per cent operation with all ovens active and all conditions favorable, the plants in existence at the end of 1923 could produce 44,092,000 tons of coke a year. When the ovens under construction are in operation this total will be increased to 48,350,000 tons of coke. The plants now built have a coal-carbonizing capacity at 100 per cent operation of 63,000,000 tons, and this will be increased by the ovens under construction to 69,000,000 tons.

Regulationists Gain Strength from Teapot Dome Developments

Deals Blow to Administration Effectiveness Obtained by Giving Broad Power to Single Officials—Position of Trade Commission Stronger—Pinchot Gains Prestige

By PAUL WOOTON

Washington Correspondent of *Coal Age*

Teapot Dome developments put great strength behind the regulationists. The present administration has placed great emphasis upon less government in business. The development of that policy has meant the placing in private hands of many undertakings which might have been handled as a part of the government's work. It now is certain that no further leases will be made of naval reserves. If it becomes necessary for the government to draw upon them, the federal government will have to go into the oil production business.

One of the indirect effects of the explosion which has blown the lid from the teapot is that it paves the way for the hoisting of regulation on coal and other basic commodities. The part played by the oil magnates not only brings into disrepute all big business but also all of the industries where large aggregates of capital are required for their development. The argument now will be brought forward that the federal government cannot co-operate closely with big business on the ground that the friendly contacts which such a policy engenders means that these interests are favored unduly. It is certain to affect to a great degree all of the leasing being done under the recently enacted General Leasing Act.

The sensational developments in connection with the Sinclair and Doheny leases is a blow to the increased effectiveness of administration which has been obtained of late by giving broad powers to single officials. The trend again will be toward the creation of boards and commissions, where the division of responsibility among several persons is a guarantee against the corruption of a single official.

There is no question that the Teapot Dome matter has strengthened the position of the Federal Trade Commission and is reacting unfavorably on the policies of Secretary Hoover in placing great faith in the integrity of the men conducting our industries.

The developments constitute a great victory for the ultra-conservationists. It has increased Governor Pinchot's

prestige and has placed new pressure behind his coal bill. The interjection of long debates on Teapot Dome will divert attention from coal legislation in the immediate future. The attention of Congress now is centered on the personal ethics of high administrative officers. The tendency still is to dwell on satchels of currency, cancelled checks and the more spectacular features of the incident. It is not going to be long, however, before attempts will be directed at things more fundamental and with them will come, it is believed generally, a wave of regulation which will be applied first to underground resources.

Pittsburgh Coal Co. Takes Over Reiss Interests

Public announcement is made of the affiliation of the Milwaukee-Western Fuel Co., the C. Reiss Coal Co., of Sheboygan, Wis., and the Pittsburgh Coal Co., which really was brought about several months ago when the Pittsburgh Coal Co. bought the interest of the late Edward A. Uhrig in the first-named company. The combine, which practically controls the Lake Michigan trade, shipped 7,000,000 tons by lake last season. V. H. Palmer, of Cleveland, Ohio, will direct all future lake shipments. The three companies will be continued as separate organizations.

Retailers Urge Coal Institute

Efforts are being made by officers of the National Retail Coal Merchants Association to obtain the co-operation of other organizations concerned with the coal industry in early consideration of the proposal for organization of an institute embracing all phases of the industry to handle common problems.

The retail dealers and the anthracite operators have committees on this subject awaiting action by the wholesale dealers and by the bituminous operators.

It is hoped by the retailer's organization to have committees representing all branches of the industry functioning by the time of the next annual convention of the Retail Coal Merchants Association, which will be held in Bluefield, W. Va., June 4, 5 and 6, although it is not believed that it will be possible by that date to have concrete plans for the proposed institute perfected.

Officers of the retailers' association have just begun consideration of the program for the annual convention and details have not yet been arranged. One of the subjects to be given major attention at the convention will be coal legislation in Congress and in individual states.

Trustees to Run Business of Jewett, Bigelow & Brooks

A trusteeship has been effected to conduct the affairs of Jewett, Bigelow & Brooks, with mining and operating offices in Cincinnati and general offices in Detroit. This was the result of conferences held in Cincinnati beginning Jan. 28 and continued for several days. A. McD. England, of the Logan Hardware & Supply Co., Logan, W. Va.; M. E. Brown, Sterling Hardware Co., Hazard, Ky.; Ray Moss, Moss Stores Co., of Pineville, Ky.; John S. Storrs, Storrs-Schaefer Co., Cincinnati; A. T. Siler, attorney, of Williamsburg, Ky., and W. F. Courtney, of Armour & Co., Chicago, have been named as trustees for the creditors and the J. B. B. corporations have agreed to vest in E. L. Douglass, vice-president and operating manager, full power to conduct the business on behalf of the corporation.

The situation was forced through a cloud that has been hanging over the company since it entered an export deal in 1920-21. Jewett, Bigelow & Brooks own or control the following companies: Hazard Jellico Coal Co., First Creek Mining Co., Guyan Mining Co., Varilla Mining Co., Pine Ridge Coal Mining Co., Bradley-Jellico Coal Co., Kimberly Mining Co., Roth Coal Co., Black Joe Coal Co., Jaybee Jellico Coal Co., J B Blue Gem Coal Co., No. 182, J B Elkhorn Coal & Land Co., J B Straight Creek Coal Mining Co., J B B Pocahontas Coal Co., J B Hickory Cannel Coal Co., J B Harlan Fox Coal Co., the Richfield Coal Co. and the J B Stores Co.

Officers of the Jewett, Bigelow & Brooks Co. are well satisfied with the turn that has been taken in the affair and believe that it will only be a reasonable length of time before the whole of the situation is clarified. They point to the fact that there has been an element of doubt existing for some time which will be entirely done away with in the event that the trusteeship reaches the happy conclusion which has been bespoken for it.

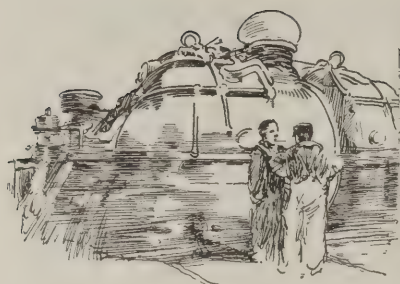
N. C. A. Appoints Committees

The National Coal Association has appointed a committee to study Senator Oddie's bill for the establishment of a department of mines and mining, composed as follows: J. G. Bradley (chairman), president, Elk River Coal & Lumber Co., Dundon, W. Va.; D. B. Wentz, president, Stonega Coke & Coal Co., Philadelphia, Pa., and A. M. Ogle, president, Vandalia Coal Co., Terre Haute, Ind.

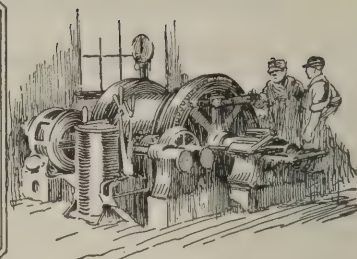
C. E. Bockus has been chosen by President Brydon to head the committee which, in conjunction with similar committees of the American Wholesale Coal Association, and of the National Retail Coal Merchants' Association, will constitute the Commerce Department's advisory committee on coal. D. B. Wentz and D. C. Guthrie are the other two members of the committee. S. H. Robbins, M. L. Gould and Walter Barnum will serve as alternates. Constituted in this manner, it is pointed out, the committee is representative in that it is drawn from Virginia, West Virginia, Pennsylvania, Ohio, Indiana and Washington.

Censure Coal Company for Johnson City Disaster

A verdict censuring the Crerar Clinch Coal Co. for alleged failure to observe all precautionary rules was returned by the Coroner's jury which heard the testimony at the inquest into the explosion which caused the loss of 33 lives at the East Side Mine, Johnson City, Ill., Friday afternoon, Jan. 25.



Practical Pointers For Electrical And Mechanical Men



Accident Hazard Eliminated by Change In Automatic Reclosing Circuit Breaker

AS THE old-fashioned steam-driven direct-current power plant becomes more and more obsolete, the modern underground substation, which may be located near the working face of the mine, will be called upon to deliver not only proper voltage but will be required to render reliable, efficient and economical performance.

Much has been accomplished in a highly satisfactory manner by means of various devices designed to function automatically, but it is probable that the most appreciated piece of automatic apparatus used in the coal-mining industry is the automatic reclosing circuit breaker used to control the direct-current side of the substation equipment. It not only reduces the labor cost of operation but it has complete and accurate control over all the circuits within the mine, and as its functions are governed by the load conditions of these circuits, important equipment is spared many hard bumps that ordinarily would be experienced

upon the reclosing of a manually operated circuit breaker.

One of the most dangerous accidents that may occur when two or more substations equipped with synchronous converters are operated in parallel is the failure of the direct-current circuit breaker to open at a given load, the result being that the load rises to such a value that the alternating-current supply is interrupted. Under these conditions the direct-current side of the converter would be left directly across the line and if the ordinary type of manually operated breaker is employed a runaway and serious damage to one converter usually results.

The modern automatic reclosing circuit-breaker may have its operating coil in series with the switch of an overspeed device which will de-energize the operating coil of the circuit breaker in time to prevent a runaway under ordinary conditions. It is here, however, that I wish to bring out a point: The conditions are not always ordinary, and serious troubles consequently result.

Probably the most popular automatic reclosing circuit breaker now used in the mining industry is the one manufactured by the Automatic Reclosing Circuit Breaker Co., of Columbus, Ohio. It is some of their old style breakers that I wish to use for an example—types AA and ARL. As all such automatic breakers are based on a similar principle a like weakness may exist in other makes. However, I do not wish the readers of this article to confuse these types with any of the later models, which give almost perfect satisfaction in operation.

Many old type circuit-breakers are still in service, performing in a most satisfactory manner, and are entirely too valuable to discard for the later types. In my experience I have never known one of them to fail electrically, and rarely have they failed mechanically. Some of these mechanical failures, however, might result disastrously to the generator. It is the object of this article to show how these breakers may be changed to make the liability of such failure more remote.

Referring to Fig. 1, it will be noticed that the breaker is closed through the mechanical action of the plunger. (1) by lifting the plunger pin (2) until the

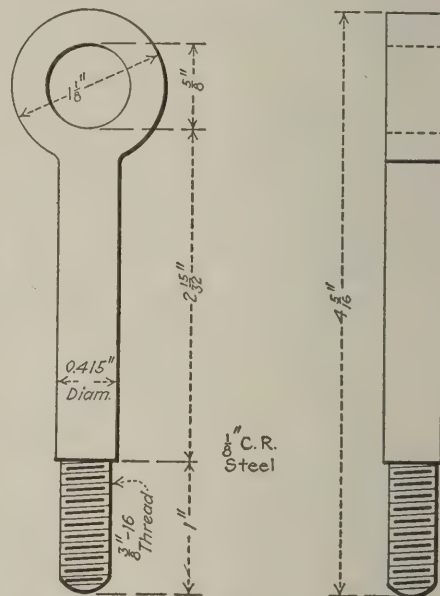


Fig. 2—New Plunger Pin Attachment

The extra weight of the plunger assists in opening the breaker under all conditions.

same comes in contact with the roller (3) the roller arm (4) is brought parallel with the top of the main body casting (5) and the breaker is found to be in a closed position.

As long as the surface on which the roller around (6) engages is kept smooth and the eccentric bushing (7) is properly adjusted there is no question but that this type of breaker will function properly, but when stations are isolated underground without an attendant, these little items are likely to be in need of attention quite frequently, and as a result the general wear that should be cared for by adjusting the eccentric bushing permits the arm (4) to raise above its proper position, which is parallel to the body casting, until it acts as a fixed prop, and even when the operating coil (8) is de-energized by the operation of the overspeed device the breaker remains in a closed position after the plunger (1) and plunger pin (2) have returned to the normal position occupied by them when the breaker is open. This condition probably would result in a runaway and considerable damage.

A quick, reliable method to prevent such an occurrence is as follows: Remove the plunger (1), plunger pin (2) and the roller (3)—Fig. 2 gives the required dimensions for a plunger pin that may be substituted for items 2 and 3 in types AA and ARL of a 600-amp. breaker; other capacities may be de-

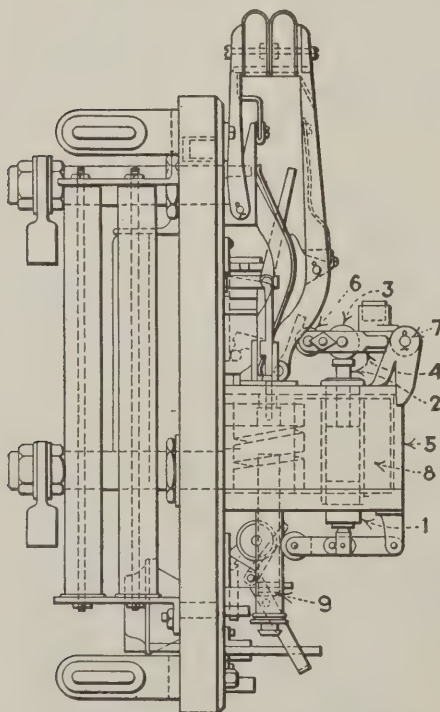


Fig. 1—Automatic Circuit Breaker

The plunger pin is redesigned so as to prevent the breaker locking closed when the operating circuit is cut open.

terminated accordingly. Now take the plunger (1); center, drill and tap it to accommodate the pin shown in Fig. 2; place the new plunger pin in the opening left by the pin (2) and screw the plunger on the pin until its shoulder is firmly butted against the top of the plunger, then insert the pin formerly in the roller (3) into the hole of the new plunger pin, reassemble the parts and adjust the breaker. The function of the new pin is to pull the roller arm (4) down when the operating coil is de-energized, regardless of any slight change in the position of the roller arm. It is obvious that the new plunger pin will permit the weight of the plunger to act upon the arm with a jerk, this action being assisted by the pull of the torsion spring (9).

To my knowledge one coal company in eastern Ohio has nine of its substations equipped with old-style breakers arranged as described, and results so far have been very satisfactory.

ROYCE L. GRIMES,

Electrical and Chemical Engineer.
Piney Fork, Ohio.

Keeping the Rock Drill Fit

Rock drills, like all other equipment, need care and attention. The very nature of the work of the drill has made it necessary that all parts be ruggedly constructed, and for this reason the parts inherently withstand much abuse and require but little maintenance. They must be given a reasonable amount of repair, however, and it is essential that it be carried out with due consideration of the function of each part.

The proper maintenance of the drill requires, in the first place, occasional inspection, which when carefully made will disclose any undue wear, damage or imperfect operation of any part. Occasionally, the drill should be taken apart and given a thorough cleaning, preferably with kerosene. After being dried all parts should be reassembled and oiled. In the wet types of drills, if water leaks past the packing around the water tube it will wash away the lubricant. This quickly results in wear on the rifle bar and piston. For this reason it is advisable before assembling to test for leakage by placing the thumb over the end of the tube and turning on the water pressure. When water tubes are renewed, a brand new rubber tube should be used.

The drill shown in the illustration is designed so that the side rods are equipped with cushion springs which hold the different parts together. Both rods should therefore be tightened up to the same tension to prevent breaking the front cylinder head, back head or other parts.

It must be remembered that when the hammer is in operation the steel holder is not a shock absorber and if the hammer is not held close to the drill steel the blow of the piston will be transmitted to the holder rather than to the steel.

Referring to the accompanying illustration, the following vital parts always should be considered:

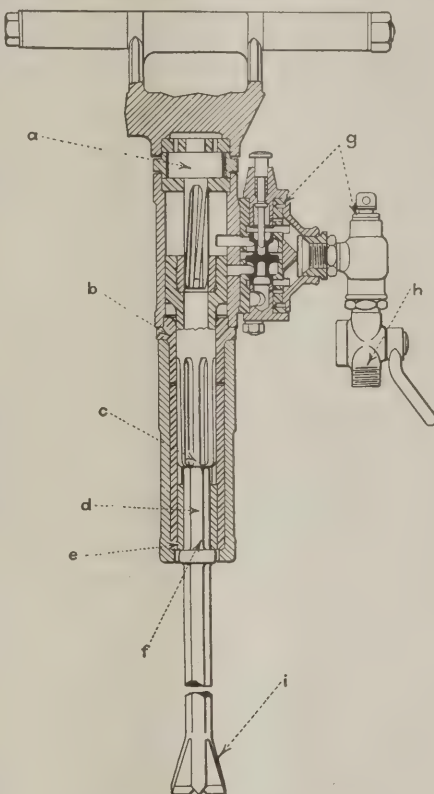
(a) Broken pawl springs will wear out rotating device. Examine before assembling.

(b) If cylinder front head washer is worn, insufficient guide is provided for front end of piston. When piston hits the steel, side strains and vibrations are set up, resulting in piston leakage.

(c) Examine striking end of piston. If the end is unevenly worn or is chipped or spalled, it indicates shanks of steel are bad. Square end of piston, then be sure shank end of every steel is square, as one uneven, poorly made shank may ruin the piston.

(d) Temper shanks in oil. Grind end smooth and square. Never temper shanks in water or they will be hard and brittle, resulting in increased breakage of steel and piston.

(e) Renew rotation sleeve bushing when worn. When bushings wear large at either end, they allow the steel to wobble. This makes piston hit edge of shank instead of the flat, square end. A gage to be used to determine when the sleeve is worn to the renewal point may be easily obtained.



Rock Drill for Mining Service

The hammer action of a drill makes it necessary that each part function properly. An incorrectly operated drill will soon cause much damage.

(f) Be sure shanks are of proper dimensions. This will give full power of piston blow. If shanks are short, piston will strike front head washer, resulting in breakage of through rods.

(g) Fill lubricator often with proper grade of liquid grease.

(h) Be sure to blow out hose well before connecting to air throttle.

(i) Properly made, correctly tempered and sharp bits will increase the drilling speed. Allow the steel to cool after forging and then reheat for tempering.

Nature and Composition of Insulating Varnishes

Insulating varnishes may be described as liquids of varied color and consistency, composed of a useful semi-solid part, or "base," made up of resins, asphalts, pitches, drying oils, driers, etc., and a solvent in which this base is dissolved or uniformly incorporated. They are used to fill or cover paper, fabric and other materials, thus improving their physical and insulating properties by replacing the occluded air with a dielectric of higher order or helping to maintain the constancy of

the initial insulation of the parts treated by affording an impermeable covering to these parts through which deleterious substances cannot pass.

They should be of such nature that, after application, they may be changed from the liquid to the solid state, or practically so, by some convenient means such as heat. In order to perform their function they must possess numerous and varied qualities, both before and during setting as well as in their subsequent useful life.

Spirit varnishes consist of varnish gums or resins dissolved in a suitable solvent, usually alcohol. The varnish may or may not be colored by the addition of dye, but it usually contains ingredients to improve the flexibility. These varnishes dry by the evaporation of the solvent, which leaves a film of the gum on the surface to be coated.

Some consider spirit varnishes more as finishes than as insulating varnishes, for their principal use is as a finishing coating over other insulating varnishes. In some applications, however, they are used for insulating purposes where little flexibility and great binding and cementing properties or exceptionally quick dry are required.

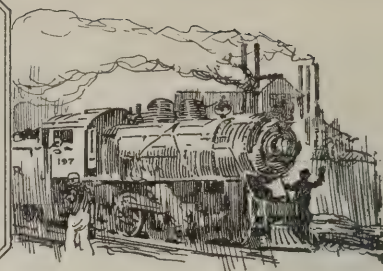
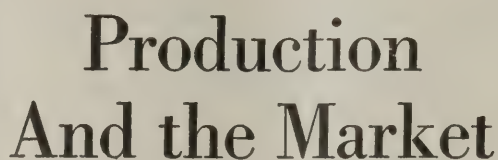
Oil-type insulating varnishes consist of varnish gums or resins in combination with vegetable drying oils (generally China wood oil and linseed oil) dissolved in a suitable thinner, usually petroleum naphtha. In the black varnishes the clear gums are replaced with asphaltic materials or pitches. The oil-type varnishes dry by the evaporation of the solvent and oxidation of the vegetable oils. The drying time is governed by the proportion of gums and oils and by the quantity of oxidizing agents or driers in the varnish. The greater the proportion of oils, the longer the drying time. They are classed as air-drying or baking varnishes, depending on the method of drying and length of drying time.

Some of the quick air-drying black varnishes may contain no drying oil. Such varnishes are neither oil type nor spirit varnishes and may be termed "asphaltic varnishes," consisting of an asphaltic base and solvent which may be a petroleum or coal-tar distillate or a mixture of the two.

In the manufacture of spirit varnishes the gums are cut cold in the solvent, while the oil type varnishes and asphaltic varnishes are made by fluxing the various ingredients together in a kettle at a high temperature. Variations in the physical characteristics are produced by variations in the formulas and in the heat treatment.

Liquid varnish changes to a solid by drying, and during this process it passes through all the intermediate stages. To thoroughly understand the characteristics of a varnish it is necessary to study it both in the liquid and solid states.

It has not been possible to combine all the desirable qualities in one product and for this reason many distinct types of insulating varnishes have been produced in which certain qualities have been improved at the expense of others to make them most suitable for specific uses. Many of these characteristics are interdependent while others are opposed and cannot be combined.



Undercurrent of Confidence in Market for Soft Coal as Result of January Trade Trend

The trend of business in the first month of the year has given the soft-coal market a feeling of greater confidence. The Geological Survey shows larger bituminous-coal production at this period than has ever been experienced at this time of the year. There is slightly more activity although it has not yet been reflected on prices. The anthracite market is suffering from weather conditions and is not as active as it should be at this time of the year. Bituminous coal consumers are coming into the market with more regularity and that much quiet buying is being done is shown by the production figures, which are being maintained around 11,500,000 net tons weekly.

Consumers are breathing a little easier now that it is known what the soft-coal miners will demand of the operators when they meet at Jacksonville next Monday. No considerable change in prices is expected unless there should be a suspension about April 1, and with the huge reserves on hand it would be several weeks before the market would feel its effect.

End of British Strike Blasts Export Hope

The ending of the British railway strike knocked on the head whatever hopes coal exporters held in that direction. The shortness of the cold spell which covered most sections of the country a couple of weeks ago was reflected in the various markets, and while there continues a good demand for bituminous domestic coals it is not as active as it was last week.

Coal Age Index as of Feb. 4 registers 187 with an average price of \$2.26, there being no change from the previous week.

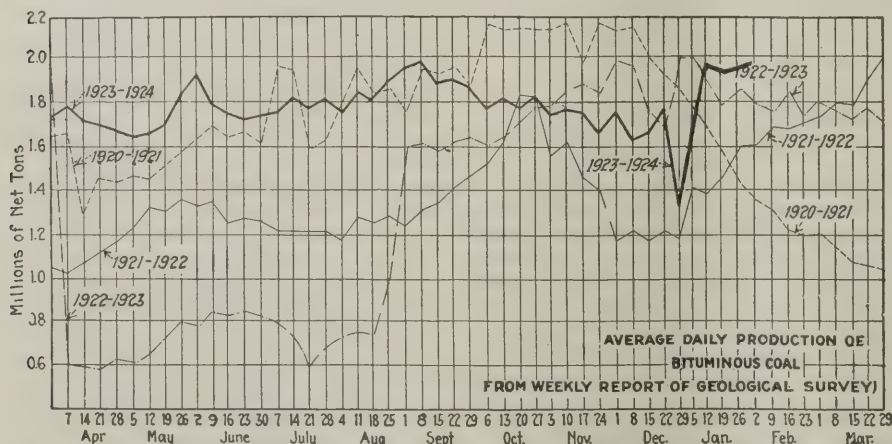
Business in the Middle West is only fair. Stocks in the retail yards were greatly reduced during the low temperatures and many new orders were placed. Demand for domestic coals is fair and there has been

enough cold weather to keep dealers busy. Domestic demand at St. Louis is easier, and little is doing in the anthracite and smokeless trade. Demand for western Kentucky coals is somewhat improved, with prepared sizes in fair call. The outlook for bituminous at the Head-of-the-Lakes is encouraging. Reserves are being put in and the various industries show improvement.

Ohio Not Encouraged at Outlook

Filling of orders placed during the recent cold wave keeps the Ohio trade moving, but the ultimate outlook is not encouraging. Retail dealers' stocks are not large and dealers are not inclined to buy heavily. The steam trade is quiet, though the smokeless coals are moving freely. Transportation in some sections is a trifle slower, but prices are generally maintained. There is a little more activity at Pittsburgh but prices show practically no change and weather conditions have left stocks larger than normally on hand. In New England there is a belief that the resumption of the 1917 wage scale in the New River district probably means a base price of \$4.75 per gross ton f.o.b. vessel Hampton Roads, the same as during the early part of 1917. The condition of the market at New York is reflected in the bids received by the U. S. Shipping Board in that city last week for about 1,700 gross tons of bituminous coal, the prices ranging from \$4.98 to \$5.99, alongside vessel, or on a basis of about \$1.74 to \$2.63 f.o.b. net ton at the mine.

Demand for domestic sizes of anthracite is not exceedingly active. Stove and chestnut coals continue to be the most in call, but these are not sufficiently short to create any trouble. Some independent producers find it difficult to keep their product moving unless they quote close to the larger company price lists. There has been



Estimates of Production			
(Net Tons)			
BITUMINOUS			
	1922-1923	1923-1924	
Jan. 12 (b).....	11,217,000	11,949,000	
Jan. 19 (b).....	10,925,000	11,622,000	
Jan. 26 (a).....	10,985,000	11,599,000	
Daily average.....	1,831,000	1,933,000	
Coal year.....	332,576,000	448,448,000	
Daily av. coal year.....	1,311,000	1,782,000	
ANTHRACITE			
Jan. 12.....	2,113,000	1,840,000	
Jan. 19 (b).....	2,010,000	1,884,000	
Jan. 26 (a).....	2,119,000	1,782,000	
COKE			
Jan. 19 (b).....	328,000	251,000	
Jan. 26.....	343,000	263,000	
Calendar year.....	1,252,000	978,000	
(a) Subject to revision. (b) Revised from last report.			

a marked falling off in sales of anthracite in the Duluth market.

Output of bituminous coal is estimated by the Geological Survey to have been 11,599,000 net tons during the week ended Jan. 26, a decrease of about 23,000 tons when compared with the previous week. During the same period 1,782,000 net tons of anthracite was produced, a decrease of 102,000 tons when compared with the previous week.

Midwest Business Fair

Domestic business throughout the Middle West continues fair with only a few cancellations of purchases made during the blighting cold spells of two and four weeks ago. There has been enough winter to keep the retail yards active and not enough to hamper railroads much. The result has been a smooth flow of large coal but no noticeable drop in its price, for a large number of the Illinois and Indiana mines are still down and no doubt will stay down.

Steam coal went into the inevitable sag during the past

few days, with only a small upward turn at the end of last week. While the dominating producers of Franklin County maintain their circular quotation of \$1.75@ \$1.90 on screenings, a good deal of their output moves sluggishly. Central Illinois small coal has been down to \$1.25 but at the end of the week was reasonably firm at a nickel better than that. Western Kentucky screenings, always on hand for any buyer, is below a dollar on the Chicago market. Eastern coals have a hard time in the Midwest territory except good smokeless. Pocahontas mine-run sticks at \$2.50 and lump at \$3.50 with a good deal moving in.

St. Louis Slows Up

With weather above freezing in St. Louis the domestic demand has eased up and there is little or no demand locally for carload steam, although wagonload steam continues good. Country domestic is just fair as is the demand for cheaper grades, in St. Louis. It is almost impossible in some sections to move Franklin County coal. Country steam has eased up somewhat and the situation is one that makes it difficult to move anything. There is nothing doing in anthracite or smokeless trade and very little coke is mov-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
	Market Quoted	Feb. 5 1923	Jan. 21 1924	Jan. 28 1924	Feb. 4 1924†		Market Quoted	Feb. 5 1923	Jan. 21 1924
Smokeless lump.....	Columbus....	\$6.75	\$3.35	\$3.35	\$3.15@ \$3.50	Franklin, Ill. lump.....	Chicago.....	\$5.35	\$3.50
Smokeless mine run.....	Columbus....	5.50	2.10	2.10	2.00@ 2.25	Franklin, Ill. mine run.....	Chicago.....	3.85	2.35
Smokeless screenings.....	Columbus....	5.50	1.50	1.50	1.40@ 1.65	Franklin, Ill. screenings.....	Chicago.....	2.60	1.95
Smokeless lump.....	Chicago.....	7.75	3.25	3.60	3.50@ 3.75	Central, Ill. lump.....	Chicago.....	3.60	3.10
Smokeless mine run.....	Chicago.....	4.85	2.25	2.25	2.50	Central, Ill. mine run.....	Chicago.....	2.85	2.10
Smokeless lump.....	Cincinnati.....	6.50	3.25	3.50	3.50@ 4.00	Central, Ill. screenings.....	Chicago.....	1.60	1.55
Smokeless mine run.....	Cincinnati.....	5.25	2.10	2.35	2.50@ 3.00	Ind. 4th Vein lump.....	Chicago.....	4.35	3.10
Smokeless screenings.....	Cincinnati.....	5.25	1.20	1.80	1.65@ 2.00	Ind. 4th Vein mine run.....	Chicago.....	3.10	2.60
*Smokeless mine run.....	Boston.....	8.00	4.70	5.05	5.00@ 5.15	Ind. 4th Vein screenings.....	Chicago.....	2.30	1.85
Clearfield mine run.....	Boston.....	3.85	1.85	2.00	1.80@ 2.50	Ind. 5th Vein lump.....	Chicago.....	4.10	2.60
Cambria mine run.....	Boston.....	4.15	2.55	2.60	2.25@ 3.00	Ind. 5th Vein mine run.....	Chicago.....	3.10	2.10
Somerset mine run.....	Boston.....	3.90	2.10	2.25	1.85@ 2.50	Ind. 5th Vein screenings.....	Chicago.....	1.80	1.55
Pool 1 (Navy Standard).....	New York.....	5.35	3.00	3.00	2.75@ 3.25	Mt. Olive lump.....	St. Louis.....	.....	3.10
Pool 1 (Navy Standard).....	Philadelphia.....	5.45	3.00	3.00	2.75@ 3.25	Mt. Olive mine run.....	St. Louis.....	.....	2.50
Pool 1 (Navy Standard).....	Baltimore.....	4.60	.....	.....	.....	Mt. Olive screenings.....	St. Louis.....	.....	1.55
Pool 9 (Super. Low Vol.).....	New York.....	4.75	2.25	2.25	2.00@ 2.50	Standard lump.....	St. Louis.....	3.10	2.90
Pool 9 (Super. Low Vol.).....	Philadelphia.....	4.80	2.30	2.30	2.10@ 2.50	Standard mine run.....	St. Louis.....	2.25	1.95
Pool 9 (Super. Low Vol.).....	Baltimore.....	4.35	1.85	1.80	1.75@ 2.00	Standard screenings.....	St. Louis.....	1.45	1.10
Pool 10 (H.Gr. Low Vol.).....	New York.....	4.10	1.95	1.95	1.75@ 2.10	West Ky. lump.....	Louisville.....	3.85	2.85
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	4.30	1.85	1.85	1.70@ 2.00	West Ky. mine run.....	Louisville.....	2.35	1.65
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	4.10	1.80	1.80	1.75@ 1.90	West Ky. screenings.....	Louisville.....	1.90	1.40
Pool 11 (Low Vol.).....	New York.....	3.50	1.60	1.60	1.50@ 1.75	West Ky. lump.....	Chicago.....	3.85	2.85
Pool 11 (Low Vol.).....	Philadelphia.....	3.25	1.65	1.65	1.55@ 1.75	West Ky. mine run.....	Chicago.....	2.35	1.75
Pool 11 (Low Vol.).....	Baltimore.....	3.35	1.65	1.65	1.65				

High-Volatile, Eastern					South and Southwest				
	Market Quoted	Feb. 5 1923	Jan. 21 1924	Jan. 28 1924	Feb. 4 1924†		Market Quoted	Feb. 5 1923	Jan. 21 1924
Pool 54-64 (Gas and St.).....	New York.....	3.10	1.65	1.60	1.50@ 1.75	Big Seam lump.....	Birmingham.....	3.95	3.85
Pool 54-64 (Gas and St.).....	Philadelphia.....	3.15	1.70	1.70	1.60@ 1.80	Big Seam mine run.....	Birmingham.....	2.35	1.80
Pool 54-64 (Gas and St.).....	Baltimore.....	3.00	1.50	1.50	1.50	Big Seam (washed).....	Birmingham.....	2.60	2.10
Pittsburgh so'd gas.....	Pittsburgh.....	4.50	2.40	2.55	2.50@ 2.65	S. E. Ky. lump.....	Chicago.....	6.00	3.00
Pittsburgh gas mine run.....	Pittsburgh.....	.....	2.30	2.30	2.25@ 2.35	S. E. Ky. mine run.....	Chicago.....	3.25	1.85
Pittsburgh mine run (St.).....	Pittsburgh.....	3.10	2.00	2.00	1.90@ 2.10	S. E. Ky. lump.....	Louisville.....	5.75	3.00
Pittsburgh slack (Gas).....	Pittsburgh.....	3.30	1.60	1.60	1.50@ 1.75	S. E. Ky. mine run.....	Louisville.....	3.25	1.80
Kanawha lump.....	Columbus.....	5.25	2.60	2.60	2.50@ 2.75	S. E. Ky. screenings.....	Louisville.....	2.85	1.40
Kanawha mine run.....	Columbus.....	3.15	1.60	1.60	1.50@ 1.75	S. E. Ky. lump.....	Cincinnati.....	4.35	2.85
Kanawha screenings.....	Columbus.....	2.85	1.35	1.35	1.20@ 1.35	S. E. Ky. mine run.....	Cincinnati.....	2.75	1.55
W. Va. lump.....	Cincinnati.....	4.60	2.85	3.10	2.75@ 3.00	S. E. Ky. screenings.....	Cincinnati.....	2.25	1.05
W. Va. gas mine run.....	Cincinnati.....	2.75	1.60	1.80	1.65@ 1.85	Kansas lump.....	Kansas City.....	5.50	5.00
W. Va. Steam mine run.....	Cincinnati.....	2.75	1.60	1.80	1.65@ 1.85	Kansas mine run.....	Kansas City.....	3.60	3.50
W. Va. screenings.....	Cincinnati.....	2.25	1.10	1.20	1.25@ 1.35	Kansas screenings.....	Kansas City.....	2.50	3.25
Hooking lump.....	Columbus.....	4.50	2.75	2.75	2.50@ 3.00				
Hooking mine run.....	Columbus.....	2.80	1.85	1.85	1.75@ 2.00				
Hooking screenings.....	Columbus.....	2.60	1.40	1.40	1.10@ 1.25				
Pitts. No. 8 lump.....	Cleveland.....	4.00	2.55	2.40	2.10@ 2.75				
Pitts. No. 8 mine run.....	Cleveland.....	3.15	1.90	1.95	2.00@ 2.10				
Pitts. No. 8 screenings.....	Cleveland.....	2.85	1.60	1.60	1.50@ 1.75				

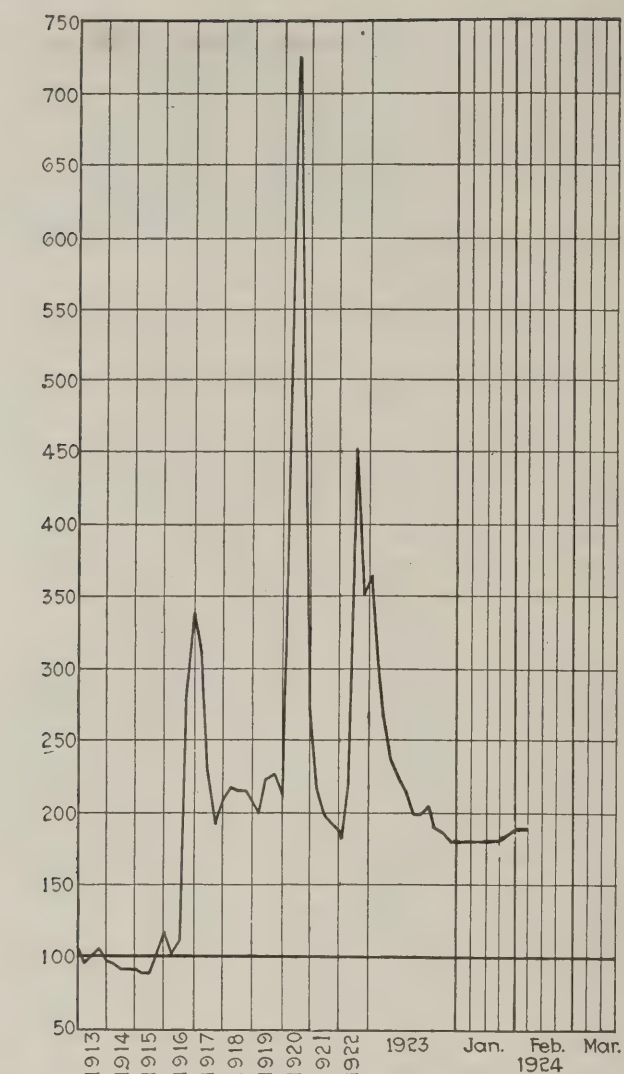
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Feb. 5, 1923		January 28, 1924		February 4, 1924†	
Market Quoted		Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34	\$7.75@ \$8.25	\$8.00@ \$8.50	\$8.00@ \$9.25	\$8.00@ \$8.50	\$8.00@ \$9.25
Broken.....	Philadelphia.....	2.39	7.90@ 8.10	8.50@ 9.25	8.75@ 9.25	8.50@ 9.25	8.75@ 9.25
Egg.....	New York.....	2.34	8.00@ 8.35	8.50@ 9.25	8.75@ 9.25	8.50@ 9.25	8.75@ 9.25
Egg.....	Philadelphia.....	2.39	8.10@ 8.35	8.50@ 10.00	8.75@ 9.25	8.50@ 10.00	8.75@ 9.25
Egg.....	Chicago.....	5.06	7.20@ 8.25	7.50@ 8.80	8.00@ 8.35	7.50@ 8.80	8.00@ 8.35
Stove.....	New York.....	2.34	8.00@ 8.35	9.75@ 10.50	8.75@ 9.25	9.75@ 10.50	8.75@ 9.25
Stove.....	Philadelphia.....	2.39	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Stove.....	Chicago.....	5.06	7.35@ 8.25	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Chestnut.....	New York.....	2.34	8.00@ 8.35	9.75@ 10.50	8.75@ 9.25	9.75@ 10.50	8.75@ 9.25
Chestnut.....	Philadelphia.....	2.39	8.15@ 8.35	9.85@ 11.50	8.90@ 9.25	9.85@ 11.50	8.90@ 9.25
Chestnut.....	Chicago.....	5.06	7.35@ 8.35	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Range.....	New York.....	2.34	8.25	9.00	9.00	9.00	9.00
Pea.....	New York.....	2.22	6.15@ 6.30	4.75@ 5.25	6.15@ 6.65	4.75@ 6.25	6.15@ 6.65
Pea.....	Philadelphia.....	2.14	6.15@ 6.20	5.25@ 7.25	6.35@ 6.60	5.25@ 7.25	6.35@ 6.60
Pea.....	Chicago.....	4.79	5.49@ 6.03	4.50@ 5.60	5.40@ 6.05	4.50@ 5.60	5.40@ 6.05
Buckwheat No. 1.....	New York.....	2.22	4.00@ 4.10	2.25@ 3.50	3.50	2.25@ 3.50	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	4.00	2.00@ 3.50	3.50	2.00@ 3.50	3.50
Rice.....	New York.....	2.22	2.75@ 3.00	1.75@ 2.50	2.50	1.75@ 2.50	2.50
Rice.....	Philadelphia.....	2.14	2.75@ 3.00	1.50@ 2.50	2.50	1.50@ 2.50	2.50
Barley.....	New York.....	2.22	1.50@ 2.00	1.25@ 1.50	1.50	1.25@ 1.50	1.50
Barley.....	Philadelphia.....	2.14	1.50@ 2.00	1.00@ 1.50	1.50	1.00@ 1.50	1.50
Birdseye.....	New York.....	2.22	2.10	1.45@ 1.60	1.60	.....	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1924	1923
Index	Feb. 4 187	Jan. 28 187
Weighted average price	Jan. 21 182	Feb. 5 312
	\$2.26	\$2.26
	\$2.20	\$3.78

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally, shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

ing. Some dealers are cutting the price of Carterville from \$8 to \$7.50, especially in South St. Louis, to favored customers. Dealers report a good supply of everything on hand.

Kentucky Fairly Active

Demand for western Kentucky coal has been somewhat better, with a good movement to the Southern, Western and Central states, and as far north as Michigan. Prepared sizes have been in fair demand. Steam coal also has been moving quite well, but production of screenings has been heavy enough to break the prices somewhat, as evidenced by screenings having been offered as low as 80@85c. a ton. The bulk of the movement is at 90c. to \$1.15.

Operating time has been increasing in a number of mines, and some that have been down are resuming operations, with others planning to do so. A few operators report better running time, and with car supply favorable, the outlook is for good business over the next sixty days, as stocks in many sections have been greatly depleted. Prepared prices promise to continue at about today's figures, which range from \$1.75 on small nut to \$3 for best 6-in. block, with mine run at \$1.50@1.90.

Northwestern Market Softens

Despite mild weather at Duluth, which has reduced the market, prices of screenings have taken an upward surge in the past week, which points to a considerably strengthened market. The fall off in anthracite sales has been most marked and the bituminous decrease has been in the nature of a slackening rather than a general letdown.

Duluth prices, with the change in screenings, are as follows: Kentucky lump, \$7.25; run of pile, \$6.50; screenings, \$4.50; Youghiogheny lump, \$6.50; run of pile, \$5.50; screenings, \$4.25; Hocking lump, \$6.25; run of pile, \$5.25; screenings, \$3.75@4; Splint lump, \$6.75; run of pile, \$5.75; screenings, \$4.50; Pocahontas lump, \$9; run of pile, \$6.50; screenings, \$5.50. Coke is still at \$10.50 and briquets at \$10. The market in anthracite is the same as last quoted.

The Head-of-the-Lakes outlook in bituminous coal is encouraging. Factories are putting in stocks and the independent iron mines are starting mining with a vim. The Steel Corporation asserts that it has enough coal on its private dock to last through the summer, and this is giving heart to the independents to continue work, as it looks as if the Corporation were planning on a full year. The general impression at Duluth is that there will be no strike this year.

The Milwaukee coal market is very active, both in a wholesale and retail way, and stocks are being drawn upon quite heavily. The protracted cold spell forced many dealers in the interior to buy. Prices hold steady. Jobbers are finding it extremely difficult to get high-grade Eastern soft coal—splints and Pocahontas—the market in the East being sold up and with orders ahead, so that rail supplies of this class of coal will not be available until well into February.

Western Situation Is Spotted

Mines through the Southwest still are working virtually full time, although a surplus of both lump and screenings again has begun to accumulate. Saturday, Jan. 26, the Pittsburg district had its largest payroll in more than two years. There has been no change in quotations on Kansas coal. Lump still is \$5; nut, \$4.25; mine-run, \$3.50, and screenings, \$2.25.

In Colorado the market has slowed down slightly as compared with the past few weeks, due to the warm weather. However, the operators are having no difficulty in disposing of all of the coal mined.

Prices continue to remain unchanged and the present supply of labor is sufficient. Transportation and car supply have been good throughout the state except in Routt County, where weather conditions have prevented considerable movement of all commodities.

Utah business is slow. The state is averaging little more than two days a week and mines are shutting down because they cannot dispose of intermediate sizes. Stocks are low in retailers' yards but cold weather is breaking and no rush for coal is expected. Industries are not buying much.

Demand for Domestic Coals Easier in Ohio

There has been a marked recession in the demand for domestic coals in the Ohio markets, due to milder weather. Orders booked for delivery in the Columbus market, however, will mean considerable activity in the southern Ohio coal fields for several days, but in the absence of continued cold weather the outlook is not encouraging. Retail dealers are not buying heavily and their stocks are not large; prices are firm. The demand for Pocahontas and other smokeless varieties is strong. Steam trade is quiet. The falling off in quotations for screenings is attributed partly to increased production during the period of better lump production and also to several large users refusing to take on more tonnage. Production in the Hocking valley has increased to between 25 and 30 per cent of capacity. Some large consumers are increasing their reserve stocks. Railroads are making inquiries, while iron and steel plants are buying slightly more than current needs.

The Southern Ohio Coal Exchange reports for the week ended Jan. 19 show an output of 213,273 tons from 446 mines having a full-time capacity of 681,400 tons. Of the shortage "no market" was responsible for a loss of 422,308 tons.

At Cincinnati a slowing up in transportation and continuance of the strong positions in prices in spite of milder weather are the outstanding features of the market. Coal that had been taking five days from the mines in south-eastern Kentucky to Chicago has been slowed up to three weeks and then the Pennsylvania lines notified Kentucky shippers that they would be forced to refuse acceptance of cars at interchange points at Cincinnati. In the high-volatile market the demand for domestic and slack is the strongest. The February "circular" put out by the smokeless companies shows \$3.50 for lump and egg; \$2.50 for mine-run, but no set figure for screenings. These were scarcely in the mails before Chicago and Western points started bidding \$4 for "car numbers" and \$3.75 for spot prepared. Retail dealers believe that unless there is a tremendous change, present prices will hold until April 1. These are \$9 to \$10 for Pocahontas lump; \$7 for mine-run; \$8@\$.25 for bituminous lump and \$4.50@\$.5 for slack.

Operators in the Cleveland market say that demand from both steam consumers and retail yards continues fair, with no apparent effort to obtain much more than current needs. Industrial plants have from four to six weeks' supplies on hand. Consumption is kept down through many lines of industries operating only four or five days a week. Distress coal is not so abundant as it was a week ago in view of the troubles experienced by shippers in disposing of recent shipments on open consignments.

Pittsburgh Market Somewhat More Active

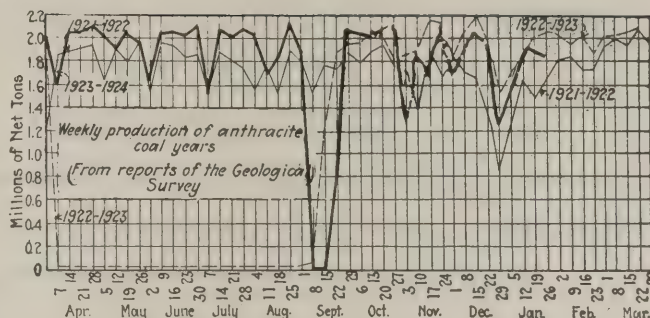
Activity in the Pittsburgh market is a trifle heavier than a week or two back and the turnover since the first of the year has in general been distinctly heavier than during the last few weeks of 1923. Consumption of coal in the territory normally tributary to the Pittsburgh district is all that could be desired, except in the case of domestic coal, the prolonged mild weather having left householders' stocks larger than they normally are at this time of the year. The steel industry is operating at about 25 per cent better rate than during December, with a corresponding increase in coal consumption. The chief difficulty in the district is the competition from nearby non-union fields, which is apparently growing more severe. Operators in the district remain silent as to whether or not they will attend the wage conference at Jacksonville next week, no formal statement having been issued regarding the letter of Secretary Hoover. Reports from central Pennsylvania indicate a better demand. During the week ended Jan. 26 loadings totaled 15,340 cars, as compared with 15,247 during the previous week.

There is a light demand for soft coal at Buffalo, consumers ordering only for current needs.

New England Reports Few Sales

In New England eyes the only outstanding feature of the past week was the resumption of the 1917 wage scale in the New River district. It means, probably, a \$4.75 base price per gross ton f.o.b. vessel at Hampton Roads, approximately the same basis that carried through the early part of 1917. The few sales that have been made since February came in have been at around \$5 for spot shipment, with a net return to the operator of about \$4.75. Inquiry here is still very light, and buyers show interest in quotations only for their bearing on spring prices.

We hear of no material increase in production. Several



of the smokeless agencies are practically without coal on hand at the piers, and there continue to be borrow and loan transactions among the different shippers to clear what tonnage reaches the piers. There are still some unshipped balances due offshore, and these together with contracts coastwise are absorbing nearly all the present restricted east-bound movement of Pocahontas and New River.

At this end for distribution inland there is practically no change in the market. Prices on cars range \$6@\$.625 per gross ton, but reserves are large in almost every instance and new purchases are for only scattering amounts. Prices of Southern coals will have to advance very materially before there will be any demand for Pennsylvania coals all-rail in the territory easily accessible from tide-water.

Little Improvement in Seaboard Markets

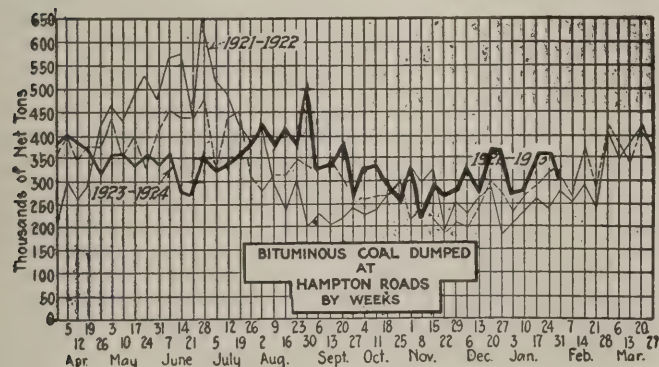
There are a few signs of improved conditions along the seaboard. At New York inquiries are a little more numerous and there has been a trifle better buying, but not sufficient to change current prices: The Philadelphia trade believes that January business was an improvement over December and that this month's buying will be an improvement over last month. The improvement in buying at the New York and Philadelphia markets may be due in part to a fear that there will be a suspension, even though there is a feeling that present prices will continue, notwithstanding the fact that the miners are asking for a long-term agreement and not an increase in wages. The Baltimore market is flat and no encouragement is seen. Interest is centered in the export demand.

The strike of the Nova Scotia miners has already been reflected in the Baltimore market, one steamer carrying about 7,000 tons of coal having left there for Halifax, according to reports. During the first twenty-eight days of January cargo coal amounting to 61,675 tons was dumped at Baltimore, as well as 3,491 tons of coke. The settlement of the British railway strike ended many inquiries which had been made regarding foreign shipments, but some business is reported as having been closed for South America.

Hard-Coal Market Unresponsive to Weather

Weather conditions have had no effect on the hard-coal situation. Retail dealers are well supplied and a few days of real cold weather had little effect. Orders are delivered promptly and production is sufficient to keep the market well supplied and movement rapid. Consumers are beginning to guess as to what will happen on April 1, and with that in view are not likely to buy any more coal than they actually need between now and then. Egg and pea sizes are the easiest, though the demand for stove and chestnut is not much more active. In Baltimore the market is quiet and, due to the mild weather, retail dealers report an increasing call for wood and briquets. The steam coals in the various markets are in better shape. The tonnage has been reduced and quotations for all three sizes are a trifle firmer. Barley is the shortest.

The market for furnace coke stiffened last week. A contract for about 5,000 tons a month during this and next month has been closed at \$4.25, with other contracts reported as having been closed at about the same figure. There also have been several inquiries for the second quarter. Floating supplies of spot furnace coke under \$4 have practically disappeared. Foundry coke continues easy at \$5@\$.50.



Foreign Market And Export News

British Coal Output Slumps as Result of Rail Strike; Dock Men Threaten

Production of coal in Great Britain during the week ended Jan. 19 took a decided drop as a result of the railway strike, amounting to 2,848,000 tons, which is a lower level than for any week since July 8, 1921, when the output was 2,355,000 tons. The output during the week ended Jan. 12 was 5,747,000 tons.

As soon as the railway strike was ended and even before the men had returned to work the leaders of the dock workers instructed the members of that organization to stop work in all ports of Great Britain on Feb. 16 unless their wage demands are satisfactorily settled.

Contrary to the general expectation, the Welsh coal market has taken a definite turn for the better, in spite of the refusal of the tipplers to operate the third shift. The result of this refusal has been considerable delay in shipment.

In anticipation of labor trouble here soon and in America about March, foreign buyers are showing a tendency to lay in stocks; as a consequence many of the pits are well booked into March. French and Italian buying is becoming heavier, and fair sized quantities have been sold to the Scandinavian state railways.

The feeling among the miners for terminating the wage agreement probably is stronger in Wales than elsewhere in the United Kingdom. It is estimated that from 80 to 90 per cent of the workers in the Welsh coal mines are in favor of the adoption of this course.

Orders for prompt shipment are fairly numerous in Newcastle, though the deliveries of German reparation coal into France and Belgium are proving a handicap. The Norwegian State Railways have placed orders aggregating about 35,000 tons of steams for delivery before March.

French Coal Market Fair

The French Government has taken further steps to obtain from the mine owners a reduction from the last advance in selling prices made as a result of wage increases. No announcement has yet been made as to the outcome of negotiations. The coal market continues fair.

Owing to the cold weather prevailing in Belgium France is now receiving but few offers for sized products. No official change has been made in prices, while rebates are granted in some instances. Total arrivals of coal from Cardiff during the week ended Jan. 23 amounted to 250,000 tons.

United States Coal and Coke Exports During December

	(In Gross Tons)	1922	1923
Anthracite.....		381,758	328,945
Bituminous.....		1,468,917	1,078,028
Exported to:			
France.....		12,502	
Italy.....		26,562	
Other Europe.....		7,442	
Canada.....		1,376,079	850,469
Panama.....		4,975	25
Mexico.....		8,710	10,251
Br. West Indies.....		70	11,729
Cuba.....		64,065	71,957
Other W. Indies.....		10,644	23,343
Argentina.....			9,540
Brazil.....			35,849
Chile.....		2,181	
French Africa.....			7,576
Other countries.....		2,193	10,783
Coke.....		123,442	44,951

United States Coal and Coke Imports During December

	(In Gross Tons)	1922	1923
Anthracite.....		26,070	33,792
Bituminous.....		356,505	56,262
Imported from:			
United Kingdom.....		188,355	4,913
Canada.....		154,569	37,998
Japan.....			5,028
Australia.....		13,466	7,754
Other countries.....		115	569
Coke.....		9,122	5,324

Better Outlook at Hampton Roads

Business at Hampton Roads was more brisk last week, though prices weakened slightly in the face of increased surplus at tidewater. Coastwise trade showed improvement and some pick-up was noted in foreign business.

Dumpings at the Norfolk & Western piers led the field easily, and inquiries in all branches of trade increased, with shippers looking forward to continued improvement throughout the entire trade.

Improvement in general shipping, resulting in brisker bunker trade, was reported, with generally steadier conditions and more optimism. The tone of the market was firm and the outlook promising.

Export Clearances, Week Ended Feb. 2, 1924

FROM HAMPTON ROADS	
For Brazil	Tons
Br. SS. Castlemoor, for Rio Janeiro.....	8,786
Br. SS. Loyal Citizen, fo. Sao Paulo.....	5,617
For Cuba	
Nr. SS. Almora, for Antilla.....	3,517
For Italy	
Amer. SS. Nobles, for Porto Ferrajo.....	4,387
Amer. SS. Arcturus, for Porto Ferrajo.....	5,593
For Nova Scotia	
Br. SS. Kamouraska, for Sydney.....	7,139
For Virgin Islands	
Br. SS. Berwindvale, for St. Thomas.....	7,603
For West Indies	
Nr. SS. Gro, for Fort de France.....	6,130

FROM PHILADELPHIA	
For Cuba	
Nr. SS. Jacob Christensen, for Havana.....	

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Jan. 24	Jan. 31
Cars on hand.....	1,126	1,194
Tons on hand.....	77,883	84,466
Tons dumped for week.....	148,625	134,570
Tonnage waiting.....	27,000	16,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	973	1,013
Tons on hand.....	61,850	66,600
Tons dumped for week.....	82,172	75,333
Tonnage waiting.....	21,520	18,470
C. & O. piers, Newport News:		
Cars on hand.....	958	1,775
Tons on hand.....	49,030	88,640
Tons dumped for week.....	82,081	43,175
Tonnage waiting.....	1,640	10,085

Pier and Bunker Prices, Gross Tons

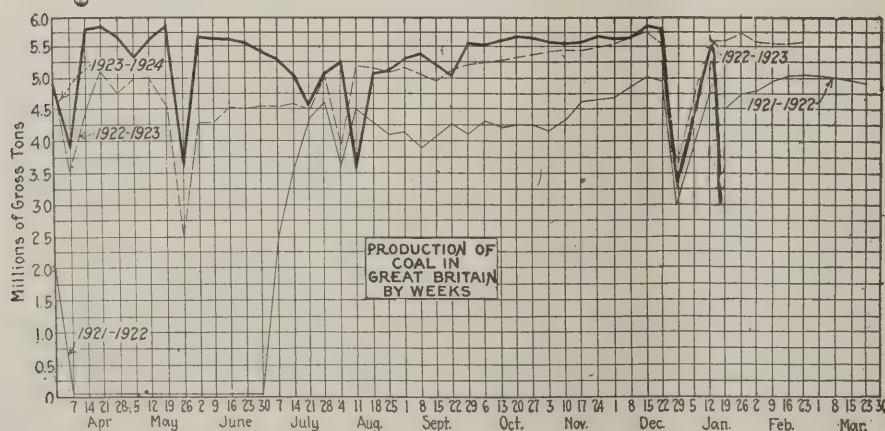
PIERS			
	Jan. 26	Feb. 2†	
Pool 9, New York.....	\$4.90@5.25	\$4.90@5.25	
Pool 10, New York.....	4.65@ 5.00	4.65@ 5.00	
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75	
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20	
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90	
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60	
Pool 1, Hmp. Roads.....	5.25@ 5.35	5.10	
Pools 5-6-7 Hamp. Rds.....	4.50@ 4.50	4.30	
Pool 2, Hamp. Roads.....	5.00@ 5.15	4.75@ 4.85	

BUNKERS			
Pool 9, New York.....	5.20@ 5.55	5.20@ 5.55	
Pool 10, New York.....	4.95@ 5.30	4.95@ 5.30	
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05	
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55	
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20	
Pool 11, Philadelphia.....	4.65@ 4.90	4.65@ 4.90	
Pool 1, Hamp. Roads.....	5.35	5.15	
Pool 2, Hamp. Roads.....	5.15	4.85	

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to Coal Age			
	Jan. 26	Feb. 2†	
Admiralty, large.....	29s.@ 30s.	30s.@ 31s.	
Steam smalls.....	22s.	23s.@ 25s.	
Newcastle:			
Best steams.....	25s.@ 25s. 6d.	25s. 6d.	
Best gas.....	24s. 6d.@ 25s.	24s. 6d.@ 25s.	
Best bunkers.....	25s.@ 26s.	27s.@ 28s.	

† Advances over previous week shown in heavy type, declines in *italics*.



Traffic News

To Argue Hard-Coal Rate from Buffalo Feb. 18

The case which has just been heard in Minneapolis before Examiner Money for the Interstate Commerce Commission on the opposition to the freight rate increase on hard coal from Buffalo to Minneapolis of \$1.66, will be argued in Washington Feb. 18. County Attorney Olson, of Minneapolis, expects to argue the case before the commission at that time. It has been hinted that a decision probably will be reached by April 1. In the hearing just closed, Secretary Ellis, of the dock association, testified that he did not expect the dock trade to increase prices of hard coal if the joint rate on hard coal were withdrawn, but he did expect them to ask for a lower rate on lake and rail if the all-rail rate were not increased, since they claim the lake and rail rate is not in line with the present all-rail rate.

W.Va. Operators Prepare Data In Lake Rate Fight

In preparation for presentation before the Interstate Commerce Commission of the case of West Virginia operators who seek an adjustment of lake freight rates a meeting of officers of the Northern West Virginia Coal Operators Association and of the lake freight-rate committee was held at Fairmont, W. Va., during the latter part of January, attended by E. J. McVann, of Washington, who has been retained as special counsel by the association. At the conference officers and members of the committee who have been busily engaged in collecting data, submitted the information to Mr. McVann to be used in support of the claims of northern West Virginia operators for an adjustment of freight rates. Serving as members of the lake freight committee for the Northern West Virginia Association are E. W. Ziler, of Elkins; J. M. Orr and A. L. White, of Clarksburg.

Mr. McVann, for the association, has already submitted a petition to the Commerce Commission requesting that northern West Virginia operators be permitted to intervene in the case of the Pittsburgh Vein Operators Association against the Ashland Coal & Iron Ry. and others, that case also involving lake freight rates.

Promotions on B. & O.

Archibald Fries, vice-president in charge of traffic and commercial development of the Baltimore & Ohio R.R., has announced the following appointments, effective Feb. 1, 1924: W. W. Blakely, general freight agent, Pittsburgh, Pa., is appointed assistant to general freight traffic manager, with headquarters at Baltimore, Md.; John

H. Carroll, Jr., general freight agent, Philadelphia, Pa., is appointed general freight agent at Pittsburgh, vice Mr. Blakely, promoted; Samuel House, general freight agent, Baltimore, is appointed assistant freight traffic manager, with headquarters at Baltimore; C. S. Roberts, assistant general freight agent, Baltimore, is appointed general freight agent at Baltimore, vice Mr. House, promoted; George S. Harlan, assistant general freight agent, Baltimore, is appointed general freight agent, with headquarters at Philadelphia, vice Mr. Carroll, promoted.

Lower Railroad Rates for Coal From Indiana Mines In Sight

An order that railroad companies hauling coal from Indiana mines to Indiana points shall reduce their rates is in course of preparation in the offices of the Public Service Commission and is expected to be promulgated next week.

The order has for its basis, it was learned, new schedules that will, according to representatives of the carriers, cut railroad revenues in Indiana more than \$500,000 a year but which will be of benefit to industries, public utilities and other large consumers of coal. Whether retail coal dealers will pass any of the lower transportation costs on to domestic consumers in the way of reduced prices is not known.

Association Activities

Sequent on a two-day meeting of the Executive Committee of the American Wholesale Coal Association the **Philadelphia Coal Club** held its annual banquet on Jan. 31 at the Bellevue-Stratford, Philadelphia. Noah H. Swayne presided and the speakers were Charles L. Dering, president, American Wholesale Coal Association; I. R. Williams, of the Philadelphia Bar, and Dr. J. T. Holdsworth, of the Pennsylvania State Land Bank. The first spoke on the essential equality of the coal industry with other industries, the second on the threatened invasions on the Constitution and the Supreme Court, and the third on the importance of avoiding special legislation. Noah H. Swayne, of the Noah H. Swayne Co., was re-elected president; Pratt Thompson, Lehigh Coal & Navigation Co., vice-president, and Charles K. Scull, secretary-treasurer. The latter is secretary-treasurer also of the Philadelphia Coal Exchange. The directors elected were W. E. Bernard, J. W. Mason, John Haslett, H. C. Pearson and W. J. Jennings.

One of the most successful and best attended annual meetings in the history of the **Northeast Kentucky Coal Association** was held recently at Ashland. Reports made by officers and committees of the association went to show that a great volume of constructive work beneficial to the operators in the Big Sandy Valley has been accomplished during the year. J. G. Bradley of Dundon, president of the West Virginia Coal Association, delivered an interesting address on "Labor Relationship," explaining the material benefits to be derived from co-ordination and co-operative effort on the part of individual operators with district associations and through the district associations with their respective state organizations and the National Coal

Association. W. H. Cunningham, of Huntington, delivered an interesting address on the subject of legislation affecting the industry. Another speaker both at the business session of the association and at the banquet was Harry L. Gandy, secretary of the National Coal Association, who urged closer co-operation on the part of operators with district associations and through their district associations with state associations and the national association. At the banquet he declared that the fight of coal against control by the state was the fight of all industries and business. The following officers were elected: C. W. Connor, of Esco, Ky., president; Cadwalader Jones, of Wheelwright, Ky., first vice-president; O. P. Chafield, of Dunleary, Ky., second vice-president; N. M. White, Sr., of Prestonburg, Ky., treasurer. The above officers and the following operators become the executive committee of the association during the year: Henry LaViers, of Paintsville, Ky.; C. H. Beidenmiller, of Huntington, W. Va.; A. M. Campbell of Ashland, Ky.

The Committee on Reorganization of the **Central Pennsylvania Coal Producers' Association** has reported the creation of the following committees to carry on the work of the association during the coming year: Legislation, B. M. Clark, chairman; Traffic, Charles O'Neill, chairman; Labor, officers of the association; Public Relations, president and secretary of the association; Statistics, W. A. Jones, chairman; Classification of Coals, Rembrandt Peale, chairman; Mining Methods, Mechanical Machinery and Power, J. Wm. Wetter, chairman; Fire Insurance, C. B. Maxwell, chairman; Finance, Pearle (chairman), Boucher and Coleman; Auditing, Caseley (chairman), Maxwell and Scott.

The **Hazard Coal Operators Exchange** held its annual meeting at the Lafayette Hotel, Lexington, Ky., on Jan. 25, at which time J. E. Johnson was re-elected president and secretary. The principal business was in connection with reading the reports of the president-secretary and hearing various committee reports, along with adoption of a few resolutions. Henry L. Gandy, Executive Secretary of the National Coal Association, talked on general conditions in the coal trade, and J. D. Battle, traffic manager of the National, talked on transportation conditions and increased efficiency of the railroads.

Obituary

Paul W. Gillham, aged 43, died at Christ's Hospital, Cincinnati, Jan. 25. Mr. Gillham was a graduate physician and practiced until 1909 at Botkin, Ohio, when he entered the coal business. At various times he was associated with the Burlington Coal Co., the Wyatt Coal Sales Co., the Thomas L. Mordue Coal Co. and the Boone Coal Sales Co. He was one of the three partners who started the MacBard Coal Co. in 1916. About a year ago, realizing that his health was failing, he retired and spent the time in the north woods of Michigan, returning to Cincinnati some four or five weeks ago. He was a son of R. P. Gillham of the Campbell's Creek Coal Co. and two of his brothers are connected with that organization.

Coming Meetings

Rocky Mountain Coal Mining Institute, Winter meeting, Feb. 13-15, Albany Hotel, Denver, Colo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

American Institute of Mining and Metallurgical Engineers, Annual meeting Feb. 18-21, 29 West 39th Street, New York City. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

Northern West Virginia Coal Operators Association, Annual meeting Feb. 12, Fairmont, W. Va. Secretary, J. O. Caldwell, Fairmont, W. Va.

Upper Potomac Coal Association, Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

Canadian Institute of Mining and Metallurgy, Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

New England Coal Dealers' Association, Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

News Items From Field and Trade

ALABAMA

The State Board of Examiners, which held a session Jan. 21-24, issued certificates of competency to twenty-three applicants as mine foremen, first-class; two for positions as second-class mine foremen, and eleven passed the test required to hold the position of fireboss in Alabama coal mines.

Promotions recently announced by the Woodward Iron Co. elevated J. A. Long, assistant general manager, to the position of general manager, and William Miller, superintendent of the coke plant, was promoted to be assistant general manager. Mr. Miller was succeeded as manager of the coke department by Harry Ross, formerly assistant superintendent.

ILLINOIS

The Southern Gem Coal Corporation receivership is now in effect for the second time, after the concern had once had it lifted on technical grounds. The original receivers, Charles E. Thomas and W. S. Wilson are in charge of the offices and property.

The mine at Tamaroa owned by the Little Muddy Coal Co. has a record of having worked every day during January. The shaft produces about 700 tons daily.

Thomas Hunter, a former employee for the Union Colliery Co. at Dowell, has accepted a position as state mine inspector in the Springfield District.

Work was resumed Feb. 4 at the McClinck mine of the Crerar Clinch Coal Co. at Johnson City. The plant has been shut down since the explosion of Jan. 25 in which 32 men died.

Miners employed at the mine of the Gallatin Coal & Coke Co.'s mine at Equality are now operating the mine on a co-operative agreement between the receiver for the company and officials of the local mine union. The drifts of the mine were filling with water and getting into such shape that it soon would have been impossible to repair the damage when the miners voluntarily went into the mine and repaired the damage. They then went to the receiver, Charles H. Guard, and signed an agreement to pay all the expenses of running the mine and a fixed amount for each ton hoisted in return for the sale of the coal. The plan was indorsed by the Circuit Court and also by the miners' union. The contract expires on April 1, 1924.

KENTUCKY

Another wash house bill has been introduced before the Kentucky Legislature to force operators to provide wash houses and hot and cold showers for mine workers. Such a law was enacted in 1920, but contained a provision that the operator would have to install such equipment when 30 per cent of his employees demanded it. A test case of the Beaver Dam Coal Co., of western Kentucky, was decided against the company in the Ohio County Circuit Court, and then carried to the Court of Appeals. On Feb. 28, 1922, the Court of Appeals in a decision, held that Chapter 20, Acts of 1920, was unconstitutional in that it was a delegation of legislative power, which only the Legislature had the right to decide.

The Carnegie Hero Fund Commission has awarded a bronze medal to Porter G. Gish, of Boxville, in Union County, western Kentucky, a mine motorman. He saved 24 men in a Union county mine from smothering or suffocating at Henderson, Ky., on May 26, 1921.

Fire destroyed the general office and store building of the Fordson Coal Co., at Stone, in the early morning of Jan. 30, causing a loss estimated at \$150,000.

A bill under which scrip issued by mining and other companies, would be redeemable every pay day by concerns issuing it to employees, has been favorably reported in the house. Such a bill was passed by both divisions of the Kentucky General Assembly in 1922, was later lost and never enrolled.

A state mining inspection board would be created in Kentucky if a bill introduced by Senator Griffin Keely, of Daviess County, was enacted. The bill provides for creation of a board composed of three practical coal miners, to be appointed by the Governor, and all miners permitted to work in mines of the state would have to pass examination under this board and pay a fee of \$2 each for "certificates of competency." The three board members would receive salaries of \$150 each per month and the bill would carry an annual appropriation of \$12,000. This is another law that is fostered by union labor.

W. B. Gathright, who for a number of years was manager in Louisville, for the St. Bernard Mining Company, has announced connection with the R. C. Tway Coal Co., selling coal at wholesale. Mr. Gathright left the St. Bernard Co. on January 1.

The Ulvah Coal Co., at Bluefield, Letcher County, lost its commissary store by fire on Jan. 28, the loss being \$10,000 with insurance of about one third that amount.

E. E. Lanning, of the Jellico Coal & Coke Co., Louisville, and member of the Horton Coal Co., Horton, was recently at Horton, planning the resumption of work at the company's western Kentucky mine, which has been down for some months.

It is reported that the Henry Ford controlled mines at Banner Fork, near Wallins, are planning to resume on full-time operations about March 1, with the idea of running full for nine months.

According to 1923 Geological Survey reports Kentucky showed a loss of 5 per cent in coke production, in a decline of 22,000 tons to 435,000 tons, whereas other states during the same period showed increases of 13 to 41 per cent. One reason for this has been small consumption in the state and long hauls to market along with development of coal markets consuming the fuel, while a good natural gas supply in the state has made for relatively small gas coke production.

MINNESOTA

Dr. Hans Holzworth, representing Thyssen & Co., of Germany, talked before the St. Paul Engineers' association last week on the lignite of North Dakota. He declared there was a supply of lignite for 700 years, and that by carbonizing and briquetting, lignite could be used for either anthracite or bituminous substitute. A plant is to be established at Richardson, N. D. by the Lignite Coal & By-Products Co., of Delaware, using the Thyssen system.

The Lignite Industries Corporation proposes to set up in St. Paul the first plant in this country for briquetting and extracting byproducts from lignite, before it is shipped to Texas. The machine has been tested in Germany for eight months under actual service conditions.

NEW JERSEY

Again placing responsibility for assuring an adequate supply of coal at reasonable prices at the door of Pennsylvania and the federal government, Governor Silzer sent a special message Jan. 29 urging the legislature to impress the situation on Congress. "Three remedies have been suggested," said the Governor's message. "The first is to call upon our neighbor—Pennsylvania—to adopt such measures as she may deem advisable to control the situation so far as it lies within the power of a state to do so. The second is to urge upon Congress the necessity of regulating the industry, not only to the extent of interstate commerce but also upon the basis that it is an industry so affected with the public interest that the federal government may exercise powers such as are now exercised, by act of Congress, over like industries. The third is to enact such legislation within our own state to deal adequately with the situation after the coal is out of interstate jurisdiction and in the possession of local dealers."

OHIO

H. M. Griggs, manager of the Ore & Coal Exchange, Cleveland, who was recently in Cincinnati, says that there seems little likelihood of contracts being arrived at until the air is clarified of strike talk and labor trouble. He would not venture to name a price at which coal might move, saying that this was a situation that would have to work itself out.

Lathrop & Trotter have opened offices in the Union Trust Building, Cincinnati, and will be the representatives of the Conveyors Corporation of America at this point.

Pittsburgh and Zanesville capitalists plan the development of a 1,000-acre tract near Satillo, which is underlain not only with coal but also clay and sand. The coal will be removed by stripping. The company, which will be chartered soon, is to be styled the Consolidated Coal & Sand Co.

George S. Payne, who has been connected with the Blue Ash Coal Co. since 1913 and who is one of the oldest coal men in the Cincinnati district, announces that he will soon retire from that firm.

Contracts were awarded by the Columbus Board of Purchase for 10,500 tons of coal as follows: J. Miller Coal Co., Columbus, 8,500 tons of nut, pea and slack at \$1.40 f.o.b. mines, this coal to be used by the municipal light plant and the Water Works department. Central West Coal & Lumber Co., Columbus, 2,000 tons of Hocking nut, pea and slack for the garbage disposal plant at \$1.40 f.o.b. mines. All of this tonnage is to be delivered by March 31.

The Central mine, at New Straitsville, employing 107 men, reopened recently after a suspension of several months due to lack of demand. The Gem mine also will soon be reopened.

Several prominent operators from West Virginia attended a meeting held by the Fort Dearborn Coal Co. in Cincinnati Jan. 29 and 30. Among these were Holmes and Quin Morton, of Charleston; Walter Wood, Bill, Tom and Barnes Gillespie and Henry Harmon, all operators, and Harry Hall and George Staymer, of the offices of the company in Chicago.

The Simpson Creek Collieries Co., Cleveland, has been chartered with an authorized capital of 500 shares, no par value designated, to mine and sell coal and coke. Incorporators are Paul J. Bickel, F. S. Whitcomb, Howard L. Barkdull, Edwin H. Chaney and Frank Harrison.

A joint meeting of the Southern Ohio Pig Iron & Coke Association, the Ohio section of the American Institute of Mining and Metallurgical Engineers and the Cincinnati Coal Exchange was held Jan. 28 in the Hotel Gibson, Cincinnati, with 75 members in attendance. "Clean Coal" was the subject that occupied foremost attention during the session, which lasted throughout the day. Standardization of sampling and analysis was suggested as the best means to obtain coal that would burn with the least amount of waste and dirt. The meeting closed with a dinner, at which pictures connected with the coal-mining industry were shown. R. H. Sweetzer, of the American Rolling Mills Co. and president of the Pig Iron & Coke Association, presided at the meeting.

A. E. Frich, secretary to the superintendent of the Ohio Division and other Baltimore & Ohio Ry. experts who have been making an extensive study of maximum efficiency in the use of fuel as applied to the Ohio Division, have announced that a pound of coal moves a ton of freight six miles. The high price of fuel, even for the railroad, has led to an intensive effort at economy and a steady increase in the service to be obtained from every ton. The latest figures, however, have been worked out on a per-pound basis.

The newest and what will be one of the largest ore-carrying vessels on the Great Lakes, the William K. Field, named after the president of the Pittsburgh Coal Co., was launched Jan. 23 at Toledo. The new freighter is owned by the Reiss Steamship Co., of Sheboygan, Wis. The William K. Field is 604 ft. long with a 60-ft. beam, 21.6-ft. draught, and will carry 15,000 tons of coal. The ship will also be equipped to carry a load of 500,000 bushels of wheat. Among those present at the launching were Messrs. Field and Reiss and the following officials of the coal company: J. Donaldson, J. H. Woods, J. B. L. Hornberger and F. J. LeMoyné, vice presidents; C. E. Leshner, assistant to the president; Aaron Westlake, secretary, and Don Rose, general counsel.

PENNSYLVANIA

Herbert Hoover, Secretary of Commerce, has advised members of the Pittsburgh Coal Producers' Association to take part in the wage conference of operators and union officials at Jacksonville, Fla., Feb. 11. The suggestion was contained in a letter to C. J. Goodyear, representing the association. The association refused in 1922 to confer with the union except on a district basis, which the union refused, a strike resulting. Periodic suspension of coal production, Mr. Hoover said, had resulted in high-priced coal, the maintenance of a large number of uneconomic mines, and generally brought about a situation which called for the "real cure of a period of continuous operation under free competition and full movement of coal."

A certificate of incorporation for the merger of three big companies has been approved by the Public Service Commission. The companies involved are the Springfield Mining, the Bloomington and the Springfield companies. The new corporation will be known as the Springfield Coal Mining Co., of Ebensburg, with a capital of \$2,000,000.

M. D. Cooper, of Pittsburgh, assistant general superintendent of the Hillman Coal & Coke Co., in charge of plants in the Connellsville coke region, has his territory enlarged to include Edna Nos. 1 and 2 mines in the Irwin gas coal basin in Westmoreland County, and Jerome Nos. 1 and 2 mines at Jerome, Somerset County, succeeding S. Snyder, who was appointed mine inspector for the same company to succeed Arthur Young, who was recently appointed superintendent of the newly acquired Orient mine.

A. R. Budd, formerly vice-president of the Diamond Coal & Coke Co., has been appointed vice-president of the Hillman Coal & Coke Co., and J. D. Martin has resigned as chief engineer of that company to become general superintendent of the Virginia Iron, Coal & Coke Co., Inc., of Roanoke, Va.

Mike Viscosky, Alfred Ramsell, Mike Kulchek, Clement Acitelli and John Laputka, of Jerome, who were found guilty in the Somerset County Court last September of dynamiting the steel bridge at Jerome, causing a loss of \$100,000, were taken into court on Jan. 26, and given the following sentences: Viscosky, Ramsell, and Kulchek, \$1,000 fine each and costs and to serve not less than five nor more than ten years each in the Western Penitentiary at Pittsburgh; Acitelli and Laputka were each sentenced to pay fines of \$1,000 and costs and serve not less than one year and six months nor more than three years in the same institution. Upon an appeal to the Supreme Court, the former three were released on \$5,000 bail and the latter two on bonds of \$2,500.

A state charter has been issued to the Crane Coal Co., Philadelphia, the purpose of which is the mining of coal and the manufacture of coke. The capital stock is \$50,000 and the incorporators are A. B. Crane, Wayne, treasurer; J. Albert Bayley, Laurel Springs, N. J., and Joseph W. Henderson, Chestnut Hill, Philadelphia.

Mayor John Durkan of Scranton has abandoned his willingness to agree to a valuation of \$380 per foot acre on local coal lands, after he had first announced an assessment of \$800 per foot acre, through the failure of the coal companies to agree to the increase over the present \$320 value. As a result, the Mayor has announced that the board of assessors will prepare the 1924 valuation books with the \$800 figure as a basis. This is taken to mean that the appeal of the corporations will be carried into court and a strenuous fight will be made against the increase. The companies, it is understood, were willing to agree to the mayor's offer to make \$380 the valuation for this year, but wanted the provision that they could file an appeal which would stand for some time. Whether or not the compromise negotiations were broken on this point could not be learned.

Thomas W. Harris, of Taylor, was awarded a gold prize of \$250 for having prepared the best paper among a number of competitors on "Working at the Face." The presentation was made at a banquet, at Minooka, Jan. 26, tendered by officials of the Hudson Coal Co. to the employees of the Greenwich mines.

The annual report of the State Employment Bureau of the Pennsylvania Department of Labor and Industry shows that during 1923 4,524 persons applied for work in or about the mines to the various branch

offices of the bureau. Of this total 3,372 were sent to positions and 3,335 of these received work.

A charter was issued to the Windber-Coalport Coal Co., Windber, with a capital of \$60,000. The incorporators are J. Wade Snyder, Windber, treasurer; Sylvester Lehman, Windber, and J. E. Reese, Scalp Level. The company will engage in mining coal and the manufacture of coke and by-products.

VIRGINIA

The Pardee interests, owning the Blackwood Coal & Coke Co., are beginning a development project in southwest Virginia which will involve an expenditure of approximately \$8,500,000 and which when mining operations meet normal production will afford about 2,500,000 tons a year. The company will first develop its holdings on the Southern Ry. between Appalachia and St. Charles, the new mining town to be known as Calvin, for the late Calvin Pardee, who was head of the Pardee interests. A contract has been let for the construction of 300 houses for miners at Calvin. Other buildings include a club house, bath house, theatre, two churches and modern tipples. The sum of \$3,000,000 has been appropriated for the construction of the new mining plant at Calvin, which is to be the first of three. Work on the second operation will be undertaken after the plant at Calvin is completed.

WEST VIRGINIA

Captain Bob Smith of the Litz Smith Co., of Huntington, announces that his concern will open sales offices in Detroit with A. Meters in charge. A. Alexander, who has been associated with Manager Albrink of the Fuel Forwarding Exchange at Russell, joined the Huntington forces.

Under a reorganization of the Tierney Mining Co. and the Tierney Coal Co., interests of Colonel Z. T. Vinson and of Donald Clark, of Huntington, in both companies have been acquired by the estate of the late Laurence E. Tierney. Under the plan of reorganization the name of the Tierney Coal Co. has been changed to the Laurence E. Tierney Land Co., with offices in Bluefield. This company controls about 10,000 acres of coal land in Pike County, Ky., part of which is under lease. Officers of the company, just elected, are as follows: Mrs. Laurence E. Tierney, president; John L. Tierney, vice-president; Dr. L. H. Clark, secretary. Directors of the company include Mrs. Laurence E. Tierney, Laurence E. Tierney, Jr., Dr. L. H. Clark, John L. Tierney and G. C. Wood.

J. W. Knowlton, of Elkins, who has been engineer of tests of the West Virginia Coal & Coke Co. and who recently accepted the position of manager of the coal department of the Southern Power Co., left late in January for his new post at Charlotte, N. C.

Clarksburg capitalists have organized the Dry Fork Sewell Coal Co., with stock of no par value, 25 shares having been subscribed at \$500. This company will have its office at Clarksburg. Identified with the new concern are R. H. Pallerson, E. Ray Burnside, L. J. Shanan, J. M. Carter, G. M. Barnes, all of Clarksburg.

Statistics have just been made public by the Consolidation Coal Co. showing that that company and its predecessors have produced a total of 233,001,657 tons of coal in the 59 years in which they have been operating. The company mined its first ton of coal in 1864 and by 1871 a half-million tons had been produced. The Watson family has been interested in all the predecessors of the Consolidation just as they are in the Consolidation. The company's year of largest production was in 1915, 11,722,344 tons being mined in that year. In 1913 a total of 11,154,897 tons was mined.

Announcement has been made that the trial of William Blizard on a charge of murder will be the first case to be brought before the court when the "armed march" cases of Blizard and his fellow mine-union officials, C. Frank Keeney and Fred Mooney, come up at Fayetteville Feb. 11. The charges are all in indictments found in Logan County and removed by changes of venue first to Jefferson, then to Morgan, and then to Greenbrier County. The transfer to Fayette County came after a jury had disagreed in trial of Blizard on the murder charge, connected with the killing of Deputy Sheriff John Gore of

Logan during the 1921 march, and after charges had been made of attempts to corrupt prospective jurors in Greenbrier County.

WASHINGTON, D. C.

Appointments to the executive committee of the National Coal Association made at the recent meeting of the board of directors are as follows: J. C. Brydon, (Chairman), president Quemahoning Creek Coal Co., Baltimore, Md.; J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va.; Ira Clemens, president, Clemens Coal Co., Pittsburg, Kan.; E. L. Douglass, vice-president, First Creek Mining Co., Cincinnati, Ohio; Michael Gallagher, general manager, M. A. Hanna Co., Cleveland, Ohio; G. M. Gillette, manager, Consolidation Coal Co., Frostburg, Md.; T. W. Guthrie, president, Hillman Coal & Coke Co., Pittsburgh, Pa.; S. Pemberton Hutchinson, president, Westmoreland Coal Co., Philadelphia, Pa.; A. M. Ogle, president, Vandalia Coal Co., Terre Haute, Ind.; P. H. Penna, secretary, Indiana Bituminous Coal Operators Association, Terre Haute, Ind.; S. L. Yerkes, vice-president, Grider Coal Sales Agency, Birmingham, Ala.

David L. Wing announces the removal to the Transportation Building, 17th and H Streets, N. W., of his office for consultant work on industrial economics and statistics; for research work both in the United States and in foreign countries, especially Latin-American; for the conduct of inquiries and the preparation of briefs of fact and reports for submission to congressional committees, and to federal, state and local commissions and boards, and for use in litigation.

John H. Libby and Thomas K. Meloy have formed a partnership under the name of Libby & Meloy, industrial counsel, with offices in the Southern Building, Washington, D. C., and a branch office at 61 Broadway, New York City. The firm will make investigations of various phases of industry involving economics and engineering.

CANADA

A wage conference at Sydney, N. S., between representatives of the Dominion Coal Co. and officials of the United Mine Workers adjourned on Jan. 29 until Feb. 5 and issued the following official statement: "The representatives of the Dominion Coal Co. offered to renew the wage contract at the 1923 rates. Representatives of the United Mine Workers offered to renew the contract with an increase upon the 1923 rates of 55c per day for day paid workers and an increase of 20 per cent on contract-rates. The adjournment moved by the representatives of the United Mine Workers was agreed to in the hope that when negotiations were resumed, better progress might be made."

A summary of the coal trade of Canada for 1923 issued by the Dominion Bureau of Statistics shows imports of anthracite to the amount of 5,165,382 tons, valued at \$46,457,902, as compared with 2,705,752 tons, of the value of \$23,795,743, for 1922. Bituminous coal was imported to the amount of 15,822,240 tons, of the value of \$49,899,099, as compared with 10,317,773 tons of the value of \$37,387,285 during the preceding year. Imports of coke were 733,604 tons, value \$5,790,771 as against 336,270 tons, value \$3,094,042 in 1922. Exports of coal from Canada amounted to 1,654,706 tons, value \$10,661,399, as against 1,818,582 tons, value \$11,159,060 in 1922.

Industrial Notes

A. B. Day, who founded the Sanford-Day Iron Works, has organized the Day-Evans Iron Works at Knoxville, Tenn., with a capital of \$200,000. A. W. Evans, engineer of the company, who is in charge of construction work, expects to have rail connection with the L. & N. and Southern rys. soon. The new company will manufacture mine cars and general mine equipment.

The Ohio Brass Co. recently purchased approximately five acres of land, and buildings just across the Pennsylvania R.R. tracks from its present Mansfield plant. The tract is triangular in shape and is bounded by three trunk-line railroads—the Pennsylvania, Erie and Baltimore & Ohio. The purchase was made from the Aultman-Taylor Machinery Co.

New Equipment

Safety Powder Flask

Every mine owner and the workers in his mines know of the ever-present danger of powder explosions due to what have seemed unavoidable accidents with the old powder flasks. Loss of life and money is the usual result when the powder burns. It is claimed that the new Fannon's "Safety-First" Powder Flask, manufactured by the American Safety Mine Appliances Co., of Knoxville, Tenn., gives absolute control of the explosive powder. The illustration herewith shows how every possibility of accident is done away with.

A few of the safety features of the



Flask for Blasting Powder

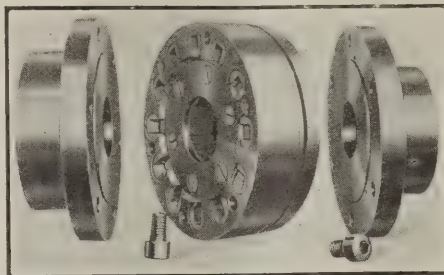
The design of this container prevents spillage and should at the same time permit easy filling with little danger.

new powder flask aside from the hand-gripped trigger are that it prevents spilling of powder in making cartridges, prevents miners from sticking picks into kegs, and is safe from fire by bystanders—sparks or flames cannot enter the flask.

High-Speed Flexible Coupling

Couplings operated at speeds between 3,000 and 9,000 r.p.m. need to be made of steel and should at the same time provide for easy endwise movement. For these conditions the Smith & Serrell Co., of Newark, N. J., has developed a high-speed flexible coupling suitable for from 6½ to 98 hp. per hundred revolutions. This coupling is very easily accessible for inspection and for repair without moving either of the connected machines. It is of the laminated spring construction which provides flexibility and durability. As far as possible all parts are made interchangeable.

In the outer member of the coupling are keepers into which the laminated springs fit. These keepers can slide endwise; thus the bearing between the bundle of springs and the keepers is



Flexible Coupling for Turbine Drives

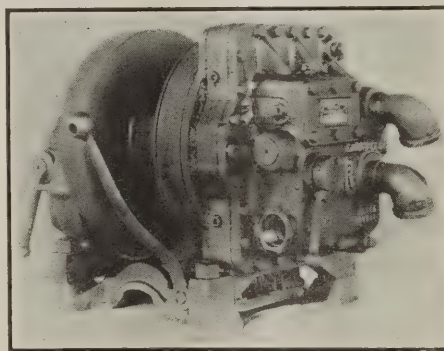
A high-speed steel coupling with flexible radially mounted spring bundles set so as to quickly adjust the two coupling members when driven at high speeds.

constantly upon a surface bearing rather than line or point contact. The bundle of springs also can slide in a vertical direction, making the coupling flexible in all directions.

New Model Air Hoist

More powerful air hoists of the Little Tugger type are now being manufactured by the Ingersoll-Rand Co., of 11 Broadway, New York. They were developed and perfected to meet the demand for a more powerful single-drum hoist than the 1H and 5H types.

Besides having increased power and durability, the manufacturers claim a



Air Hoist for Mining Service

much greater air efficiency than heretofore known in a machine of this type. This low air consumption is due to the fact that the motor runs in one direction only and has a specially designed piston. The air consumption per delivered horsepower varies from 25 to 30 cu.ft. per minute over a range from 5 to 11 hp. at air pressures running from 50

to 80 lb. per square inch at the throttle.

The new hoists, known as the 10H class are made in three types, each type specially suited for its particular field of operation.

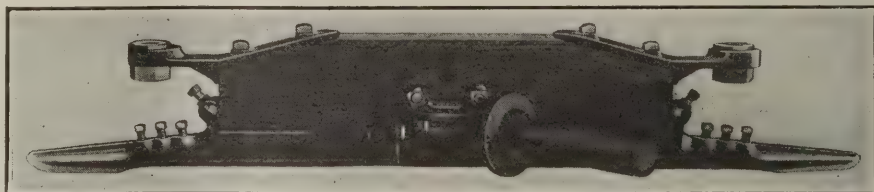
The slushing hoist has deep-flared flanges which serve to eliminate rope and drum wear when the rope is not led on straight. The general-purpose hoist differs from the slushing only in the provision of a drum with straight flanges and the addition of a brake band and other brake details. The 10HL, or large-drum, hoist differs from the general-purpose hoist only in size of drum and base. This hoist is intended for work where a large drum and exceptional rope capacity are needed.

Heavier Designed Section Insulator Switch

A heavier design for all the needs of modern heavy electric haulage—greater current capacity, ruggedness, and mechanical strength for withstanding constant passage of high current locomotives—and a method of suspension which simplifies the problem of roof clearance are features of a new Ohio Brass Co. section insulator switch.

Like other O-B section switches this new design provides an underrun for the trolley wheel, even though the switch itself may be open. This is provided for in the rigid underrun across the circuit-breaking section of the switch. All parts of the switch are heavy for severe service with heavy locomotives and heavy motor currents. The approaches, the underrun and the knife-blade circuit breaker and clips are designed for a heavier than ordinary rating, ample for all requirements—even to carrying the feeder line through the switch. Lugs on each end of the switch permit installation of feeder connections and allow for opening the feeder circuit as well as the trolley circuit when the switch is opened. The switch is designed for 4-0 trolley wire and will take feeder wire up to 4-0.

The two suspension brackets are set so that the hanger support is below the top of the switch. Thus it is possible to keep the trolley height even with one of these switches without cutting into the roof for clearance. Standard insulated hangers should be used with a section insulator switch, for by this scheme of support they may be used without serious problems of clearance. Hangers are installed just as they would be for trolley clamps, and the switch is attached without further roof drilling or chipping.



Section Insulator Switch of Heavy Construction

This new switch is capable of carrying heavy feeder line currents into any section of the mine, thus making possible the combination of trolley and feeder switch in one.

COAL AGE

McGraw-Hill Company, Inc.
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Devoted to the Operating, Technical and Business
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Number 7

For a New Era in Safety

SAFETY in mining has been endowed by the accident compensation acts. Prevention of accidents has been made profitable and can no longer be regarded as an unremunerative, though worthy, way of spending money. Unfortunately, the effect of compensation has not been as great as might have been expected. Several ways of obtaining greater safety still are being overlooked, and it seems now, after several years of accident compensation, that the laws must be strengthened.

In many sections of the country have been found operators ready to co-operate in a revision of the laws having that end in view. A. J. Moorshead tried through the American Mining Congress to have such revision put into practice, but his effort seems long ago to have spent its force.

The Rocky Mountain coal operators are actively advocating better legislation and the Rocky Mountain Coal Mining Institute is even now canvassing ways of achieving greater safety in the dry areas of the West. This effort of the operating men will surely meet with the approbation of all the mining fraternity.

Some time back some of the western Pennsylvania operators sought to eliminate the menace of mixed lights by demanding that all mines having areas operated by safety lamps be operated entirely with such lamps. They were not successful, however, in procuring sufficient support to make their legislative plans successful.

An effort should be made to get safety measures required in one state adopted in all others where conditions are similar. Much credit should be given to those concerns which, like the Old Ben Coal Corporation, have adopted safeguards outdistancing those provided in mines confronted with similar safety problems. In the long run such precautions are not only salutary but profitable, especially when taken to prevent such accidents as may involve a whole mine in a common catastrophe.

A New Use of Trade Associations

A SPEAKER at a recent meeting of the Philadelphia Coal Club jocularly refused to give statistics regarding farming, for fear that agents of the Department of Justice might be around. We must be equally careful and shall avoid giving any statistics of mine explosions caused by coal dust, for fear some one might make an improper use of them.

A brick, we are told, is a construction material of use in masonry, but it has been used to commit murder. Statistics resemble that brick and if someone used it improperly, the Department of Justice might ask who it was that smuggled in the brick and we could be convicted of being the guilty party. Someone might say, for instance, that mine explosions were so many and the cost is so high that the price—but that is enough.

Before we write more we must ask the subscription department if Secretary Daugherty or any of his henchmen are reading *Coal Age*.

Avoiding bricks, whether in hand or in flight, we wish to suggest a new use of trade associations. Could not some such body erect for its members a mill, centrally located, yet far enough from the mines to avoid having a scale made for it by the United Mine Workers, where rock could be ground for the use of members and others in the rock dusting of mines? Of course unless it was intrastate it would not be allowed to ascertain the cost of the installation, the cost of grinding the rock, the quantity ground or distributed, the percentage of its product that would go through any given screen, but nevertheless it might be well to install it if it could be done without the aid of statistics and if it rendered no accounts to its members. At least, we believe it might be permitted to exist for a while till the Department of Justice tried once again to legislate the action into one of criminal intent.

Such a mill could do much to make mines safe in the area it served. The suggestion has been made to *Coal Age*; it surely is worthy of consideration—if legal, of course.

Can't Win with Poor Cards

NO ONE can hope to meet the present low cost of coal with equipment that has a high cost of operation. Circumspect development is the one hope for staying in the competition. If care be taken to provide appliances that will save labor and increase production the race may be won. Mere economy and a decision to get along with what equipment is in hand may carry a plant along a month or so, but only judicious expenditure will give the operator such advantage as to protect him for a long period of low prices.

Coal operators in flush times overextend themselves. They load their financial structure with mines and lands until it fairly groans under the strain. They do not put enough of their profits back into the plants they have, but squander their money in plants they desire to add to their holdings. As a result when the close margin comes they are taken entirely by surprise.

If they had loading machines and shortwall cutters, good tracks and switches, pipes and screens which did not have to be perpetually renewed, automatic substations, reclosing circuit breakers, pumps and doors—to mention a few items—they could clip off the few cents that would keep them out of the market, and, being in the market, they would be able to run steadily and clip off some more cents.

A vicious cycle in high cost perpetually drives the operator further and further to the wall. When the cost is high, the price of coal must be high, and being high must be made a little higher because the mines cannot run steadily. When for this reason the price

is raised a little higher, then the mine runs still more irregularly, and the price must be raised again. Just a little advantage—two cents on the steady-run basis—may make a difference of ten or more times that much because of its effect on steadiness and intensity of run.

Times of low prices call for high courage combined with circumspection. A little diligent figuring, however, will show just where a man can be relieved here, there and the other place to engage at other and more profitable work for the company.

There are in this world but two cycles, the cycle of success and the cycle of failure. A little profit makes efficient operation and steady business and spells success. A little loss of money and of faith results in an excessive economy and that again in inefficient, irregular, ill-sustained operation and bankruptcy. A trifling difference in cost oftentimes separates the two. Low cost sets the cycle of success in operation. High cost brings in operation the vicious cycle of failure.

Give Them a Boost

YEARs of experience have given the coal industry confidence in the U. S. Bureau of Mines. It is critical of the industry but not muckraking. It holds up a true mirror to us and to the public. We see ourselves not as others see us but as we are. They "nothing extenuate nor set down aught in malice." For a little while the Bureau seemed to be following the lines of government organizations which prescribe "Make out a bad case against industry, and jobs, salaries, honor and public approbation will flow therefrom." The Bureau has come scot-free from that Adam's apple, tantalizingly tempting as it was. It never tried to tell anything but the truth, and the best elements in the coal industry have been helped. As for the worst, no one wants to spare them. They are the true enemies of every coal man, vociferously though they may declare their interest in backing the industry.

Manning, Cottrell and Bain have each in their turn tried to do their work fearlessly and constructively. Mistakes of judgment may have been made but not of heart. They have deserved a more outspoken note of approval. Their effort to keep safety before the industry should be given wholehearted support. Their advocacy of rock dust should bear more effective fruit. Their investigations of safety appliances should meet with greater interest and what they have recommended and devised should have speedier acceptance.

They are the friends of the industry and no one can conceive any instrumentality better suited than the U. S. Bureau of Mines for the obtaining of that greatest of needs for the reformation of the industry—cleaner coal.

A concern in Buenos Aires purchased its coal for some twenty years from a company of standing in the United States. In the course of those years the mine became exhausted, and the Argentine firm was notified by the American company of that fact. "We have," said the United States company, "other coal which might suit you." The Argentine firm tried it and did not like it as well. Its officials, accordingly, said: "There are lots of mines in the United States; let us try some of them." They did so, and got in the hands of the sharks that seem more active in the export field than perhaps in the domestic. As a result these Buenos Aires buyers said they would never try again to buy in this country. They purchased coal from Europe and told an American

commercial attaché that never till the United States would guarantee coal quality would they again be in the market for coal from this country's mines.

Shall we never learn that adequate inspection has been, and ever will be, the sheet anchor of successful trade?

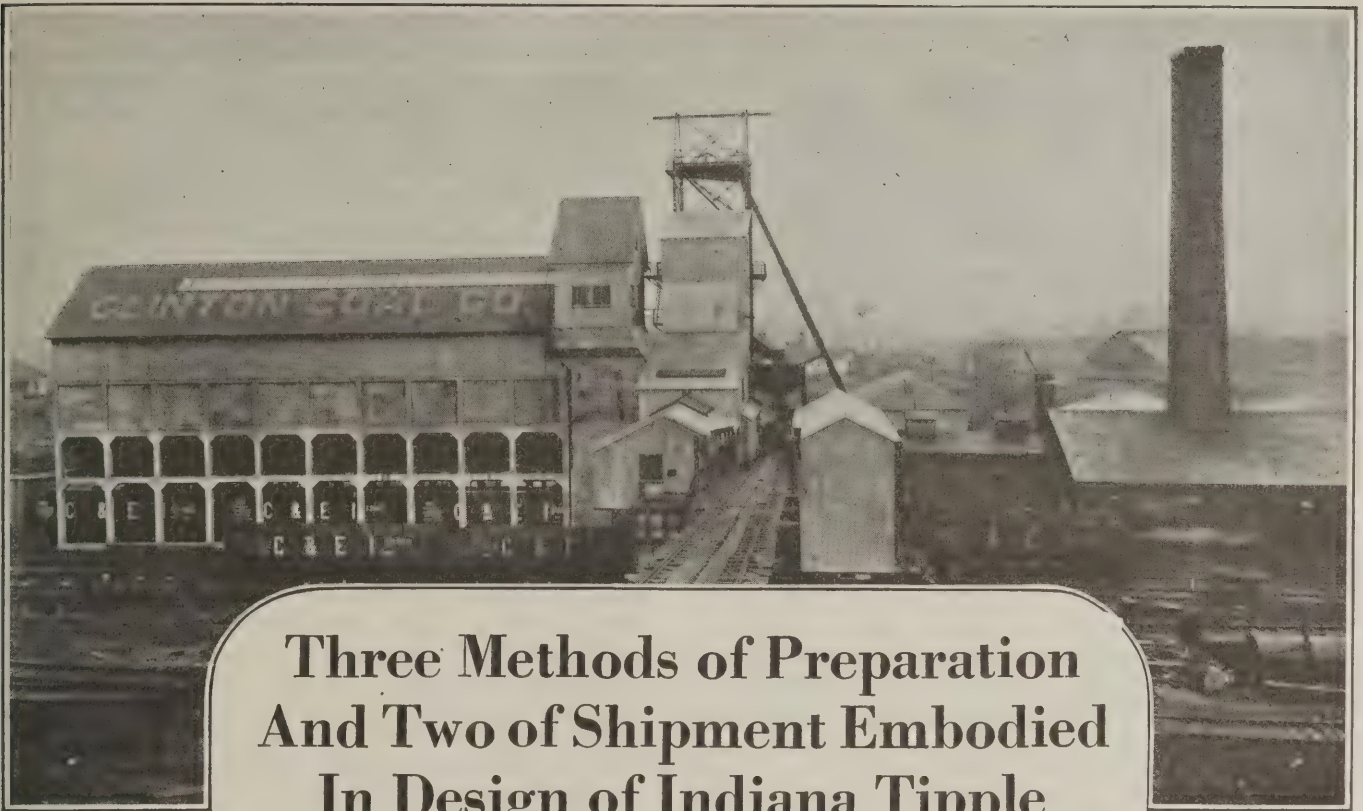
Better Inspectional Forces

RECENT explosions and the high death rate in the mines of the United States make it essential to improve the inspectional service. At present we have no adequate safety organization. In each state we have only chief inspectors and subalterns. The latter have a hard life traveling through the mines and being always away from home. Their salaries are small. Though their tenure of office is reasonably secure and in most cases not threatened by politics, they have no hope of promotion. Increased comfort, decreased exertion with advancing years, growing public appreciation are denied them. Such conditions do not provide the best men. The inspectional service is a blind alley.

In Great Britain, on the other hand, there are grades of inspectors. The upper classes of the service are spared the drudgeries of general inspection. When a problem is presented they act to settle it, and being more competent than the general run of the inspectorate and living on a higher plane of social recognition they are able to approach those who wish to contravene their authority or stretch the law by some technicality with a degree of confidence and understanding that makes their representations respected. It is difficult for a \$4,000 or \$5,000 man to make the \$25,000 or \$50,000 president of a large company realize that he must conform to some practice which safety prescribes or the law requires.

Furthermore, our inspectors in general have not received technical training. They have experience obtained in actual contact with mining problems. They have studied enough to obtain a certificate but most of them know little enough about electricity and almost nothing about the other forms of safety that would throw light on safety at mines. They are rarely traveled men. They know their district well and they know perhaps more than their district knows but there is no incentive to acquire more. They are safe to continue to be inspectors without this further instruction. The safety services of the coal mines are better than we have any right to expect under present conditions, but why not take the steps that will make them still better?

MR. LEWIS' IDEA of the proper place for the wage scale negotiations, concurred in by a few operators, was an unfortunate one from many standpoints. The choice of Jacksonville, Fla., for the Feb. 11 conference too easily gives the impression that operators and miners are entering the forthcoming parley in a playful, vacation mood. The argument that the negotiations ought to be removed as far as possible from the interfering influences of the coal states is thin soup. If the sessions should be drawn out at great length the unpleasant impression of the conference would be intensified over the country. Hence it will be good policy for both sides to knuckle down to business at once upon their arrival in sunny Florida and do the one logical thing without delay—extend the present wage agreement.



Three Methods of Preparation And Two of Shipment Embodied In Design of Indiana Tipple

One Grizzly and Two Shaking Screens Used—Five Sizes May Be Shipped by Truck, Eleven Sizes by Rail—Large Concrete Storage Bins Facilitate Local Shipments and Relieve Car Shortage

A NEW four-track steel tipple recently was completed by the Clinton Coal Co. at its No. 2 Crown Hill Mine located near Clinton, Ind. This improvement has been made at the shaft where two years ago a 1,500-ton rescreening and wagon-sales storage bin was constructed. The combined equipment makes coal preparation at this mine unusually complete. The plant as a whole is the result of the determination of the owners to be ready to meet a recurrence of every market and operating contingency that has arisen in the past as well as those which business experience indicates may be expected in the future.

Three methods of preparing coal are provided in this plant. The first is the preparation of run-of-mine over a 1½-in. bar screen, making standard 1½-in. lump and 1½-in. screenings. This product can be made without operation of any mechanical screening equipment and is intended to satisfy that portion of the trade that has become accustomed to this kind of coal, having used it for years, and which therefore still demands it.

ALL LARGE COAL LOADED OVER BOOMS

Passing the coal over a horizontal screen, where it can be picked, and then loading it into cars on four tracks forms the second method of coal preparation. The three larger sizes are loaded over loading booms. Screening in this manner together with provision for picking and for loading into cars by means of booms

is all that is necessary in order to obtain the best domestic preparation.

The third system of handling coal at this plant consists of delivering the run-of-mine from the weigh hopper in the tipple direct to an elevator, by which it is raised and then screened over a horizontal screen into five sizes, each of which is deposited in a separate concrete bin. The sizes made are designated as screenings, pea, nut, egg and lump coal. The bins are quite wide and each is fitted with two openings, or gates, in the bottom. One of these gates delivers to cars on the screenings track under the tipple. Thus all coal prepared in this manner can be shipped by rail if desired. On the other side of the bins the coal is loaded directly into wagons. A mechanical rescreen is inserted in the wagon chutes, which results in an extremely high-grade coal being available to the town of Clinton, located at a distance of a mile and a half from this mine.

The space below the bins is provided with a concrete floor or pavement. This is extended so as to make connection with a concrete road leading to Clinton. The capacity of the bins is such as to provide for a large wagon and truck business. It also serves for coal storage frequently relieving the situation when there is a car shortage and these sizes are being shipped.

FROM CAGE COAL MAY TAKE SEVERAL ROUTES

A brief description of the method of handling and the mechanical equipment follows: The coal is discharged from self-dumping cages into steel chutes which deliver it to a bottom-door gravity-dump weigh hopper serving a chute and bar screen. In case bar-

Excellent facilities for wagon shipment are provided at few mines. The headpiece shows how the Clinton Coal Co. has made provision for local delivery. The concrete bins here shown span not only one railroad track but a paved wagon space as well. Shipment of any size may thus be made by either car or truck.



Fig. 1—Side View of Tipple

In addition to the four sizes made over the tippel screens, two sizes made by a bar screen, as well as run-of-mine, may also be shipped.

screen coal is to be sold the veils covering this screen are lifted and the screenings delivered direct to a hopper above the slack track. The 1½-in. lump coal flows to a feeder hopper which delivers to an apron loading boom over the nut-coal track.

In case run-of-mine is to be loaded the veils over the bar screen are closed and the entire mine product is loaded over the boom on the nut track. The reciprocating feeder is so adjusted that it delivers the coal to the boom quickly, so that an interval is preserved between dumps from the mine car. Thus this boom can be used for inspecting the contents of each car for docking purposes.

BYPASS SHUNTS THE COAL TO THE BINS

When it is desired to send coal to the concrete bins for preparation a door below the bar screen is opened and the run-of-mine delivered through it to an apron conveyor. This in turn feeds a gravity discharge elevator which delivers the coal at the top to a horizontal screen 5 ft. wide. This screen is provided with

¾-, 1½-, 2½- and 4-in. openings. The larger sizes of coal are picked at intervals along this screen and the refuse deposited in the rock trough, which delivers it to a small bin at the end of the storage bins, whence it is hauled away in wagons.

If it is desired to prepare the coal over the screen in the tippel another door in the chute is opened. This deflects the coal to the reciprocating feeder directly below it, which in turn distributes it evenly on a 6-ft. horizontal screen. This separates the coal into 1½-in., 3-in., 6-in. and lump sizes, thus making grades that are standard in Illinois and Indiana. The larger sizes of coal can be picked on this screen. The pickings are placed in the refuse trough over the screen and delivered beyond the lump track into a bin from which they are hauled away in wagons.

ROCK IS READILY SENT TO WASTE

Another feature of interest embodied in this installation is the means employed in handling rock from the mine. Doors are placed in the dump chute above the weigh hopper. These, when opened, deliver rock to a steel bin at the side of the tippel. A side-dump car draws rock from this bin and proceeds up a 10-deg. incline to the gob pile beyond the railroad tracks. This incline extends directly over the three loading booms and is in the same position that it occupied before the steel tippel was built, its trestle having been incorporated into the new tippel structure.

The provision of three distinct methods for preparing the coal is the most unusual feature this preparation plant embodies. In a measure it is exceptional also in the excellent facilities that have been provided for shipping the entire mine output or any portion of it in prepared sizes for local consumption.

At this plant the rescreen and storage bins were built by the coal company while the equipment and machinery was furnished by the Roberts & Schaefer Co., of Chicago. The steel tippel also, including all equipment, was designed and built by this same firm, actual erection being performed by R. G. Lawry, contracting engineer.

FIG. 2

Local Bins

This picture shows the concrete bins extending at right angles to the tippel proper, in which are stored five sizes of coal that are prepared on screens above them. From these bins the coal may be delivered either to trucks or wagons located in the paved space below them or to railroad cars on the slack track. Coal for local delivery is rescreened making an exceptionally good product.



Building a Long Retarding-Conveyor Gallery at Brotherhood Mine, Coal River Collieries

Structure Rises 800 Ft., Is in Places 40 Ft. Above Ground and 1,400 Ft. Long, the Maximum Grade Being 35 Deg.—How Joints Are Stiffened and Strengthened



BY W. J. DENMAN

Assistant Engineer, Coal River Collieries

LONG rope-and-button coal retarders often must be provided with trestles of considerable height and must be erected on such pitches as to bring heavy strains on these structures. When these trestles are built of wood, shrinkage occurs, weakening the joints on which so much depends. Care therefore should be taken to see that the bolts are kept tight at all times lest the structure become loose jointed and crowd down the hill onto the tippie below. The height of the building is not merely to be measured from some point on the hill to the peak of the roof immediately above it but from the bottom of the bin on the top of the hill down to the railroad track. This great height makes the trestle inherently somewhat unstable. It is necessary therefore that it be held rigidly together.

At the Brotherhood mine of the Coal River Collieries, on the Laurel Fork of Big Coal River, Boone County, West Virginia, has been built a headhouse and conveyor gallery of somewhat unusual construction. The new headhouse is located 1,400 ft. away from the railroad and some 800 ft. above it, the coal being conveyed to the

tippie at the railroad by a rope-and-button conveyor (one of the longest, if not actually the longest, ever installed in a single unit). The maximum slope of the conveyor is 35 deg. The headhouse bents in general are built of 10x10-in. timber with 2x8-in. bracing and with all intersections bolted. On the conveyor gallery the bents range from 5 to 40 ft. in height with standard 8x8-in. and 10x10-in. four-post tower construction having 2x8-in. level and cross bracings, all intersections being bolted. With such a structure we expected to have much expense for upkeep and inspection. The joint bolts would have to be tightened continually, that being our experience with bolted structures.

USE PLATES TO STIFFEN TIMBER JOINTS

In order to avoid some of this uncertainty and expense and to make a structure unusually stiff and safe we used a new device consisting of a cold-rolled steel plate of special composition which is made in square and round forms. The dimensions of the square plates are 1½ in., 4 in. and 5 in. The round type has a diameter of 3 in. A hole in the center of each plate is made of ample size to permit the passage of the bolt with which it is used. The edges of the plate are cut so as to form triangular teeth ¾ in. high and about ½ in. wide at the base. These teeth are turned alternately up and down so that they project on both sides of the plate. They are so designed that when the plates are inserted in the timber joints they relieve the bolts of most of the shear stresses.

In Fig. 2 is shown a view of one of the timber-joint plates, clearly illustrating their construction. These plates can be used in bolted and in other forms of timber joints such as post joints, eliminating thereby the necessity of a pin and mortice. Our first use of them, however, was in connection with bolted work. They were placed between the members of a joint so that the bolts passed through the two members and also through the hole in the center of the plate. The entire joint then was pulled tight, causing the teeth to bite into the wood on both sides of the plate.

When we first considered these timber-joint plates our main desire was to obtain a more rigid structure with a greater factor of safety. Tests made by the Department of Civil Engineering of Columbia University at its testing laboratories showed the results tabulated in Fig. 3. They were made on a number of

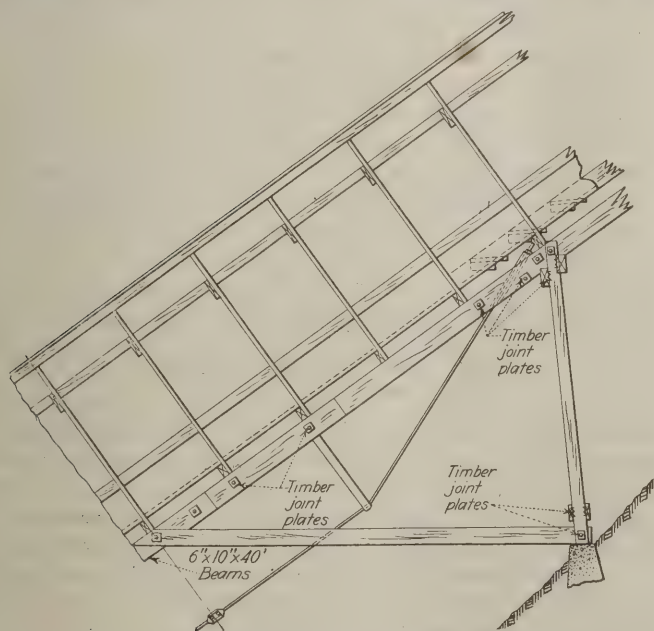


Fig. 1—Rope-and-Button Conveyor Gallery

This longitudinal cross-section shows a half span between two bents, the joints being stiffened by specially designed plates and the spans by an inverted truss.

joints each made up of 4x5.93-in. yellow-pine timber, with two 2.02x5.93-in. yellow-pine splice plates, three $\frac{3}{4}$ x10-in. bolts, six $\frac{3}{4}$ x3 $\frac{1}{2}$ -in. washers and four 4x4x0.052-in. timber-joint plates, the bolt holes being of 1 in. diameter and the plates being countersunk in the splice and main members. In the first test the plates were squeezed into the timbers by pressure applied to the top and bottom of the splice plates by means of a testing machine. The other two joints were simply tightened by the $\frac{3}{4}$ -in. bolts. The three joints were subjected to tension through suitable connections attached to the main and splice timbers and the relative movement of splice plate and main members was measured with an extensometer.

WHEN JOINT IS WELL MADE TIMBER IS SAVED

Because these tests demonstrated that a joint made up with these plates was much stronger than one made up merely with bolts we were able to effect radical savings in the materials and labor required for the work.

The illustration in the headpiece shows the conveyor gallery near the foot of the hill and indicates the type of construction used when the bents required were long. Fig. 1 gives details of the conveyor-gallery bents and indicates how the plates were installed. Four-inch plates were used throughout.

Similar plates were used in connection with the 2x8-in. bracing in the conveyor gallery, making a more rigid job and eliminating one-half the number of bolts which otherwise we would have had to use.

Four-inch plates were used where the 10x10-in. posts of the high tower bents were lap-spliced, a single,

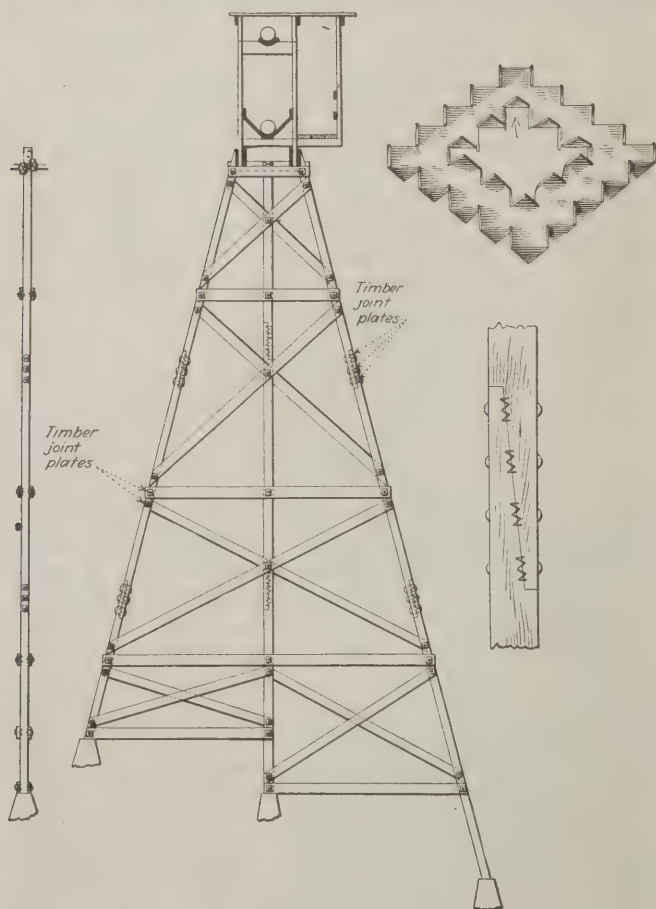


Fig. 2—Bent and Cross-Section of Gallery

In the upper right-hand corner is one of the special plates and on the right a scarf joint stiffened by four of these devices.

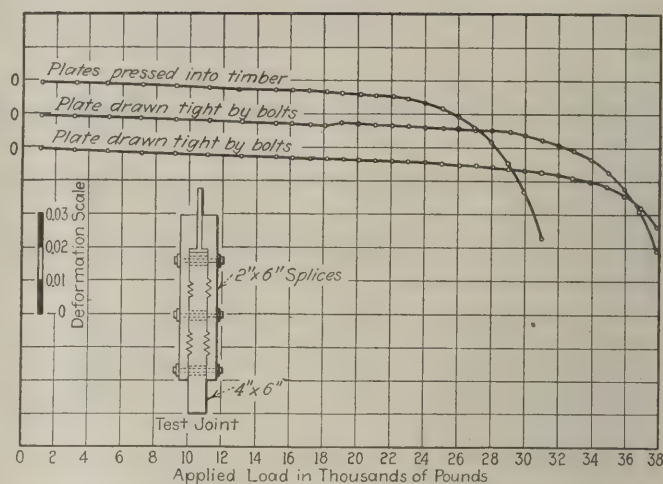


Fig. 3—Tensile Test of Timber Joints with Special Shear-Sustaining Plates

The curves of deformation have each an individual baseline marked "0." Pressing the plates into the timber apparently makes little difference under a tension of 11 tons but allows seriously greater deformation thereafter.

instead of a staggered, line of bolts being used. Despite the reduction in material and complexity, greater stiffness and strength was obtained than could have been afforded by joints of the original design.

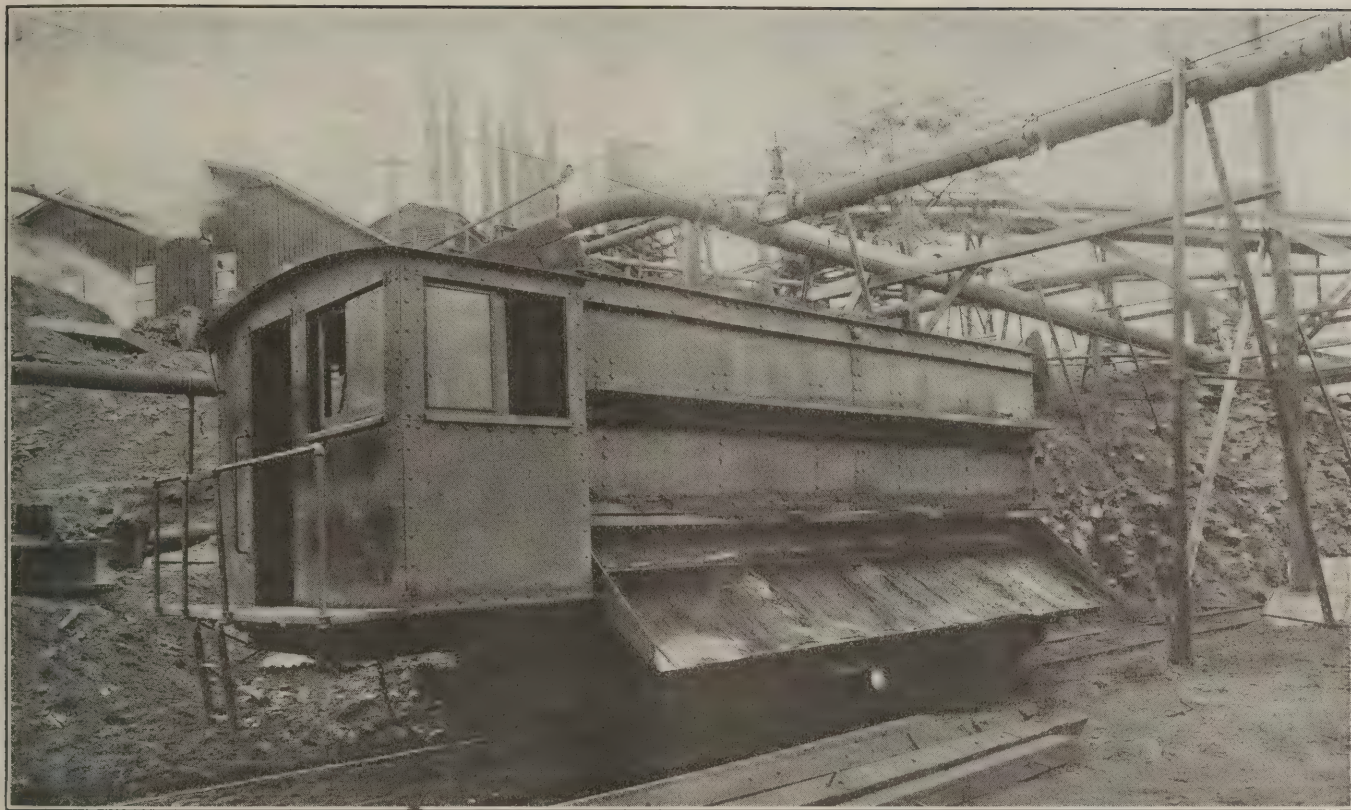
Fig. 1 shows the details on the conveyor gallery on the upper part of the hill. It will be noted that timber-joint plates have been used in splicing 6-in. x 10-in. x 40-ft. built-up beams. These beams were built of two lines of 2x10-in. oak planks, 18 ft. and 22 ft. long, respectively, with filler splices at the ends and centers 8 ft. in length. Plates were used at these splice joints.

To the present our experience has been exceedingly satisfactory and we hope, as is claimed, that even where the timber dries out, the rigidity of the joint will not be impaired. So far, we have not had an opportunity to check up this in detail, but though the wood has already dried out somewhat the joints do not show the slightest tendency to loosen, nor was there any splitting at the bolt holes. On the contrary, the plate seemed rather to prevent this action from occurring. Periodical inspections, however, are still being made.

So far we have used these plates only where they can be held by the compression of bolts. In the approach trestle to our No. 4 tippie we expect to install them on the tops of the caps and under the stringers, eliminating dapping and doweling and keeping the timber faces apart, thus decreasing rot and increasing the life of the timber.

Useful Data on Storage Batteries For Non-Technical Men

"Elements of Storage Batteries," by Jansky and Wood, describes in a clear and simple way the principles, operation and maintenance of storage batteries for the non-technical man who is desirous of getting the highest efficiency out of the batteries which he uses or supervises. The underlying principles of the various types of storage batteries are explained in considerable detail. An important section of the book is devoted to the proper charging of the batteries, together with a description of various types of charging equipment. The book is published by the McGraw-Hill Book Co., 370 Seventh Ave., New York.



Specially Designed Motors for Larry-Car Service

Mechanical Details Are Such as to Accommodate Heavie Axles—Must Have Armature Winding and Gear Ratio Suitable for Slow Speed—Motors Fitted with Ball Bearings

BY C. A. ATWELL

Motor Engineering Department
Westinghouse Electric & Mfg. Co.

ELECTRICALLY driven larry cars have lately come into more general use around the mines as coal transfer cars, slate dumping cars, scale cars, concentrator cars and for many other uses about docks, quarries, steel mills, coke plants and other similar industries. While their uses and types of construction are numerous, they all have the common features of being self-propelled, burden-bearing cars and usually operate at speeds that are low compared to electric railway service.

The motors used for propelling larry cars should be of the same general construction as the modern railway types of motor; that is, they should be series-wound, commutating pole motors of rugged construction suitable for mounting on the car axle and geared to the axle by single reduction gearing. The features that were mentioned above as common to all larry cars place several special requirements on the motors, however, that are not required for the usual railway motors. This makes it necessary that the motors which are entirely suitable for use on larry cars be designed especially for that service. The principal special requirements are:

- (1) Extra large axle bearings.
- (2) Slow-speed winding.
- (3) Ball-type armature bearings.

The fact that larry cars are built primarily for carrying heavy loads necessitates a truck design using a large axle. This in turn requires larger axle bearings than are customary for the usual railway type motor

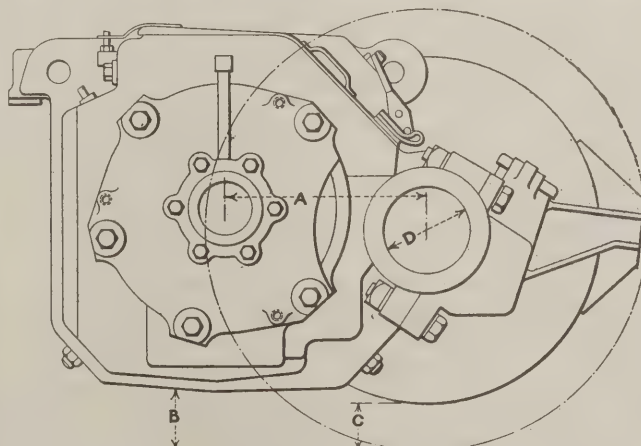


Fig. 1—Outline of Larry-Car Motor

Much depends upon the axle diameter, D , because if it is increased the gear center distance, A , increases and C , the clearance under the gear case, increases because of the use of a larger gear. B is the clearance under the motor frame.

The headpiece shows a typical mine larry car. The use of this car is rapidly increasing, due to the larger capacity and the ease of dumping. The arrangement for dumping usually is made to fit the conditions far better than is possible with the ordinary mine car.

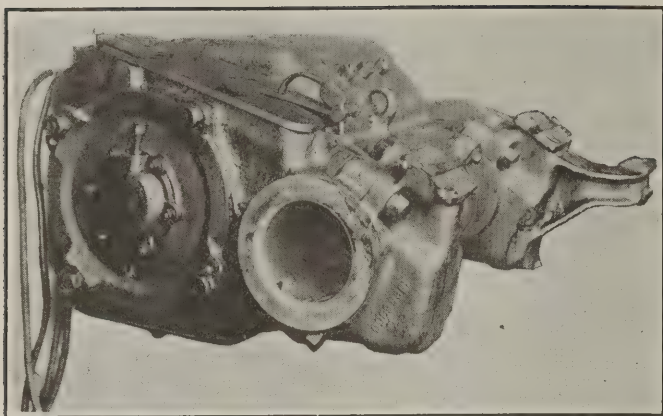


Fig. 2—Larry-Car Motor

This specially designed motor is rated at 80 hp. and 230 or 550 volts. The axle bearings are for an 8-in. rear axle. Ball armature bearings permit higher motor efficiency and proper lubrication of the bearings without overflow into the motor and windings.

of the same size such as are used on street railway, interurban, or even freight locomotive service. In Fig. 1, the dimension "A" represents the "gear center distance." On standard railway motors this distance usually is made a minimum for the largest size axle that is likely to be used with a certain motor. A minimum distance, "A," has the advantage of a maximum clearance, "C," between the gear case and top of rail. In order to increase the axle bearing bore, "D," the gear center distance, "A," must be increased. A gear with more teeth is used to make up for the increase in gear center distance and mesh with the motor pinion. The clearance, "C," is reduced by the same amount that "A" is increased. As it is not necessary for "C" to be as large for slow-speed service as on high-speed railway service, this decrease is not detrimental.

The voltages common about industrial material yards where larry cars are used generally fall within the ranges of 230 to 250 volts or 500 to 550 volts. Of these voltages the most common are 230 and 550. A car speed within the limits of 8 to 12 miles per hour at the nominal rating of the motor usually is desired.

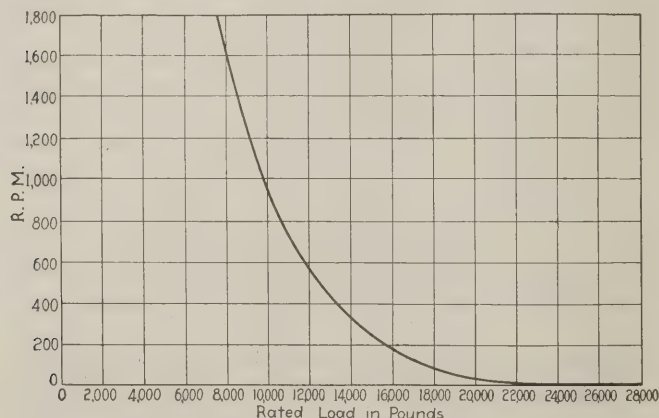


Fig. 3—Load Rating of Ball Bearing

It will be observed from this curve that the manufacturer's load rating decreases with increase in speed. This curve shows the extreme impact loads the bearing will withstand at slow speeds.

The special voltage and speed requirements of the larry car service practically prohibit the use of an existing railway motor winding. It sometimes happens that a standard high-speed 600-volt railway motor, when operated on 230 or 250 volts, will run at the desired speed; but, due to the fact that the motor is designed for 600-volt service, the ampere capacity of the copper conductors in the windings will not be adequate for the lower voltage. This will result in obtaining less horsepower for a given motor size and weight than is ob-

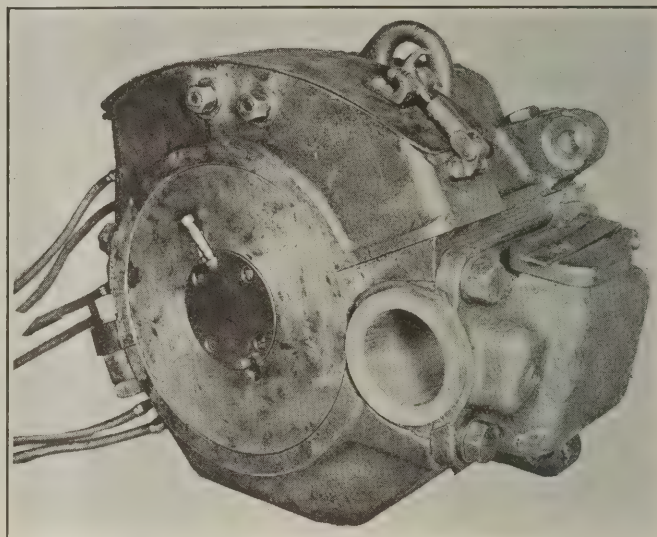


Fig. 4—Motor for Narrow Track Gage

This motor is rated at 7.5 hp. and is made for use on larry cars operated on 18-in. track gage.

tained from a larry car motor which has a winding designed especially for the voltage and speed required in such slow-moving equipment.

Ball armature bearings are preferred to the sleeve type on larry-car motors for the same reason as on mining locomotive motors. They require less lubrication and attention and maintain the armature in a central position with respect to the field poles. Ball bearings usually are lubricated with grease while sleeve bearings are lubricated with oil, which often results in over-oiling and a consequent entrance of oil inside the motor, where it damages the windings or commutator. Ball bearings have not been accepted as standard on the higher speed railway motors, but this is due to the mechanical inability of the ball bearing to stand up under the conditions of high armature speed and impacts received at high car speeds. The average speed of the larry car service is even lower than that of the mining locomotive, so the odds are strongly in favor of the ball type of armature bearings. Fig. 3 shows how the manufacturer's rating of a ball bearing increases as the speed decreases.

Fig. 2 illustrates an 80-hp. larry-car motor that possesses the special requirements mentioned above. The following tabulation shows comparisons of this motor with a high-speed 600-volt railway motor that has the same size of frame and same armature and field-pole dimensions.

COMPARISON OF LARRY-CAR MOTOR WITH HIGH-SPEED RAILWAY MOTOR OF THE SAME PRINCIPAL DIMENSIONS														
Motor	Hp.	Volts	Amp.	R.P.M.	M.P.H.	Lb. Tractive Effort	Gear Ratio	Diam. of Wheel	Wt. of Motor Complete with Gears and Gear Case	Dimensions—(See Fig. 1)			Type of Armature Bearings	
										A	B	D		
Larry Car Motor.....	80	230	305	390	8.6	3,500	15/67	33	4,470	16.6	4 $\frac{3}{8}$	2 $\frac{1}{2}$	8	Ball
High Speed Railway Motor....	140	600	128	900	23.2	2,260	16/61	33	4,050	15.4	4 $\frac{1}{2}$	3 $\frac{1}{8}$	6	Sleeve

Preventing Stray Currents from Detonating Explosives

Ground Currents Cause Premature Explosion—Potential Differences Reduced by Intercconnections and Grounds—Keep Firing Cable Well Insulated

By E. E. JONES

GROUNDING of electric equipment is highly desirable, but this alone is not sufficient because current leaks into the ground create relatively high potential differences between strata of earth and metals. Whenever liability of explosion exists from gas or blasting caps, the whole surrounding region should have little or no potential difference between objects. The blasting circuit is most important of all. It should be well insulated and free from splices or broken insulation. It should be inspected frequently—at least every day. Usually leakage of stray currents into the blasting circuit are the cause of premature explosions because the cable or conductors often span areas or materials having high potential differences.

JUST as the men employed in sinking a shaft at Stotesbury, W. Va., for the E. E. White Coal Co., were in the bucket descending to the bottom there was a premature detonation of a charge that had been previously set. The shaft was at that time 65 ft. deep and, owing to the fact that the bucket had only started down, a fatal accident was narrowly averted. Investigation showed that the explosion was caused by stray electric currents in the ground and metallic connections to a pump and hoist equipment; hence it was not safe to proceed with the work until this condition was corrected.

Some of the men refused to work in the shaft unless steam was used in place of electricity for operating the hoists and pumps. This was practically out of the question, since the electric equipment had already been installed. It was decided, therefore, to make tests to determine the cause of the explosion and to decide upon the remedy.

The system we were using for power was grounded on one side and supplied by a 1,000-kw. rotary converter,

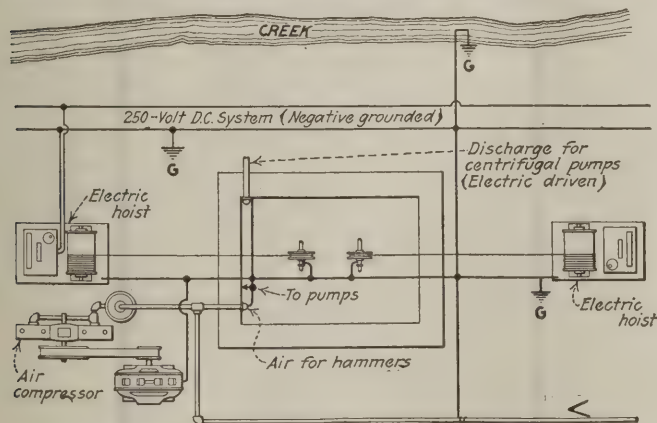


Fig. 1—How the Equipment and Pipes Were Interconnected and Grounded

The heavy lines show where a solid 0000 copper conductor was connected and grounded, thus reducing the potential difference between various objects to a point too low to set off a blasting cap.

From *Explosives Engineer*, September, 1923.

similar to those used in street railway systems except that 250 volts were employed instead of 500 to 700, as in street railways. First, all the switches in the hoist, pump, motor and compressor circuits were opened to make sure that the trouble was not caused by a leak from the positive side of the system to any of these machines.

While the switches were open, an electric blasting cap was connected between a pipe in the air line and

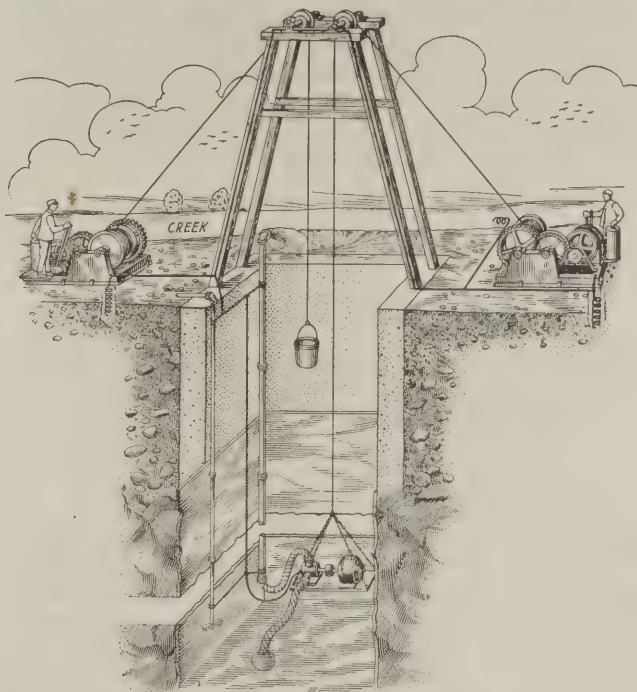


Fig. 2—Elevation View of Shaft Showing Ground Connections

By thus effectively grounding the system of electric apparatus, pipe lines and tower the confidence of the workmen was regained and the work made safe.

the discharge line from the pumps. The instant a connection was made, the blasting cap detonated. A connection was then made between the air line and the ground adjacent to the shaft. The cap detonated, but not instantly, which showed that there was not at all times sufficient voltage between these points to fire a cap.

Next, a connection was made between the metal of the hoist frame and the ground, and the blasting cap fired instantly. Finally, a connection was made between the bottom of the shaft and a wet place near the surface; in a few seconds the cap detonated. From these results it was evident that there was a sufficient difference of potential present in the various places selected to fire blasting caps connected in an ordinary circuit in the shaft.

To equalize the voltage at various points around the surface and at the bottom of the shaft, the frames of all the machines on the surface and the pump at the bottom of the shaft were metallically interconnected with a heavy copper conductor and grounded. The two hoists were connected by a heavy copper cable which was grounded; this cable also was connected to other surface equipment and to all pipes going down the shaft. The grounds at the two hoists were made by burying a coil of 0000 copper wire in a hole 4 in. deep. Salt water was poured on the coil to increase its earth contact. The different connections and grounds are shown in the accompanying diagrams.

After this work was completed \$25 was offered to some of the most intelligent workmen if they could fire an electric blasting cap by connecting it in any way that it would explode, without, of course, using a blasting machine or the power circuit. None of them was able to fire a cap in this way. After the tests the caps used were fired by connecting into a power line to prove that they were good caps.

Tests were then made with a mili-voltmeter, with which no difference in potential greater than 100 mili-volts could be detected between any two pipes, from any of the pipes to the ground, or from the top of the shaft to the bottom. When it was thus demonstrated that danger from stray currents had been eliminated the confidence of the men was restored.

New Coal-Cutting Machine Drives Gangways

Same Device Cuts, Breaks and Delivers Product—
Entries May Be Driven on Both
Sides of Main Gangway

BY ARTHUR GERKE
Waldenburg, Silesia, Germany

ATTEMPTS at driving galleries in a coal seam by machines date back to the time when boring by means of machines was begun. Technical periodicals and books of the last decades contain descriptions of machines which were successful only in so far as they were patented. Many were put to test, but without the result hoped for. That all these attempts failed probably is due to the fact that it was impossible to produce equipment that could stand the great strain of coal cutting, and to provide a guide that excluded any deviation from the direction intended.

In spite of these failures, however, the activity of inventors has not come to a standstill, and numerous appliances have been patented. The solution of the problem would be of special importance to the mining industry, since driving galleries means waste of money and time. The quicker the gallery advances, the sooner large-scale mining may begin and the larger will be the number of men at work. As the advantages to be gained are many, a description of a new coal-cutting machine, called "Rotatia," is of interest. Some time ago this machine was introduced in the German, Czech and Hungarian mining industry and proved a complete success.

This rotating coal-cutting machine consists of three main parts: (1) The driving device; (2) a system of tubes for lengthening; (3) the cutting device, which consists of cutters composed of several parts, and the mechanism for vertically cutting or breaking the core, likewise composed of several parts.

The driving device, fixed on a carriage, is secured on an inclined plate at any point from which a gallery is to be driven, while the cutting device is kept in close touch with the face of the coal through the system of lengthening tubes, as shown in Fig. 1. The whole system is connected with the shaft of the driving device by a special coupling. The lengthening pieces are tubes with flanges and are connected by keys and two locking screws. The cutting device is fitted to the last lengthening piece and rests on a column provided with

The following rules were strictly enforced:

(1) Explosives must be in an insulated container when lowered down the shaft. (2) No more than two men can be in the shaft while the shots are being prepared. (3) The muck bucket must not touch the bottom of the shaft during the preparations for a blast. (4) The blasting machine must be in possession of the top man and can be used only by the men who prepare the shots in the shaft and then only in the presence of the top man. (5) The shooting cable must be inspected daily from top to bottom. If a bare place is found, the cable must be thrown away and a new one obtained.

I consider No. 5 a very important rule, because if stray currents should develop, the danger would be greatly reduced if the leading and connecting wires were all well insulated. I am glad to say that no one was seriously hurt during the sinking of the shaft.

an adjustable bearing, stayed against the roof or the sides.

At a suitable distance from this column a second column, which also may be stayed and arranged in various positions, is provided with an adjustable bearing. On the cutting shaft behind this second column is mounted the cutting device, as shown in Fig. 2. The arms of the cutting device are connected by means of rings which correspond to the diameter of the cut to be made. The cutting device on the cutting shaft has on its front side a crown cutter for preliminary boring, which serves as a guide for the cutting device and also makes it easier to cut the core.

The arrangement for cutting the cores is mounted in the cutter arms. On every second arm, lying opposite each other, there are cutters of equal size and form, one set for cutting the outer, the other for cut-

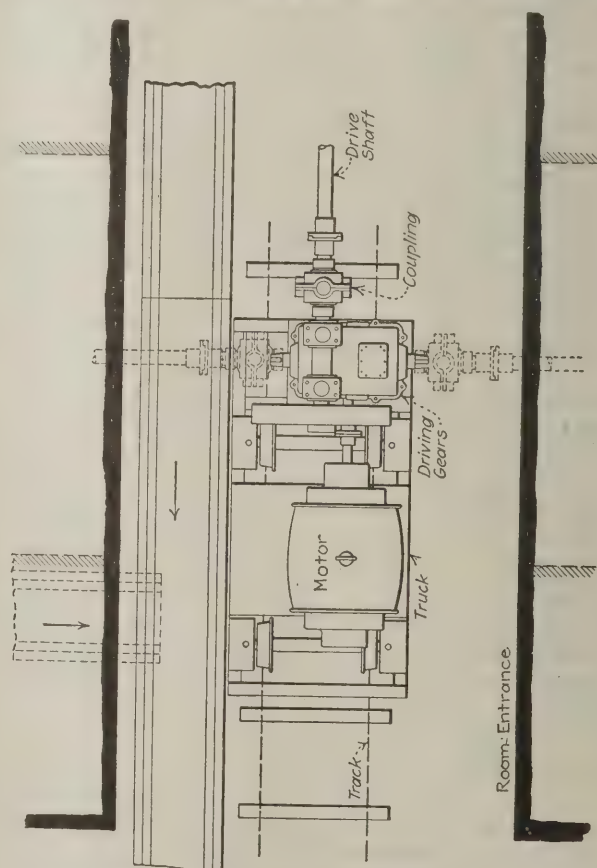


Fig. 1—Machine Which Mines Coal

This device drives a rotary coal cutter which mechanically cuts, breaks and loads coal.

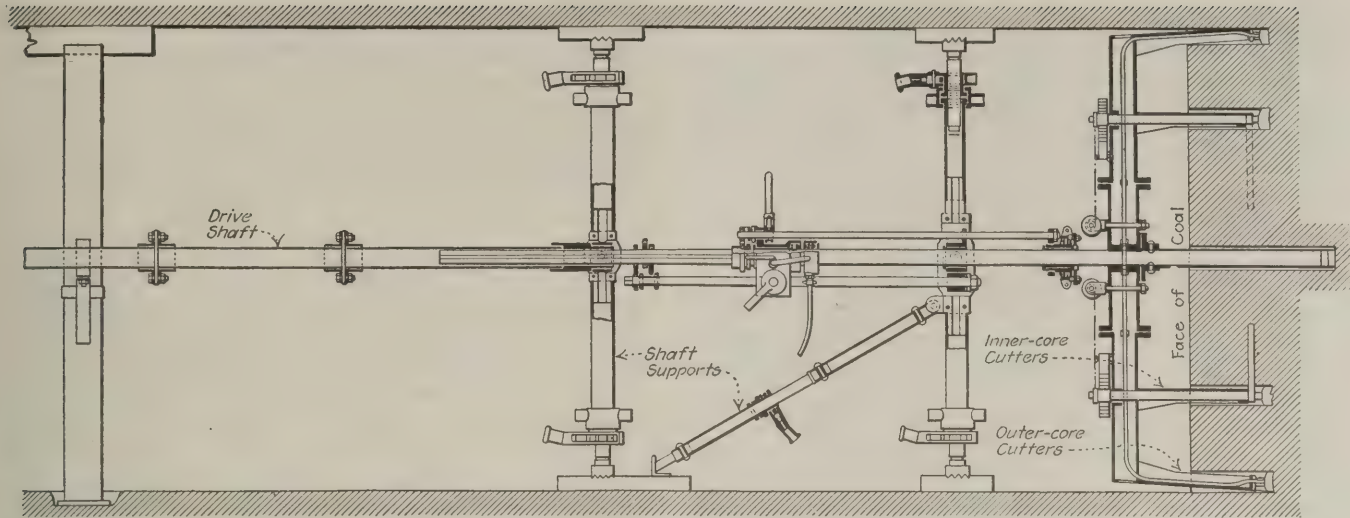
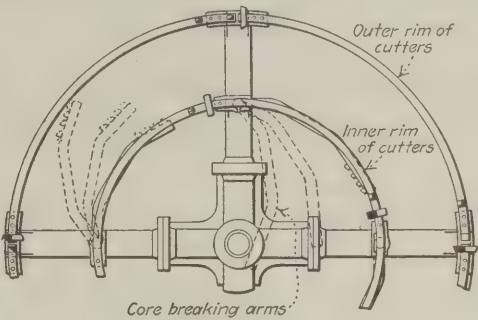


Fig. 2—Cutters Projecting from Two or More Rings Are Driven by a Long Line of Shafting

What will puzzle the American reader will be to tell how the coal can be removed with a line of shafting and posts filling the roadway for a distance which in cases is said to be 230 ft. This is effected by those rocking or swinging chutes, which, introduced in Germany, Belgium and Great Britain, are now finding their way into the mines of the anthracite region of the United States. The shaft is extended as the cutters advance, new columns being erected for its support. This must cause some delay in the operations. The columns are adjusted readily by a screw with ratchets.

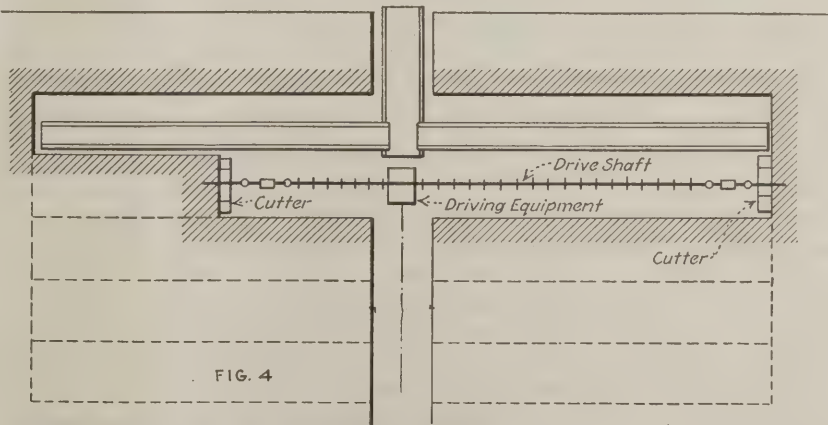
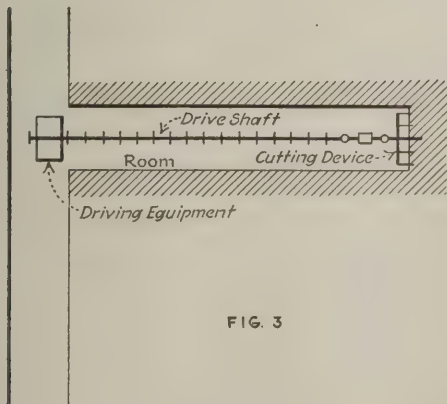


ting the inner core. These cutters are arranged in a circle which exactly corresponds to the diameter of the cut to be made. These core cutters are behind the arms of the rings holding the cutting tools and are regulated by springs. When the machine is in operation the driving mechanism is set in motion by compressed air or electric power. The cutting operation begins as soon as the advance work is completed, and the cutting tools begin to work, making one outer and one inner circular cut. If the coal is very solid, a third narrow cut is made near the center.

After about one foot of coal has been cut, the advance work stops and the cutting device continues rotating about its shaft without advancing. The core is then cut or broken by the operation of a special mechanism on the arms of the core cutter. This core-

cutting device consists of parts like sickles which are advanced into the coal with an up-and-down motion so as to break the outer and the inner core. The broken core falls in lumps of large and small size and these are carried off by means of a rocking or swinging chute. When the whole of the core is cut, the advance work again begins to act and the cycle of operations repeats. The advance work may be extended to the total length of 3 ft. After 3 ft. has been cut, a lengthening piece is screwed on and work proceeds. Additional lengthening pieces are added as required.

As the roadways advance new columns must be set. The system of lengthening tubes may be extended to about 230 ft. when necessary. The driving device may be shifted from the entrance into the gallery and the work carried on to any desired point.



Figs. 3 and 4—Cutting a Room in One Direction or in Two

The figure on the right shows the cutters working in two directions on a longwall face, the coal left by the cutter doubtless being removed by picks. In this case loading can be performed readily, as the track can be set alongside the drive shaft.

Frequently the rotating coal-cutting machine is employed as shown in Fig. 3. The first gallery may then be driven parallel with the main level to a length of about 230 ft. Then the adjoining part of the seam will be cut and the work continued. In case cutting devices that rotate in opposite directions are used, the mining system may be carried on as depicted in Fig. 4.

For the attendance of the machine three men are required, one driver and two cutters. In a day's work, that is, two shifts of eight hours each, an advance of about 10 to 15 ft. can be made if a diameter of 8 ft. is chosen, these figures referring to work done under usual conditions; they probably would be exceeded when the coal was not very hard.

The advantages of the Rotatia are: No blasting is needed, considerably more cutting can be done and timber costs are lower, as the roof will be more even and consequently less timber will be needed. Considering these advantages, the cost of buying and operating such a machine are of secondary importance.

Barricades Against Gas Save Lives of 275 Miners

But in 140 Disasters About 1,400 Were Killed by Afterdamp, Almost as Many as by Violence of Explosion

MINERS trapped in underground excavations during mine fires or after explosions may frequently save themselves from the peril of deadly gases by the erection of barricades of cloth, board, coal or rock, states the U. S. Bureau of Mines, which has completed a study of the subject. The Bureau of Mines has a record of 275 lives being saved in coal mines by the erection of barricades. The bureau is confident that hundreds of other lives might have been saved if entombed miners had possessed a thorough knowledge of barricade construction.

After many mine disasters in America and in foreign countries examination has shown that many of the men found dead had escaped the violence and flame of the explosion but had succumbed to the afterdamp. The evidence collected shows that at 140 disasters 1,477 persons were killed outright and 1,391 were overcome by afterdamp.

Sometimes miners have traveled long distances from their working places before meeting deadly gases, and groups of men have been found dead in a remote section to which they had retreated to escape the afterdamp. Again, men have been found dead near a pile of brattice material which they did not use because they did not know that a barricade would be of value. After the Reilly mine explosion in Pennsylvania in 1922 several of the men rescued said that they knew nothing about the erection of barricades, and there must be many miners unaware of this method of escaping death.

The following practical recommendations for the guidance of miners entrapped at mine disasters are made by the Bureau of Mines: When entrapped by gases from fires or explosions and forced back into workings in which there is comparatively good air, keep uppermost the thought of building a bulkhead or stopping and collect tools, timber, canvas, water, dinner buckets, hay from the stable, and anything else that might be useful.

If possible wherever air is used the barricade should be placed so that a valve in the compressed-air pipe line

will be inclosed in the barricaded area. The valve should be opened to furnish additional air. If there is no compressed air, the miners behind a barricade should either lie or sit on the floor in the hope that the rescue crew will find them before they are overcome. In this relaxed position they will breathe much less of the contaminated air than they would if they exerted themselves.

As soon as a place is chosen for a barricade, its erection should begin, for the gases often travel quickly. The ventilation should be shut off as soon as possible by the opening of doors and the hanging of brattice cloth or by the moving of a door to a new place across an entry. The permanent barricade should be started 50 to 75 ft. from the brattice cloth. Always barricade off as much of an entry, room, drift or crosscut as possible, so as to provide a maximum quantity of air. Before constructing a bulkhead make sure that there is no manway or other connection with other workings through which gases could pass. At some place outside of the first stopping, if more than one stopping is built, place a sign of some kind to show that men are behind it.

If a barricade be made of lumps of coal, slate or other rock, build two walls 2 to 3 ft. apart and fill the space between them with fine material or mud. The stopping must be airtight. Board stoppings are not as easily made gastight as those built of dirt or rock and dirt. All chinks and holes in the barricade should be stopped with clay, raps, clothes and similar material.

Coal miners should remember that they should not barricade themselves in any working or other place that gives off methane, for the firedamp may accumulate and be ignited in some way, causing the death of the whole party. If a piece of pipe is available it should be placed through the stopping and plugged at the inner end, in order that the air outside the barricade can be tested by removing the plug.

After the barricade has been built, the men should keep as quiet as possible so as to conserve the oxygen present. However, occasionally somebody should walk around so as to mix the air. All the men should not congregate in one place.

When the bulkhead is erected test it for leaks by means of a candle or carbide lamp. The way in which the flame of a lamp or candle burns will show the condition of the confined air and to what degree the oxygen is being consumed. All flame lamps should be extinguished, in order not to consume any more oxygen than necessary; also it is desirable not to use oil, carbide and electric batteries needlessly.

Men should signal frequently by pounding on the air or water pipes if there are any, or on the rib or the roof. If, during their retreat from gases, miners find any chalk they should carry it with them. Directions for a relief party may be written on doors, or an arrow may be drawn to indicate the course the miners took in retreating. With the flame of a carbide lamp legible letters can be made on timber or rock.

The first barricade recorded in the reports of the Bureau of Mines was built by entombed miners during the fire at the Cherry mine, in Illinois, in 1909. Seven days after the outbreak of fire in this mine a rescue crew met a party of eight men who had barricaded themselves with twelve others, saved later, but had broken through and were making toward the shaft. They had walked over half a mile, past cars and dead mules, in the dark, and in an atmosphere that would not support the flame of a lamp. These men were in

comparatively good condition when found, and they recovered completely.

By bratticing themselves in an emergency shelter, by closing the "creep-hole" or sliding door in a stopping above a compressed-air pump, and then breathing the exhaust from the pump, thirteen men saved their lives in the No. 2 mine of the San Bois Coal Co., at McCurtain, Okla., in March, 1912.

Detailed information regarding the erection of barricades during mine fires or after explosions is given in Miners' Circular 25, by J. W. Paul, B. O. Pickard and M. W. von Bernewitz, which may be obtained from the U. S. Bureau of Mines, Washington, D. C.

The Miner's Torch

An Age of Charts; but Not at the Mines

IN RECENT years recording instruments have been devised to furnish checks on almost every operation carried on in connection with the various industries and the manager of many modern plants can, without leaving his desk, get a pretty good idea of the work of each department and put his hand on any department that is not functioning properly. In fact, the first thing that will attract your attention in some offices is the prodigious number of chart files.

But the manager of a coal mine is not so favored.

I had this brought home to me the other day when the manager of a group of mines, who had had little mining experience, asked me to devise a system for him that would allow him to keep tab on his superintendents; he didn't want his mines to explode if careful supervision would prevent it. After giving the matter a good deal of thought I began to realize that the thing he asked for was not only impossible but that even his superintendents could not depend on automatic devices to any great extent to check up on their mine foremen and assistants.

Probably the first man whose work you would want to check inside the mine is the fireboss; he leaves his mark in every working place, and if you go to the working places you can see his mark—that is the only way to find out how he has been spending his time.

Then come the men who sprinkle the headings and the working places. If you travel the routes they travel you may be sure they have carried out instructions, but not otherwise. Wait a minute, says someone; how about taking psychrometer readings in the return airways to see whether the air is saturated; if it is saturated you can feel sure that there was plenty of moisture along the traveling ways. Guess again. Even with the dry atmosphere characteristic of our Western mines the air as it travels through the workings of these mines manages to get enough moisture from somewhere to practically saturate it.

The trip riders who are supposed to keep a light prominently displayed on the rear end of each trip—who will check them?

And how about the numerous inspectors who look after the haulage ropes and the mine-car couplings and wheels and the mining-machine cables and swinging trolley wires, etc., etc.; what kind of a recording instrument will furnish a record of their activities?

The section bosses who supervise the timbering, tamping, shooting and loading of bug dust—how will you keep tab on their activities from the outside? Many an explosion could be traced back to one of these bosses, and the evidence would be full and complete, but such checks are not welcome.

The manager of a coal mine is dependent on his superintendent and the superintendent is dependent on his engineers and foremen and these men in turn are dependent on their assistants, and so on down the line. If the manager, the superintendent and the mine foreman and his assistants are competent to give orders and all of these orders that are passed down the line are carried out, things probably will move along smoothly and satisfactorily, but unless some or all of these "order givers" check up occasionally on the "order takers" you can be quite sure that the time will come when some of the orders won't be passed on down the line, or if they are they will not be carried out.

There may be a way to relieve the conscientious mine manager of some of the worry incident to his position (responsibility for explosions, etc.) other than the "see-for-yourself" method I have suggested above, but if there is I haven't discovered it.

Relative Value of Various Inert Gases in Extinguishing Mine Fires

HITHERTO the inert fire gas mainly used in the putting out of mine fires has been the carbon dioxide made by the fire itself, which has a valuable power of combating the flame when the air in which the fire burns is sealed so that oxygen cannot enter. The question of the use of inert gas was quite generally discussed at a recent meeting of the Coal Mining Institute of America. Joseph J. Walsh, Secretary of Mines of the State of Pennsylvania, declared that a small fire should never be sealed. A miner's lamp sealed in a chamber would not go out but would continue to burn because it would not create enough carbon dioxide or consume enough oxygen to provide its extinguishment. The fire should be at least large enough to involve the width of a single chamber.

Answering R. D. Hall, who said that C. Tarleton, general manager of the West Virginia mines of the Consolidation Coal Co., had declared that the return could not be sealed first in a bituminous mine, Mr. Walsh said the fire should never be sealed at a point closer than 1,000 ft. from the seat of the conflagration. In reply to the same questioner, who stated that B. F. Tillson had declared that he had maintained combustion in a producer with air containing only 5 per cent of oxygen, Mr. Walsh asserted that an investigator has found that the glowing coals ceased to glow as soon as fed with air containing 10 per cent of oxygen. Questioned as to the quantity of carbon dioxide in the flue gases with which he proposed to flood the mine workings to the exclusion of air, Mr. Walsh said that he had regarded the quantity of oxygen in the gas as the determining factor.

J. W. Paul said that carbon dioxide had little more effect than nitrogen in blanketing a flame. He said, and A. C. Fieldner supported him, that the carbon dioxide had more effect only as it was of greater specific gravity and had a higher specific heat. The weight of carbon dioxide is to the weight of nitrogen as 44 is to 28.

Harry Pythyon described an incipient fire started at

Belle Vernon on the outcrop of the Pittsburgh seam by a policeman who collected and burned the garbage of the village in the holes made by small openings excavated to obtain fuel for local consumption. The village authorities refused to be responsible for the fire though started by their employee in what was laid out as a village street. He was asked by the Department of Mines to put out the fire, and obtaining help from the Pittsburgh Coal Co., he had several holes drilled and erected a pump with which he endeavored to flood the area.

The fire was not extinguished even though it was sealed. Finally he backed his Ford over one of the boreholes and let the engine run, exhausting the gases into the hole. With this the fire was finally extinguished. He thought the gases from large internal-combustion engines might be used with profit in extinguishing fires, though he admitted that as a rule they would be deficient in volume.

Someone wanted to know why even a small fire could not be extinguished by the increasing oxygen depletion resulting from the absorption of oxygen by the exposed coal faces. Mr. Walsh said that an experiment had been tried in the anthracite region in which the air was sealed tightly for a month. At the end of that time the air in the sealed area contained 19.20 per cent of oxygen.

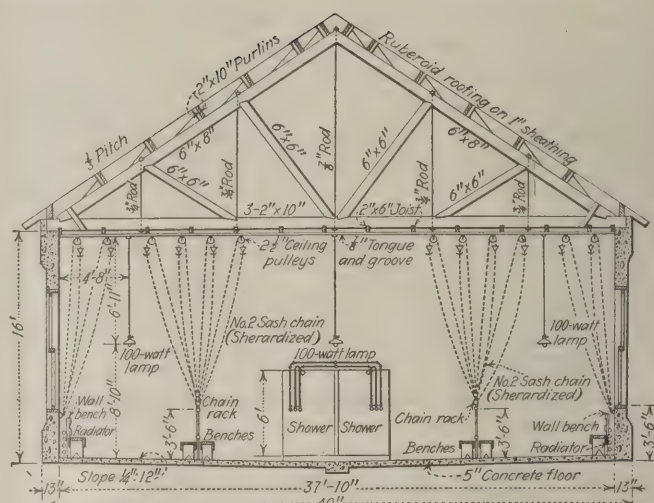
One of the members declared that the absorption of oxygen was more rapid in bituminous than in anthracite mines. Mr. Walsh added that flushing a burning coal area with earthy materials suspended in water had not proved a successful way of quenching a mine fire.

Company Laundries for Mining Towns

BY W. F. BOVARD

President, Keystone Coal & Coke Co., Greensburg, Pa.

OUR laundry installations at the mines of the Keystone Coal & Coke Co. have proved successful beyond all expectations. It is a great gain to rid the miner's kitchen of the large steaming washtub with its malodorous clothing, which filled the house with steam

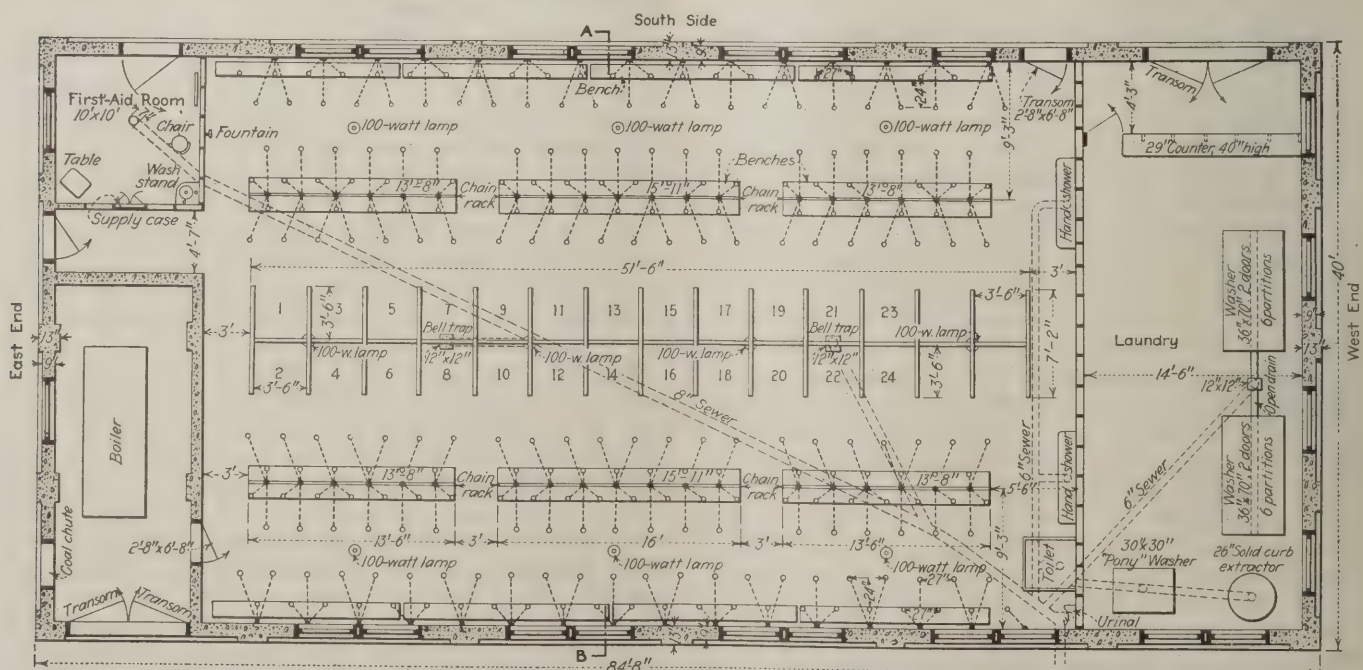


Bathhouse of Keystone Coal and Coke Co.

Radiators behind the wall benches keep them warm and comfortable for those using them when undressing and dressing. This elevation is that of section AB as shown on the plan at the foot of the page.

and rendered the home unhealthful. Now the clothes are bundled weekly and taken to the laundry, where they are passed through the most sanitary washing process that can be conceived. Naturally some of the employees' wives showed some reluctance to make use of this facility, but as time wore on they more and more recognized its advantages, and now the laundries are used by 90 per cent of the community, and every user is well pleased with the change.

No direct return has been derived from this service, our charge to employees actually only offsetting the cost of material used. At our Crows Nest village the laundry consists of two 36x70-in. washers, one 30x30-in. washer and one 26-in. extractor. These units are capable of handling forty washings per day. At present we wash the clothes of only thirty families per day at a total cost of \$13.80. We charge 25c a wash, sustaining a loss of \$6.30 a day, but the benefits obtained are well worth the financial outlay.



Plan of Bathhouse, First-Aid Room and Laundry, Crows Nest Mine, Keystone Coal & Coke Co.

Company Doctors in West Virginia Field

IN A REPORT on "Life in a West Virginia Coal Field," published by the American Constitutional Association, of Charleston, W. Va., a record is made of conditions in 58 mining towns in Kanawha, Fayette, Boone, Raleigh, Logan and Putnam Counties. This investigation was made by Miss Margaret H. Bottum, a community sociologist. The report says that in one section of the field studied there were four mining towns with a combined population of approximately five thousand. They are served by one doctor, assisted by a capable full-time trained nurse.

Six cases of typhoid were reported for these towns during the past ten years. This would indicate that sanitary condition in these towns is above par. The fact that one doctor and a nurse could adequately serve so many people proves that much attention has been paid to the protection of the health of the citizens in the towns they serve.

If one doctor could satisfactorily serve the needs of a community having five thousand population, according to this ratio, eight doctors would be sufficient for Charleston, a city of forty thousand population. But this city has 110 doctors and about as many nurses.

The reason for the existence of "the company doctor" is well explained in bulletin 117, 1923, issued by the Children's Bureau of the U. S. Department of Labor dealing with mining town life, a quotation from which is as follows: "Probably the most serious drawback to living outside the company town was the problem of securing a physician in case of illness. The independent settlement referred to was 15 miles from the nearest private physician, and without telephone." This is an accurate description of the situation in regard to many small, independent towns and rural communities that are too small to support a physician.

With the establishment of the mining town arises the necessity of providing medical care for the people living there. Over a period of many years of actual practice, the plan of collecting monthly subscriptions from the payroll to provide for medical assistance, a sort of health insurance, has proved most satisfactory to employees, employers and physicians.

The monthly subscription ranges from \$2, the high-

est payment for families, to \$1.50 the highest charge for single men. The rates vary somewhat in certain communities, but as given they are those in common use throughout this coal field.

There are 53 physicians in mining-town practice in the towns visited, these physicians being paid by monthly subscriptions. Where the communities are small, one doctor serves two towns. There are 34 resident physicians; 15 towns are within 2 miles and 9 towns are from 3 to 7 miles from their doctors.

At the present time there are less than a half-dozen community nurses employed in this section. This is explained by the fact that, as a rule, they are maintained at the expense of the companies, which have not recovered as yet from the long periods of strike and business depression of the past few years. In several towns visited the companies are contemplating obtaining a public-health nurse who will work under the supervision of the full-time county health officer.

Government Finds It Cheaper to Buy Coal

OPERATED for a short time in 1922 by the Alaska Engineering Commission, now called the Alaska R. R., with funds supplied by the Navy Department, the Chickaloon mine in Alaska served to enable a large-scale test to be made of the coal of that vicinity for naval use. Full results of the tests were not made public, but the general conclusions were that the coal makes a good quality of bituminous fuel. However, the navy decided that under present conditions it could transport privately mined coal from the Atlantic seaboard to the Pacific coast for use at a lower total cost than the Alaskan coal could be, in view of the costs of production and transportation along the coast to the states of Washington and California. Moreover, the best Eastern coal is slightly more desirable.

The Chickaloon mine is one of three governmental operations in the Matanuska field of Alaska. None of these is being operated by the government, which does not propose to mine coal so long as private mines are being operated. The Eska mine has been worked for several months by the Evans-Jones Corporation since the destruction by fire of the equipment at the mines of that company.



Chickaloon Mine of Alaska Engineering Commission.

Convinced that it ought to find out something about fueling possibilities on the Pacific Ocean, the United States Government started three mines in Alaska, but, partly from a feeling that it should not pit the unbounded resources of the nation against pri-

ivate capital and partly because the price of coal at the point of use was higher than better coal obtainable elsewhere, the government closed two mines down and turned the third over to a private company.



Will Midwest Rivers Reduce Cost Of Illinois Coal To Chicago and Northwest Consumers?

WILL river traffic in coal spread westward to include the Mississippi from St. Louis to Minneapolis and from St. Louis up the Mississippi and Illinois rivers through a canal to Chicago and Lake Michigan? Will southern Illinois and Standard district coal thus enter the Lake trade by an all-water route? The questions are not new but with the steady development of waterways in the Middle West they get more and more discussion. Every car shortage brings them to the fore and every word about raising rail rates on coal throughout the Middle West sets interested men to work with pencil and paper figuring how much the cost of Illinois coal could be reduced by water haulage.

Only the extreme river enthusiast can see possibilities of hauling Illinois coal from the great southern fields of Franklin, Williamson and Saline counties by water northward. There are two main obstacles: The

field is crisscrossed with a network of railroads already and there are few mines that could make river connections without tremendous expense. The necessary thing would be to set up some sort of railroad shuttle service between the mines and river loading points. Such a road as the Wabash, Chester & Western has possibilities for this sort of thing. But the cost and degradation of handling coal from a mine tippie into a railroad car and again from a car into a boat twenty miles away on the Mississippi or Big Muddy would be considerable.

On the other hand, the Belleville mining field, directly east of St. Louis and only 10 or 12 miles from the river, offers a better opportunity for river loading. Steam- or electric-railroad service between field and river tippie generally is recognized as feasible. In fact one company has used such service for years between some of its mines and a river tippie in East St. Louis. Such lines as the St. Louis & O'Fallon and the St. Louis, Troy & Eastern are well located to run a shuttle service that could be made, by the extension of tracks in the mining field, to serve

many a mine. Degradation would not be so costly a factor here because the Belleville field depends to a less extent upon perfect sizing of coal.

From St. Louis northward there is no question among well-informed men that water movement of coal could far undercut present freight rates. The rate from Belleville to Chicago now is \$1.85. It is confidently declared by experienced river and coal men that this could be reduced \$1 with river traffic properly developed. The astonishing but sober estimate for moving coal by barge from a St. Louis river tippie to an unloading point in Chicago is 50c. This is based upon the assumption that a strong and continuous market for Belleville coal could be found in or around Chicago and that the river fleet was made up of big modern towboats of approximately 1,000 hp. and enough barges to guarantee against loading and unloading delays.

"But there can't be any such strong and continuous market because there are not enough coal consumers with water frontage in the Chicago district," say the unbelievers. A survey made in 1915, however, shows that at that time there

Headpiece shows towboat Nokomis with famous tow of St. Louis-to-St. Paul coal. In 1915 this shipment of 3,000 tons on six barges was loaded at St. Louis and delivered in fourteen days at the Twin Cities. W. K. Kavanaugh, who dreams of hauling coal up the river and grain down, made the shipment to prove that it could be done.

was a coal consumption of 5,000,000 tons a year along the Illinois state canal between Joliet and Chicago either at the water's edge or within short trucking distance.

There are those who say: "When you begin talking about hauling coal from barges inland to Chicago consumers you spoil the whole program. It will cost so much to unload boats into cars and haul the cars to destination that all the freight saving is lost." But the river men declare that a vast tonnage could be handled from the canal by trucks at less cost and in shorter time than is possible with railroad equipment and they add that underground conveyors would be feasible for consumers whose plants are near the water but too far away for direct unloading.

WOULD DEVELOP RIVER SYSTEM

W. K. Kavanaugh, of St. Louis, president of the Southern Coal, Coke & Mining Co., is one of the men who believe in water transportation. For years it has been his firm belief that it is practicable to develop a system of river shipping of coal from Mississippi River points clear up to Minneapolis and St. Paul and bring ore, grain and other bulky northwest freight down as return loads. To prove it he and Edward Goltra, veteran St. Louis river transport men, made a single shipment of 3,000 tons of mine-run coal to the Twin Cities without expectation of getting a return load.

That trip is famous. The coal was hauled from the Shiloh mine of the Southern Coal, Coke & Mining Co. by rail to the company's river tipples at St. Louis and loaded into six barges. The staunch towboat Nokomis took the tow and headed north. Mr. Kavanaugh's directions to the captain were to deliver that coal into the Twin Cities within ten days. The tow plowed its way up the river—a trail blazer.

There was no report of it for several days. Then word came back that the Nokomis and her 3,000 tons of coal had lost two precious days at Rock Island, Ill., trying to get a government river pilot, without which the northward trip could not be made. The next word was that two more equally precious days had been lost because of a broken pitman strap on the steamer.

Mr. Kavanaugh took a train and journeyed up to St. Paul, however, and met his shipment a few miles below the city. He went aboard and rode into town with the coal, stepped

ashore, and, without previous cultivation of the market, disposed of the whole cargo before nightfall at a price which he says was "a good profit." The captain of the Nokomis could account so well for all the excess time consumed over and above the specified ten days that Mr. Kavanaugh, with the money for his coal in his pocket, figured the experiment a success.

Today there is even more serious contemplation of hauling coal up to the Twin Cities and of bringing grain and ore down. "But it must be considered only as filled," according to Colonel T. W. Ashburn, in charge of inland waterway transportation for the War Department, which owns a number of big barges now in freight service on the Mississippi. The main sources of revenue, he thinks, will be general cargo. Ever since war days the government's enterprise, The River Transit Co., has been handling great volumes of general freight up and down the river between St. Louis and New Orleans at a profit, and there is reason to believe that the same thing can be achieved from St. Louis northward.

Railroads are freely charged with trying to choke this sort of river traffic to death, however. Congressman Cleveland A. Newton, of St. Louis, has publicly stated that there is organized railroad effort to strangle river shipping and that it ought to be stopped. It is his idea that all transportation systems in this country, whether rail, water or highway, ought to be welded into one great system. The strangulation method, he says, is simple. Railroads, realizing that the river serves mainly only those towns on its banks, proceeds to reduce to ridiculously low levels, rail rates into those towns at the expense of the towns a few miles back from water, thus stealing river freight.

This sort of competition between rails and water on coal is not so easy to apply. Coal men who see possibilities for river shipment of coal into the Chicago switching district declare there could be no distinction made by railroads between consignees on water front and any others because the rate fabric within the switching district could not be so juggled. They feel there is enough coal business at the water's edge to support a large river coal transportation system and that therefore some day it will be established.

There can be no shipping between

St. Louis and Chicago until an extensive program of canal development now under way is completed between LaSalle, the present north limit of Illinois River navigation, and Joliet, on the Chicago Drainage Canal. An appropriation of \$20,000,000 has been made for this project with an additional \$8,000,000 for water-power development, and some of this money has already been spent. It was the original intention to have this state waterway open for barge navigation by 1924, but delays of various sorts, political and otherwise, have held the work back in spite of pressure brought to bear upon laggard state officials by agitators for the Great Lakes-to-the-Gulf waterway.

The canal eventually will be open for shipping, however. What about coal traffic then? There are one hundred different answers to the question supplied by every one hundred men in the coal business. Meanwhile freight rates on coal to Chicago from Southern Illinois continue at \$1.95 instead of the "dollar" so freely prophesied by a few river boosters; from Belleville, \$1.85 instead of 75c., and \$2.16 from western Kentucky, a coal field that often ships heavily to Chicago and which can put coal on water with considerable ease.

Coal-Mine Development In West Virginia

Fifty new mine plants were put in operation in West Virginia during the fiscal year ended June 30, 1922, according to the annual report of the State Department of Mines. In the same period 43 new power plants were constructed and 81 fans.

One of the most important equipment improvements made, indicating at the same time the growth of the industry, was the purchase of 8,235 mine cars, the Logan field leading with 1,329, the McDowell mines coming second with 1,144 cars, followed by Fayette mines with 1,113 and Raleigh mines with 1,070. In all 85 new tipples were built, Logan having 9 of such structures to its credit, Raleigh 8, Fayette 7, Greenbrier 7 and Monongalia 7.

Companies operating in the state built 828 new houses for miners, Wyoming mines building the largest number, 114. Another important addition to equipment was locomotives. There were 187 new locomotives put in use, Logan mines obtaining the largest number, 35. McDowell and Raleigh county mines purchased 23 and 24 locomotives, respectively. There were 124 new mine openings; Preston County led in such development, with the opening of 18 new mines, McDowell County ranking next with 11 new openings.

News Of the Industry

Wage Parley Begins at Jacksonville; John Lewis Presents Miners' Demands

(Special Dispatch to Coal Age)

JACKSONVILLE, FLA., Feb. 11.—The joint conference of union miners and bituminous-coal operators of the Central Competitive Field organized here this morning with Michael Gallagher, Ohio operator, chairman; William Green, secretary of the miners' union, as secretary, and Ezra Van Horn, Ohio operator, assistant secretary.

John L. Lewis, international president of the miners' union, made a brief statement of the miners' demands, reading the report of the scale committee adopted at the Indianapolis convention, which instructed the miners' representatives to "obtain the best possible agreement on the basis of no reduction in wages," and recommended that the contract extend for a period of four years. Van Horn then moved that the conference adjourn until 10 o'clock tomorrow morning.

Directly afterward the operators went into caucus, but did nothing. Statements by the operators indicate that they are not organized and will

be unable to act as a unit until they confer further and determine upon a counter offer to the miners. Operators are here from all four districts. They are as follows: Illinois—Rice Miller, L. H. Smith, E. C. Searls, George B. Harrington, W. J. Spencer, C. H. Kraus, H. C. Perry and Harry C. Adams; Indiana—David Ingle, M. L. Gould, J. A. Templeton, Hugh Shirkie, W. J. Freeman, A. M. Ogle, E. D. Logsdon, and P. H. Penna; Ohio—Michael Gallagher, S. H. Robbins, Ezra Van Horn, R. L. Wildermuth, W. H. Haskins, T. R. Biddle, J. S. Jones and A. A. Augustus; Western Pennsylvania—J. A. Donaldson, J. M. Armstrong, W. M. Henderson, T. W. Guthrie, John A. Bell, Jr., R. C. Crawford, M. W. McClain and A. M. Marion.

Miners are represented in the conference by their three International officers and the Central Competitive Field scale committee, named during the Indianapolis convention, which ended Feb. 2.

Industrial Relations Program Of A.I.M.E. and N.S.C.

Co-operating on a safety and industrial relations program the American Institute of Mining and Metallurgical Engineers and the National Safety Council will hold sessions on Monday, Feb. 18, Tuesday, Feb. 19, and Wednesday, Feb. 20, at the Engineering Societies Building in connection with the annual session of the first-mentioned society. At Monday's session the various subcommittees of the Industrial Relations Section will make their report. At the meeting of Tuesday W. W. Adams, of the U. S. Bureau of Mines, will read a paper on "Mine Accident Statistics" based on the carefully collected experience of member companies, using of course only aggregated figures, and not revealing company names. R. L. Sanford, of the U. S. Bureau of Standards, will relate his progress in the magnetic testing of hoisting rope. T. T. Read, of the U. S. Bureau of Mines, will deliver an address on the efforts of that institution to promote safety.

On Wednesday morning, Arthur Notman presiding, Dr. A. J. Lanza, who has just returned from a long foreign trip in the interest of occupational-disease prevention, will give an address entitled "Some Recent Experiences in Australasia"; Robert E. Tally,

an address on industrial relations; L. K. Silcox will speak on the same subject, emphasizing the dual responsibilities, and D. L. Sterling, secretary, Australasian Institute of Mining and Metallurgy, will give an address on a subject not yet announced.

On Wednesday afternoon Sidney Rolle, secretary of the Industrial Relations Committee, will introduce G. M. Gillette, general manager, Consolidation Coal Co., Maryland Division, who will speak on "Vital Factors in Industrial Relations." John T. Ryan will discuss "Industrial Relations in the European Coal Fields" and D. Harrington "Dust and the Health of the Miner." W. R. Chedsey will present a paper on the living wage.

Herrin Again

Eight companies of Illinois-state troops on Feb. 9 took over the administration of law in the region around Herrin, in "bloody Williamson County," scene of the mine massacre of 1922. This is the second time within a month that troops have gone in to stop open warfare between Ku Klux Klansmen, who have been recklessly raiding various dives and homes of liquor suspects, and Knights of the Flaming Circle, organized to oppose the Klan.

Inspectors Soon to Report on Shanktown Disaster

Mine Inspectors Nicholas Evans, of Johnstown; Thomas S. Lowther, of Indiana, and Thomas J. Lewis, of Punxsutawney, on Feb. 8 completed their examination of the Lancashire mine, at Shanktown, Pa., in which 36 men lost their lives in a gas explosion on Jan. 24. The inspectors will formulate a report on their findings and submit it to State Secretary of Mines Joseph J. Walsh.

Coal operators are generally of the opinion that the inspectors located the source of the gas which filtered into the mine and caused the explosion. It is the belief of the producers that the commission will strongly recommend measures meant to prevent a recurrence of the disaster that occurred in the Shanktown plant. Agents representing compensation insurance companies are examining the mine and may file statements covering the points of mine equipment, etc., which they believe need replacement. On going to press we learn that the Coroner of Indiana County will hold an inquest Feb. 12.

Form Mine Safety Association In Central Pennsylvania

Sixty representative coal operators of Cambria, Blair, Clearfield, Centre, Somerset, Westmoreland and Indiana counties, Pennsylvania, met in Johnstown on Thursday evening, Feb. 7, and organized a mine safety association. The purpose will be to co-operate with the U. S. Bureau of Mines and to obtain a safety or emergency car for the central Pennsylvania district. The importance of having several emergency stations for possible disasters such as occurred at Shanktown recently was advocated by P. J. Morrissey of Johnstown, who presented an outline of the proposed work of the association, whose purpose, he explained, will be to establish emergency stations to which all mines in trouble may call and receive aid by crews as soon as possible.

M. J. Bracken spoke of the necessity of co-operating with the Bureau of Mines and a representative of the Bureau of Mines outlined plans for the work of organizing the state operators for the purpose of obtaining a central Pennsylvania relief car. To further the work, the following were named as a committee: P. J. Morrissey, Pennsylvania Public Service Corporation; John R. Thomas, state mine inspector; Timothy McCarthy, superintendent of the Clearfield Bituminous Coal Corporation; William Patterson, Pennsylvania Coal & Coke Corporation, and A. E. Roberts, Revloc Coal Co.

Death Claims Edwin Ludlow In Muskogee

After an exceptionally brilliant career as a mining and railroad engineer Edwin Ludlow passed away Feb. 10 in a hospital at Muskogee, Okla., after a short illness, of pneumonia. He was almost 66 years of age.

The deceased was born at Oakland, Long Island, N. Y., March 12, 1858. He attended the Flushing Institute and the Columbia School of Mines, being graduated from the latter institution in 1879.

From 1879 to 1881 he was assistant engineer on river and harbor work at Philadelphia, leaving this position for Mexico, where he was one of the engineers on the Mexican National R.R. running from Laredo, Texas, to Mexico City. That company being in financial straits he returned to the United States and became assistant superintendent and later superintendent of the Mineral R.R. & Mining Co., at Shamokin, Pa. This was one of the subsidiaries of the Pennsylvania R.R.

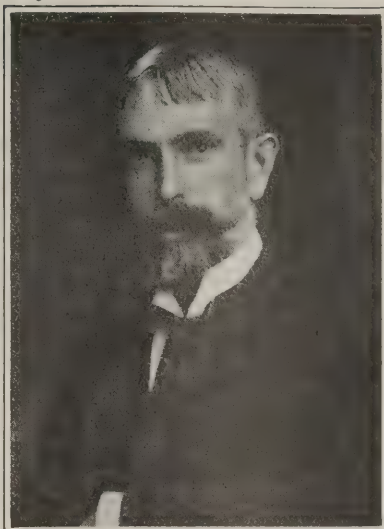
Later he became superintendent of the Union Coal Co., a concern which had just leased two of the Mineral company's collieries. When in 1885 Major Stearns was made general manager of all the coal properties of the Pennsylvania R.R. Co. Mr. Ludlow was promoted to the superintendency of the Mineral company. This was the time when he introduced into the anthracite region water-tube boilers and chain conveyors.

In 1899 he was asked to take charge, as superintendent, of the mines of the Choctaw, Oklahoma & Gulf R.R., Harts-horne, Okla., then a virgin coal field. While employed there he married Miss Anna Wright, who, by her ability as a hostess, in later years added much to the social events of the A.I.M.E. The mining field that Mr. Ludlow opened was some 80 miles long and communications were not of the best. In consequence he did not find time lagging while directing the operations of the field.

After ten years of Oklahoma Mr. Ludlow returned to Mexico, becoming general manager of the Mexican Coal & Coke Co. at Las Esperanzas. Here he succeeded so well that his company made \$600,000 in a single year, but the operation of the mines became increasingly difficult and the success of his work brought rivals in the field.

In 1911 he became vice-president and general manager of the New River Collieries Co. at Eccles, W. Va., and in 1912 exchanged that position for a similar one with the Lehigh Coal & Navigation Co., at Lansford, Pa. This position he occupied till 1919, when he resigned to become a consulting engineer. In 1921 he became president of the American Institute of Mining and Metallurgical Engineers and traveled extensively over the country in its interest.

In Mr. Ludlow the mining engineers have lost one of the most aggressive of their leaders. He was from the first a firm believer in modernizing equipment, and he took an active interest in mining education and industrial relations. None more than he believed



Edwin Ludlow

in the importance of membership and co-operation in the work of engineering societies, and those who were at any time under his direction contributed generously to the technical societies' programs and to the columns of the technical press.

New Record at Zeigler Mines

The cold weather of January so increased the demand for coal that a new production record was made at the Zeigler mines, in Illinois, 310,077 tons having been hauled to the surface, prepared and shipped by the Bell & Zoller organization during the month. The daily average production was approximately 12,000 tons. The highest daily run of the mines was made on Jan. 23, when 14,205 tons was hoisted to the surface.

To handle the coal required 6,752 railroad cars, which would make a train which would reach about 63 miles, or very nearly the distance from Chicago to Rockford, Ill. A train of this length would require 137 engines to move it, or, divided into separate trains, there would be approximately 50 cars to each engine. Production like this necessitates the shipment of about five such trains each working day.

Ten years ago, in January, 1914, what was then a record of production for the Zeigler mines was established when 58,000 tons was loaded and shipped. The 1924 record was nearly six times greater.

Pittsburgh Coal Co. Back in Fold

The Pittsburgh Coal Co., which resigned from the Pittsburgh Coal Producers' Association at the time of the Cleveland settlement, in August, 1922, has rejoined the association. At a meeting Feb. 8 Pittsburgh district operators decided to attend the wage conference at Jacksonville. They had some difficulty in reaching an agreement and would not give out an official statement.

Sees Mergers as Only Hope for Some Companies in 1924

"Consolidate!" is the cry ringing through many a coal field. For a year fitful starts have been made to bring together favorably located groups of mines. Now the movement is definitely on its way. It is absorbing direct attention in central Illinois, in Saline County, Illinois, and in both ends of Kentucky. The first direct accomplishment was in the fusion of the Taylor Coal Co. and the Bickett Coal & Coke Co. several weeks ago, bringing together a group of six good mines in southern Illinois backed by Cassatt & Co., the same financial interests which are behind the Old Ben Coal Corporation, long a dominant operating concern in southern Illinois.

The proposed consolidation of central Illinois operators took a definite turn a month ago when one of the active operators there proposed that a majority of the tonnage of the field, other than that produced by the Peabody Coal Co., the biggest influence in the field, be pooled. The plan was for each participating company to put its properties under the control of an operating company, the tonnage to be sold through one agency. This plan failed. Nevertheless the consolidation movement did not stop. A new plan is now under consideration which would group a number of properties under one ownership and leave the proposed company and the Peabody Coal Co. in control of so nearly all the No. 5 vein tonnage that ruinous competition would be reduced.

The various other proposed groupings have advanced far enough to require engineering reports and appraisals and for the collection of bushels of options on this and that.

"There is no doubt," said one of the wisest coal operators in the Middle West, "that consolidations must come—and lots of them. There is no other way that I know of for a good many companies to weather 1924. This country is going to require its usual 500,000,000 tons of coal, but if the 1923 number of operators try to stay in business, they are going to fall by hundreds. The only question in my mind is: Will enough of them be willing to make mutual concessions now in order to form consolidations on sound bases, or will too many of them insist upon independence until they are driven to the wall?"

"It is painful, in a way, to see all this going on, but it is exactly what the coal industry needs to make it healthy. There is no better way to reduce the number of mines and miners in this country than by voluntary grouping of operating interests, which would cull out the high-cost and undesirable mines, and put the whole industry on a firm, substantial foundation."

A.I.M.E. Meet in Birmingham

The American Institute of Mining and Metallurgical Engineers has accepted an invitation of the Alabama Mining Institute and the Birmingham Chamber of Commerce to hold its autumn meeting at Birmingham. The meeting probably will be held in October.

New Safety Film for Bureau of Mines

In memory of his father, the late F. S. Peabody, Stuyvesant Peabody has agreed to finance a new Bureau of Mines film showing the application to coal mining of the most advanced safety practice. The only motion pictures dealing with the safety problem in coal mines which the Bureau of Mines now has for display are old. They were made at a time when the technique of motion-picture making had not reached its present stage of development. Since they were made there also has been much progress in safety practice. For these reasons there is a great demand for the production of a high-class film which will include the latest safety developments.

Congress never has appropriated for films to be used in connection with the Bureau of Mines' work. The many motion pictures being displayed under Bureau auspices have been made possible by contributions from industry. Most of these pictures, however, deal with technical problems from an economic point of view.

U. S. December Coal Exports By Customs Districts

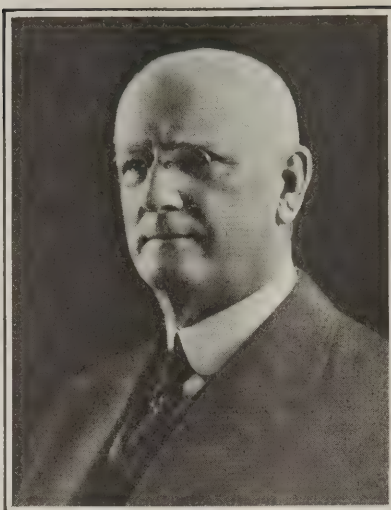
	(In Gross Tons)		
	Anthracite	Bituminous	Coke
Maine and New Hampshire.....	198	36	250
Vermont.....	492	371	977
Massachusetts.....	36		25
St. Lawrence.....	110,212	145,092	515
Rochester.....	6,052	36,236	18
Buffalo.....	197,572	272,945	15,737
New York.....	2,711	1,654	300
Philadelphia.....	50	20,970	603
Maryland.....		6,248	4,203
Virginia.....		181,876	
South Carolina.....		22,349	
Florida.....			367
Mobile.....		183	654
New Orleans.....		460	1,275
Sabine.....			2,008
San Antonio.....	46	241	1,332
El Paso.....	23	2,178	
Arizona.....	260	3,924	3,644
Los Angeles.....	25	8	
San Francisco.....	2		3
Washington.....	605	1,264	
Alaska.....		25	
Dakota.....	5,147	7,496	510
Duluth and Superior.....	2,447	8,349	372
Michigan.....	3,061	119,569	10,915
Indiana.....			
Ohio.....	6	246,327	1,243
Porto Rico.....		227	
Totals.....	328,945	1,078,028	44,951

Fewer Mine Fatalities in 1923

Accidents at coal mines in the United States in 1923 caused the death of 2,452 men, according to a report by the U. S. Bureau of Mines. Of these fatalities, 2,249 occurred as the result of accidents underground, 46 were due to shaft accidents, and 157 to accidents in and around surface plants. The production of coal during the year was 641,476,000 tons; hence the fatality rate for the year was 3.82 per million tons, as compared with 4.15 for 1922.

This reduction of 8 per cent in the fatal-accident rate per million tons of coal produced in 1923 is equivalent to the saving of 210 lives.

Falls of roof and coal, which generally account for nearly half of all deaths in coal mines, were responsible for 1,158 fatalities in 1923, which represents a rate of 1.81 per million tons, as compared with 1.90 in 1922. Haulage accidents underground usually cause



William Kelly

Nominee and probably next president of the American Institute of Mining and Metallurgical Engineers; general manager, Penn Iron Mining Co., Vulcan, Mich., and Republic Iron Co., Republic, Mich.

about 18 per cent of all fatalities, and the reports for 1923 show that 413 deaths were due to this cause, indicating a rate of 0.64 per million tons, as against 0.72 for the previous year. Gas and dust explosions killed 372 men, the fatality rate being 0.58; the previous year's rate was 0.65. Seventy-five deaths were due to electricity, for which class of accidents the fatality rate per million tons was 0.12 as compared with 0.16 the year before. Powder and other explosives caused 114 deaths, representing a rate of 0.18 as compared with 0.19 for 1922.

Production of 10,225,000 Tons in 1922 Shows Importance of Soft-Coal Strip Pits

The growing importance of strip pits as producers of soft coal is indicated by the fact that in 1922 10,225,000 tons—equivalent to 2.4 per cent of the total output—was produced by the strip mines, according to the U. S. Geological Survey. They employed 9,108 men. The total number of steam and electric shovels used was 379. The mines at which these shovels were employed produced 9,886,431 tons of coal. In addition,

338,711 tons were produced at workings where some method other than a steam or electric shovel was used in removing the overburden and loading the coal.

Ohio leads all other states in the tonnage of strip-mined coal. Nearly one-third of the 1922 output was reported from that state. Other leading producers were, in order of rank, Pennsylvania, Indiana, Missouri and Illinois.

Production, Number of Employees and Number of Steam and Electric Shovels At Bituminous-Coal Strip Pits

State	Production, in Net Tons			Average Number of Men Employed	Number of Steam and Electric Shovels a
	1920	1921	1922		
Alabama.....	224,491	342,033	375,166	421	15
Arkansas.....	1,860	3,350	39,761	151	3
Colorado.....			2,700		
Georgia.....		10,563	40,036	59	
Illinois.....	610,209	586,203	720,060	520	23
Indiana.....	1,361,869	800,738	1,374,715	1,323	50
Kansas.....	706,586	367,207	404,947	482	19
Kentucky.....	20,667	134,729	468,845	321	15
Missouri.....	1,142,617	782,243	833,427	967	32
North Dakota.....	108,376	122,889	274,722	209	5
Ohio.....	3,322,387	1,260,815	3,156,615	2,297	108
Oklahoma.....	239,422	230,059	321,580	262	14
Pennsylvania.....	1,244,537	488,253	1,951,316	1,906	83
Tennessee.....	15,706	2,406	6,411	20	1
West Virginia.....	31,854	6,000	179,841	109	8
Wyoming.....	50,000	68,322	75,000	60	3
Other States.....	800				
Total.....	9,081,401	5,205,810	10,225,142	9,108	379

(a) Includes a small number of shovels used underground.

Miners' Union Prepares to Fight Pinchot Bill

The United Mine Workers, it is announced, are preparing to fight Governor Pinchot's coal bill as introduced in Congress by Senator Borah. It is declared the measure aims at anti-strikes and for that reason organized labor is against it. An official of the miners in Washington is quoted as opposing the bill because it would tie up the funds of the organization and threatens to jail the officers.

The bill provides that in the event of an emergency growing out of a strike threat the President may exercise through a proposed coal division of the Interstate Commerce Commission all the powers conferred by the Lever Act in effect during the war.

The courts have interpreted this act as giving the authorities power to enjoin the calling of a strike in any industry affecting the nation's fuel and food supply.

"This is anti-strike legislation in its most vicious form," said the mine workers' official. "Were it enacted the mine workers' union might as well close up shop. Our experience in 1920 convinces us that it would not be a difficult matter to induce a federal judge to repeat what was done by Judge Anderson at Indianapolis, who reduced us to the status of a debating society. His injunction prevented us from giving relief through our own funds to members who were in need. Governor Pinchot may consider himself a friend of the worker, but his coal bill is one of the most destructive blows ever aimed at the miners' union. We will do everything we can to defeat it."

Oddie Putting Finishing Touches on Administration Coal Bill

Basic Fact Finding Proves Knotty Problem—Situation Complicated by Attitude of Department of Justice Toward Trade Associations—
Issuance of Export Certificates Planned

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

After nearly three months of intensive effort, Senator Oddie is whipping into final shape his ideas as to the legislation which will be necessary to carry into effect the recommendations of the Harding Coal Commission. Before making the bill public he is anxious to confer with representatives of the various branches of the industry and with those of the different types of consumers.

One of the knotty problems which Senator Oddie has been called upon to consider is that of basic fact finding. He has acquainted himself with the arguments for and against compulsory reporting of essential data. He has found such wide differences of opinion as to the best procedure in fact finding that he now is considering an alternative suggestion which he believes possesses sufficient merit to justify careful study. At this writing, however, it has not been embodied in the draft of the bill.

The idea is to collect the information through the existing trade associations, both national and local. The reporting is to be done on a voluntary basis with the understanding that the federal government is to have the right to check all returns at any time a need should arise. In this way the federal government would be spared great expense and the industry would not be subjected to federal interference except when suspicion might arise as to the correctness of certain returns.

Under such an arrangement, it is thought, there would be few occasions for the government to exercise its right to audit any statement that may have been made. Even were it to become necessary to exercise it, the checking probably would be confined to a small area and possibly to individual mines.

Such a system probably would have to be supplemented in some way, as there are districts which have no local associations. Senator Oddie sees no adequate reason why a scheme of fact finding may not be worked out through friendly co-operation of trade associations, pledged to give the full picture of the situation with the right to check any returns as an assurance against the small minority which exists in any business which might submit false returns.

Senator Oddie realizes that the situation in this connection is complicated by the policy of the Department of Justice toward trade associations. In the course of the investigations of the Commission of Gold and Silver Inquiry, of which he is chairman, he has been reminded frequently of the uncertainties which have settled down upon all business statistics as a result of the Attorney General's action. He realizes, however, that a coal bill is no place to attempt to settle the status of statis-

tical activities and as he believes the trade associations in the coal industry perform a highly valuable function and are in the interest of the public generally he does not expect any permanent interference with their work.

Senator Oddie also is considering embodying in the bill a provision giving authority to the Cabinet officer in whom the power conferred by the bill will be vested, to effect a plan for the issuance of export certificates on coal, should that official reach the conclusion that such a plan is wise. Senator Oddie is impressed with the need for some certification as to the quality of coal shipped in export trade.

Teapot Dome has so monopolized the attention on Capitol Hill that no great amount of attention has been given to proposed coal legislation, but despite sensational developments in the oil situation, the convention of the United Mine Workers at Indianapolis did not pass without notice. There is little difference of opinion among the lawmakers as to what ought to be done.

The general feeling is that the operators should sign the proposal of the United Mine Workers that present wages and working agreements be continued for four years. There is a general feeling, however, that in such an agreement some provision should be made for flexibility. The thought has been advanced that a clause should be inserted in the agreement providing for automatic adjustments in wage rates

each time there should be a rise or fall in the cost-of-living index figure. If the operators should object to accepting the index number of the Department of Labor, it is believed an arrangement could be worked out to accept the average of the index numbers of the Industrial Conference Board and of the Department of Labor. Any such plan would necessitate putting into the contract detailed provisions for putting the adjustment into effect.

Members of Congress are particularly aware of the inequity worked upon the man with a fixed income by fluctuations in living costs. For that reason, they sense at once the difficulties of a fixed and rigid wage scale intended to apply over a four-year period. They have not forgotten the supplemental agreements of 1917, which caused the strike of 1919. It is realized that if prices should fluctuate as much during the next four years as they have during the past, violent labor troubles would result.

Just at this time Congress is considering revenue revision. This has led its members to acquaint themselves with the economic prospects. They find that the Federal Reserve Board is apprehensive as to the possibility of our being on the verge of another period of inflation. It is recognized that the abundance of gold and the banking situation generally lends itself to the recurrence of an unhealthy boom such as that of 1920. With these thoughts uppermost in mind, many legislators and federal executive officers entertain the hope that some provisions will be made whereby wages in the coal industry will follow the purchasing power of money.

Much satisfaction is expressed in official quarters as a result of the decision of the Pittsburgh district to send a scale committee to Jacksonville. It was not realized in Washington at first that the position of the Pittsburgh operators was being influenced by their doubt as to the legality of an interstate conference. Sight had been lost of the fact that the Attorney General never has expressed himself other than to say that such a conference is illegal. Secretary Hoover's letter to the Pittsburgh Operators' Association was thought to be hardly sufficient since it was his expression, and not that of Mr. Daugherty. Mr. Hoover's conference with the President, however, put the administration on record and cleared the air.

Communications from Pittsburgh show that the operators there, as well as in all other fields, are divided as to which is the better course to take in formulating the new agreement. All agree that the renewal of the present scale carries with it the possibilities of serious consequences, but the alternative is the closure of mines by a strike. No single operator in the Pittsburgh district is advocating a strike rather than recede from what the operators want. The Pittsburgh operators are far from being belligerent, as is indicated by their sending a scale committee instructed only to obtain the best agreement that they can get. One of the reasons they will advance for a contract to run less than four years is that it should terminate in other than a presidential year.

Coolidge Urges Attendance At Jacksonville Parley

After conferring with President Coolidge, Secretary Hoover issued a formal statement Feb. 6 declaring it was the administration's wish that representatives of the bituminous-coal operators and the mine workers in the Central Competitive Field attend the wage conference at Jacksonville, Fla., Feb. 11. The purpose of the statement, it was said, was to set at rest reports that those attending might be attacked as attending a price-fixing meeting in violation of the Sherman Act.

"It is the understanding of the administration" said the statement, "that the conference is solely for the purpose of settling a contract covering wages and conditions of labor. This is intended to confirm my recommendation to certain coal operators' associations on Jan. 26 and to finally quiet rumors on the administration's attitude that have been current during the past few days."

British Columbia 1923 Output 37,000 Tons Below 1922

Total coal production of British Columbia for 1923 is placed at 2,543,675 tons as against 2,580,915 tons for the previous year, or a decrease of 37,240 tons. To arrive at the net output for the year it is necessary to take 87,834 tons from the figure given, as approximately that amount was used in the manufacture of coke or lost as waste. Thus it is found that the net production was 2,455,841 tons, in comparison with a net output for 1922 of 2,511,843 tons, or a decline, in point of value, of about \$280,010. The manufacture of coke increased from 45,836 to 58,000 tons. This was due to the activity of the Michel ovens of the Crows Nest Pass Coal Co.

For comparative purposes the following statistics on total production, in tons are interesting:

	1922	1923
Vancouver Island	1,754,656	1,551,926
Nicola-Princeton	770,890	666,865
Crow's Nest Pass	554,361	744,568
Tellwa Mines	1,008	36
Totals	2,580,915	2,543,675

Production by collieries for 1923 with estimated figures for December follow:

VANCOUVER ISLAND FIELD

Canadian Collieries (2) Ltd.		
Comox Colliery	366,837	268,535
Extension	223,954	215,753
South Wellington	27,348	75,449
	676,139	559,727
Western Fuel Corporation of Canada		
No. 1 Mile	347,234	319,398
Reserve	225,857	210,075
Wakesiah	79,515	103,513
Harewood (abandoned Jan., 1923)	43,795	2,000
	691,401	634,976
Other Collieries		
Granby C.M.S. & P. Co.	276,919	230,851
Nanosee Wellington	99,049	86,394
East Wellington		
(Opened Apr. 23)		28,573
King & Foster	9,148	11,405
	385,116	357,223
Grand totals	1,754,656	1,551,927

NICOLA-PRINCETON DISTRICT

Middlesboro Colliery	69,330	84,458
Fleming Colliery (abandoned) ..	38,485	3,969
Princeton Colliery	19,418	17,808
Coalmont Colliery	142,806	140,630
Community Coal & Coke Co.	233	
Chu Chua Coal Co., Ltd.	618	
Totals	270,890	246,865

CROWS NEST PASS DISTRICT

Coal Creek Colliery	291,671	443,096
Michel Colliery	216,668	253,198
Corbin Colliery	46,022	48,274
Totals	554,361	744,568

Check-Off Is Large

Figures of the National Association of Manufacturers show the monthly check-offs paid by United Mine Workers to be as follows:

State	Monthly Wage of Union Tonnage Miners in 1921	Monthly Check-off in 1921	Check-off Per Cent
Pennsylvania	\$104	\$3.50	3.4
Ohio	118	3.00	2.5
Indiana	129	2.25	1.7
Illinois	121	3.00	2.5
West Virginia	125	5.00	4.0
Oklahoma	138	8.05	5.8
Arkansas	106	8.05	7.6
Missouri	111	8.05	7.3
Washington	155	20.26	13.1



William L. Saunders

Newly elected president, United Engineering Society; chairman of board, Ingersoll-Rand Co.; past president, American Institute of Mining and Metallurgical Engineers, New York Chamber of Commerce and Manufacturers Export Association.

Engineers Study Industrial Preparedness for War

Industrial preparedness for a possible war was the subject which attracted more than 700 engineers to a dinner at the Hotel Commodore, New York City, on Tuesday, Feb. 5, under the auspices of the Army Ordnance Association and the five national engineering societies, the A.S.C.E., A.I.M.E., A.S.M.E., A.I.E.E., and the S.A.E. Judge Elbert H. Gary presided, the other speakers being Colonel Dwight F. Davis, assistant Secretary of War; Colonel James L. Walsh, chief of the New York Ordnance District, and General John J. Carty, vice-president American Telephone & Telegraph Co.

Colonel Davis explained that work on industrial mobilization has been under way for three years and much progress has been made. The seven supply branches of the government have fig-

ured out what will be required should the country find it advisable to engage in war, and the next question that arose was where can the necessary supplies be obtained. To answer this a survey of the industrial resources of the country is in progress.

Mr. Carty read an address in which he paid a tribute to the part played by American engineers in the last war and emphasized the necessity of being better prepared for the next one.

In an ante-room to the banquet hall was an exhibit of modern developments in munitions, including a 4,000-lb. aerial bomb, ten times the weight of the largest bomb used in the World War. A caterpillar tractor has been produced that will climb a 45-deg. slope at the rate of 30 miles an hour. The Ordnance Department has designed a 75-mm. gun with twice the range of the French guns of the same caliber used in the late war. Newly perfected automatic shoulder rifles bid fair to replace the magazine rifle of World War days. The 0.50 caliber super-machine gun recently developed shoots a bullet weighing four times as much as the 0.30 caliber Browning and throws it nearly three times as far. Although development of munitions is so rapid, Colonel Walsh said that the Ordnance Department would not halt production to await new inventions but would proceed with the manufacture of those certain to give reasonable satisfaction in battle, and which could be made in America in sufficient quantity.

Colonel Walsh recommended complete arrangements being made for the manufacture of munitions on a war-time scale so that if there were any springing to arms overnight there would be arms to spring to. He also urged that engineers aid by forming local committees whose chairmen would comprise a district advisory committee. Furthermore, engineers should become reserve officers, and he expressed the hope that we will some day have reserve ordnance plants which in time of business depression would be given educational orders by the government.

British Miners Produce Short Ton per Man in Single Shift

Presenting a statement of output and production costs for the quarter ending June 30, 1923, of mines producing about 95 per cent of the total quantity of salable coal mined in Great Britain, the November (1923) issue of the Ministry of Labor Gazette says that the production costs, after deducting the proceeds of the miners' coal, were \$3.74 (par) per net ton and the credit balance averaged 70c. (par) per net ton. In three districts costs exceeded proceeds; in other districts credit balances ranged from 2c. to \$1.10 per ton.

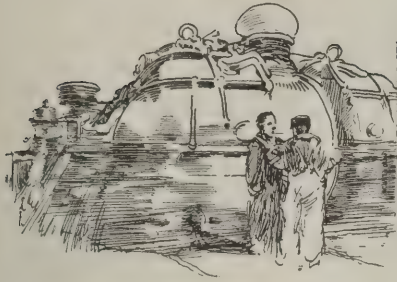
The number of workers employed during the quarter was 1,102,380 and the number of man-shifts worked 73,205,708. Based on the tonnage of salable coal mined the average output per man-shift worked was one net ton, the average for the different coal-mining districts ranging from 0.67 to 1.14 net tons. The average earnings per man-shift were \$2.13 (par), the earnings varying from \$1.64 to \$2.69 (par), according to the district.

The accompanying table shows the quantity of coal mined, number of workers and output and earnings per man for the quarters ending March 31, 1922, to June 30, 1923.

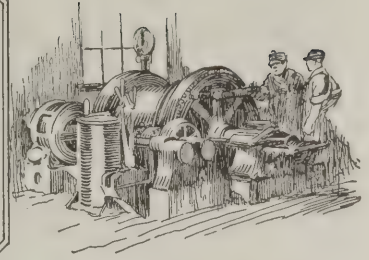
Operating Data of British Mines by Quarters

(Shilling at par 24. 3c.; penny 2.03c.)

Quarter Ending	Salable Coal Mined, Net Tons	Credit (+) or Debit (-) Balance per Net Ton, Cents	Number of Workers	Output per Man-shift, Net Tons	Earnings per Man-shift Worked
March 31, 1922	64,549,667	+24	1,020,207	1.0209	2.68
June 30, 1922	59,652,347	-003	1,025,542	0.9968	2.49
Sept. 30, 1922	65,763,899	+23	1,027,853	1.0046	2.27
Dec. 31, 1922	72,282,783	+32	1,068,594	1.0136	2.30
March 31, 1923	75,126,848	+52	1,087,733	1.0220	2.35
June 30, 1923	73,390,760	+69	1,102,380	1.0024	2.39



Practical Pointers For Electrical And Mechanical Men



How to Keep Rock Drills on the Job and Out of the Repair Shop

MANUFACTURERS always have realized that the very nature of the work of a rock drill required that it be made to withstand rough service and consequently have made durability one of the prime essentials of all types. Nevertheless, like all other mechanical devices, it requires proper operation and occasional lubrication, inspection and repair.

The trouble records of one of the largest rock-drill manufacturers disclose the fact that most troubles result from improper repair and assembly after the drill has been taken apart. Some of this difficulty is due to poor workmanship in the repair shop and some of it is due to careless tinkering and repair of the drill while on the job. In any event it is mostly attributable to a lack of understanding of the importance of each part on the successful functioning of the drill.

REPAIR MAN NOT ALWAYS AT FAULT

Trouble often may be traced to the condition of the drill when sent back on the job after repair, and in many cases to the condition of the drill steel. The repair man is not always at fault, for often the operator—unknown and against the rules of most companies—will take a drill apart on the job, with the result that dirt is included in the assemblage, and the side rods are pulled up unevenly. This condition results in excessive wear of the parts, decreased power and broken through bolts.

Very often the operator complains of loss of power and decrease of drilling speed. The drill apparently works well enough, but the results are lacking. The service man's attention in this case is directed to the condition of the steel. If the bits are holding up and are of proper gage, the trouble usually can be found in the shank being of improper length or the drill socket not being fully opened. If these conditions are found to be satisfactory the trouble is looked for inside the drill. If the

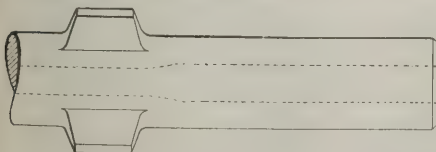


Fig. 1—Properly Shaped Drill End

To get the full force of the striking piston it is important that the drill end be accurately squared off. Do not rely on guess work, use accurate tools.

piston is badly cupped or short, the power of the blow is not fully transmitted to the steel but is taken up by the front head through rods and springs.

A large part of drill trouble can be traced, especially where hand sharpening of drill steel is employed, to the size of bits used. Often the bits are too large, thereby cutting more rock than necessary, and also they are not of uniform gage. The non-uniformity of gage results in steels being wedged, excessive torque on the rotation parts and a boring or reaming operation in the rock instead of a cutting operation. Unbalanced or poorly made bits often result in rifled holes.

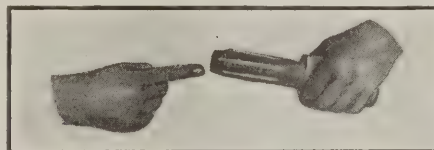


Fig. 2—Piston Face Must Be Square Also

If the piston becomes slightly cup shaped on the striking end and a drill with a good square shank is used, the striking edge of the piston will chip off. The striking surface of the piston should therefore be ground off square and maintained in this condition.

Where the cuttings are not properly blown from the hole, they form a cushion on the bottom and the energy of the drill is expended in cutting and recutting these loose particles instead of cutting new rock with each blow of the hammer.

Concerted efforts are being made by rock-drill manufacturers all over the country to emphasize the importance of lubrication and to introduce the proper methods of applying lubricants.

Many operators rely on the all too prevalent method of lubrication through the inlet hose. This practice should be discouraged as quickly as possible, for it is not dependable and cannot supply a continuous supply of oil to the various parts of the drill. If lubricated often enough—say every few minutes—this method would prove satisfactory. It is usual, however, to introduce a few spoonfuls of grease at the time the

hose is connected to the drill, then run the drill until it no longer operates.

Lubricators and grease pockets provided in each machine are ample to afford continuous lubrication to all parts of the drill if they are kept filled with the proper grade of lubricant.

Important points to be emphasized to obtain the best service from drills may be outlined as follows:

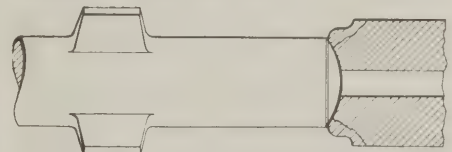


Fig. 3—Battered Drill Shank

Chips off the damaged drill end may become lodged in such a position that the drill will stick.

Lubrication.—See that all moving parts are always well lubricated with the proper grade of grease, as recommended by the manufacturer. It is good practice to fill the grease pockets twice each shift, as it guards against wear, increases the drilling speed and also the life of the machine.

Steels.—Be sure the drill steel is of the best quality and suitable for hard usage. See that the shanks and bits are properly made and of correct dimensions. Also give the steel the proper heat treatment, for more good drill steel is condemned and discarded because of careless, inaccurate heat treating than for any other reason. The proper heat treatment for any grade drill steel can be obtained from the drill steel manufacturer.

Air.—Know that your air supply is plentiful. Be sure that pressure at the drill is sufficient to operate it to the best advantage. Too low air pressure will decrease the drilling speed of any drill, so an examination of the air line may eliminate such trouble.

Worn Parts.—It is good practice, even when a drill seems to be giving the best of service, to take it apart occasionally and clean the parts. Wash with kerosene and examine carefully for any wear, oil all parts and reassemble. Most drill manufacturers supply limit gages which indicate when a part is worn to the point for replacing. This inspection and care will greatly increase the life of the drill.

E. H. PAULL.

One ft.-lb. equals:

1.3558	joules.
0.13826	kilogram meters.
0.000003766	kw.-hr.
0.0012861	heat unit.
0.0000005	hp.-hr.

Physical Characteristics of Insulating Varnishes

To meet adequately the many requirements of the electrical industry, insulating varnishes having widely different physical characteristics are necessary. It has not been possible to develop standard tests by which these physical qualities could be definitely measured, which makes it necessary for the user to supplement the standard tests by others to determine whether the physical characteristics are suitable for his purpose.

Generally, these tests are a practical application of the varnish to the apparatus for which it is being selected. If intended for use in making varnished cambric, the important physical characteristics would be elasticity and flexibility. The varnish could be applied to cloth and these characteristics noted. The ability of the varnish to withstand stretching without cracking could be determined by using bias-cut strips of treated cloth.

ACTUAL APPLICATION IS BEST TEST

For use on small high-speed armatures, where toughness and binding and cementing qualities are most essential, the best test, of course, is actual application to the apparatus, but this characteristic can be observed also by cutting or tearing a film of the varnish. For large form-wound coils, particularly those which may be held in stock a considerable time before use, a plastic type varnish generally is used. The varnish should soften slightly when heated, in order that the coils can be formed to exact dimensions, and be flexible, so that they can be readily assembled in the slots.

Only a few of the many uses of insulating varnish with the necessary qualities have been suggested. There are numerous others that require various combinations of qualities and each case will have to be considered individually, and the characteristics of the varnish studied with reference to the requirements of the apparatus on which it is to be used.

These tests that have been passed in review will give some general idea of the choice of varnishes to meet the many requirements of the electrical industry. Most users, by a slight change in their processes, could employ one of a number of varnishes successfully, especially if they would give a little thought to the test results and comparisons. This is, of course, difficult without a basis of evaluation.

VALUE OF STANDARD TESTS

The standard tests are of great value to both producers and users of insulating varnish, affording a common basis for discussion of the characteristics and merits of such materials. The tests of the liquid material indicate the approximate composition, relative value and general working characteristics of the varnish. The tests of the hardened films indicate the electrical characteristics and resistance to the various destructive agents.

These tests should be supplemented by other tests, preferably the actual application of the varnish to the apparatus on which it is to be used, to

verify the suitability of the varnish for the purpose intended.

Qualities as measured by the standardized tests may be made the basis of specifications for varnishes.

Would Use Fiber-Duct Where Conductors Heat Up

In regard to the article by B. K. Shaner, assistant electrical engineer, Frackville, Pa., in which he requests tables regarding the heating of conductors in iron conduits, I regret to state that I have been unable to find anything on the heating of conduits. But if it is an actual problem that he describes I think this trouble is caused by using too small wire.

One table on the carrying capacities of wires gives 3/0 for 200 amp. at 440 volts. Another gives 200,000 cm., and with rough figuring I arrived at the size of 2/0 for 200 amp. These figures do not take voltage drop into consideration. For slow-burning wire the capacity could be increased about 15 per cent, and if the conditions are dry and warm I believe this would be the best insulation to use.

It seems to me that if the power factor of the load is low abnormal heating quickly results. If the load is a meter load I would think that the power factor would be about 80 per cent. If Mr. Shaner has not installed the conduit I would like to suggest using fiber-duct as I believe it would be more suitable. At one large mine that I know of about two miles of fiber-duct is giving good service. It is encased in cement, however.

GRADY H. EMERSON,
Birmingham, Ala.

An Experience in Sickness Of Copper

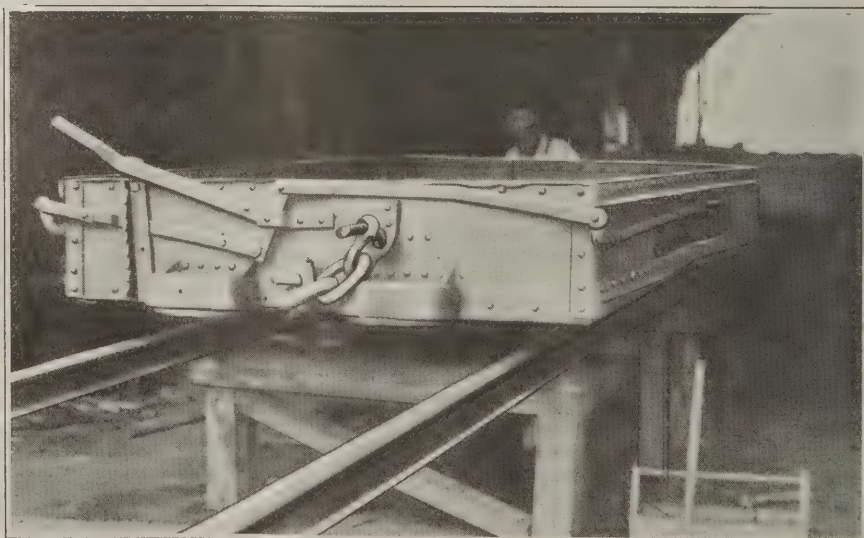
An armature was being wound with coils having German silver resistance leads, with copper tips brazed onto their ends. A number of coils had been put in place when it was found that the first one had to be removed. In

doing this, the copper tips were bent back to get them out of the way. With only a single bend one of the tips broke off in the workman's hands. On examining all the tips of the coils, twelve more defective ones were found. At first it was thought that it was a bad lot of copper. Tests showed that the copper from which the tips were made was of good quality. A study of the process of handling the copper revealed that the defective tips had been heated in a flame containing unburned hydrogen.

Since one cannot see, without breaking the strap or wire, whether the copper has been affected by this sickness, it follows that to be safe copper should not be heated in a flame containing an excess of hydrogen. This means that with a blow torch the copper should be kept outside of the inner cone of blue flame. When heating copper in a gas and air furnace, an excess amount of air always should be used, as too little air will produce an excess of free hydrogen. Smoke from such a furnace always indicates too little air and the mixer should be adjusted to give a little more air than is necessary to prevent any trace of smoke. Wherever possible the copper should be heated without coming into direct contact with the flame.

Elevated Track Aids in Repair Of Mine Cars

In the car-repair shops at the Lynch mines of the United States Coal & Coke Co. one of the efficiencies of the Ford automobile factories has been adopted to facilitate repairs of mine cars. A mine track elevated on bents runs through each shop. The cars to be repaired are pulled up an incline by a small hoist and rope to the top of the elevated track. In this position the workmen can more efficiently replace or adjust mine-car riggings. Especially is such an arrangement advantageous at Lynch, where a low, wide mine car only 22 in. above the rail is used. As the illustration shows, this type of mine car is constructed so that its body overhangs and partly covers its truck.



At Lynch Mine Cars Are Put on Elevated Track for Repair



Problems In Underground Management



Proper Air Spaces Help Bring Down All Coal Undercut, Saving Coal and Powder

By Using a Small Dummy That Does Not Fill the Hole
the Pressure of Gas Is Spread Over the Whole
Length of Undermined Coal

BY W. J. GERMAN
Technical Representative
E. I. du Pont de Nemours & Co.

IMPROPER methods of loading and tamping shotholes often cause the coal to break improperly. In mines where the coal seam is only 3 to 4 ft. thick and the cuts are put in 8 to 9 ft. deep and where caps and fuse are used, coal usually is shot too hard. I have visited hundreds of miners at their working places in such mines and have found that they shoot the coal as follows:

They bore the hole, prepare the primer for the breaker shot with a short fuse, place two sticks of explosive at the back of the hole, set the primer stick in the mouth of the opening, light the short fuse and shove it back to meet the other two sticks. Then they ram in a short dummy not longer than 10 in. on top of the charge. When these three sticks explode, the coal breaks down just under the charge and most of the explosive force is lost.

This loss is unavoidable with the method of loading described because the explosive force naturally follows the line of least resistance. As there are only about 36 in. of coal under the charge, the explosion breaks the coal down at the back of the cut, and most of the gases from the explosive pass out by this channel. This leaves the face of the coal still standing so that the miner must dig it out with his pick. He does not enjoy this labor and determines to avoid it on the next cut by putting in another stick or two of

explosive—as a consequence the coal resulting from this shot is almost all pulverized.

This waste of explosives and pulverizing of the coal can be prevented by

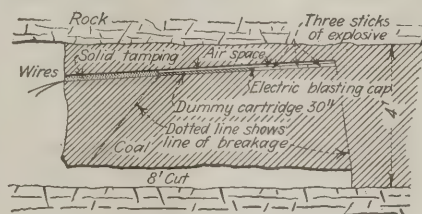


Fig. 2—A Better Way of Loading the Hole

In this instance the hole is not tightly filled for nearly 5 ft. of its length. The gases bear on the whole area undercut and all the coal falls. The same result would be obtained by using more powder but it would cost more and damage the coal more. It might also cause a dust explosion. Why use explosive when clay allows the work to be done better, safer and cheaper?

using electric blasting caps and a different method of tamping. The desired number of cartridges should be placed in the mouth of the hole, end to end, with the primer containing the electric blasting cap last, and then the entire charge should be pushed to the back of the hole.

Next a dummy of tamping about 1½ in. in diameter and 30 in. long should be shoved into the hole until it meets the charge. Finally the hole should be tamped solidly from the outside end of this long dummy to the mouth. As shown in Fig. 2 this method of tamping will leave an air space around both the charge and the dummy and this will permit the distribution of the explosive force. The gases from the explosive will spread through the coal and break up a much larger portion of it than in the first loading described and without pulverizing the coal. There is a saving in explosives and the coal is in better condition.

This method of confining the explosive charge is the most satisfactory way to balance the shot where the depth of the cut is twice as great as the thickness of the coal. It also gives excellent

results in thick seams where the coal is cut in the center, leaving two thin benches of coal to be blasted.

Keep Moisture from Telephones

BY GEORGE EDWARDS
Pikeville, Ky.

Many mines have continual trouble with their underground telephones, on the interior of which moisture is always condensing. Some superintendents have met this difficulty by placing a 25-watt electric incandescent lamp with a short globe at the back of the telephone box inclosing it in a small box of its own with five holes drilled in the two sides ½ in. in diameter. This insures ample ventilation, absence of excessive heat and uniform temperature.

Of course, if the telephone box is absolutely tight this is not necessary, but many mine telephones are not so carefully warded against dampness. It is not well to tamper with the telephone box except as a last resort.

Another plan that has given good service in damp mines is to place the telephone in a larger box with a tight door and two incandescent electric globes on each side of the telephone. This plan works well unless some careless workman leaves the door open.

More About Eyestrain and Nystagmus

Writing in the *Colliery Guardian*, D. W. Rees discussed the use of special tinted glasses to reduce the eyestrain of miners, saying that "eyestrain is recognized as causing fatigue of the nervous system, ultimately ending in nystagmus." He says that metallic-filament lamps, especially those that are gas-filled, give an intensely bright light, a considerable part of which consists of ultra-violet rays, which are recognized as being harmful to the eyesight.

He recommends tinting the glass preferably a yellowish green or, better yet, a yellowish brown. The most efficient antidote to the ultra-violet rays is at the other end of the spectrum, but a penalty must be paid in the form of greater loss of light. Protection against the excessive radiance of searchlights during the war was achieved by the use of veils and net gloves of the exact tint of sunburn, and undoubtedly this tint is the most protective against the chemical action of ultra-violet rays. To compensate for the loss of light Mr. Rees recommends using some type of prismatic glass to focus the light.

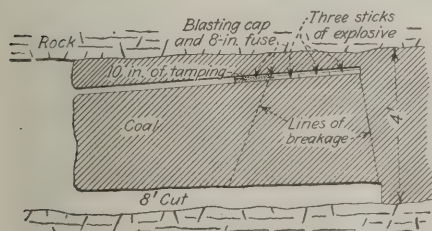


Fig. 1—Unsatisfactory Way of Loading Drillhole in Thin Seams

The gases are held in by the tamping so that they can press only on the coal around the cartridges. Consequently the end of the shothole blows the rear of the undercut coal down, leaving the front part of the undercut for the miner to handle with his pick.

Discussion

French Operators Aid Their Miners And Repair Devastated Plants

Parental Relation Between Employer and Employee—Interest Shown in
Workers' Families—Repair of Shafts Destroyed by Germans—
Craft of Latter in Work of Destruction

BY GODFREY M. S. TAIT*
Consulting Engineer, Washington, D. C.

I read with interest the article appearing in your Jan. 10 issue by John T. Ryan entitled "What American Coal Mining May Learn from European Mines," for when the armistice was declared I found myself located in the devastated northwestern coal fields of France and was shortly thereafter assigned to the preparation of a report on which the Allied Governments might base their decision as to the reparations to be demanded.

I, therefore, take the liberty of corroborating and supplementing Mr. Ryan's remarks as to French mining equipment and as to the satisfactory relations existing between employers and employees.

For example, on the subject of pay: In the Marles section the underground men averaged 7½ fr. per day and day men 5½ fr. in 1913. In the Noeux section the underground men received 7 fr. and surface and day laborers 5 fr.

In 1918, however, wages had jumped tremendously, due to the shrinkage in value of the franc and to the general high cost of living, so that at Marles the wages were 15 fr. and 12½ fr., respectively, for the two types of labor, whereas at Noeux they were 16½ and 9½ fr., respectively.

This, as Mr. Ryan writes, has been reduced down to the basis to which he refers, but it is interesting to note that there is no standardization between the wages paid at adjacent collieries. In some cases the discrepancy in wage is as much as 2 fr.

This is largely, if not entirely, due to the fact that the workers in these French mines have such a genuine affection for their employers, whom they almost regard in the light of parents, that it is almost unknown for the workers in one "concession" to be influenced to go to work in another.

I talked to hundreds of these returned workers and they all left me with the same impression, namely that the place at which they worked was their home. There they were provided with a comfortable little brick house with a tiled roof and with sufficient space in which to grow vegetables for the family. They would not think of leaving that particular concession any

more than they would think of abandoning their own homes. In fact I suggested at that time that they would be much better off if the French were to occupy the Ruhr and move them up there far from the devastated areas, but they unanimously replied "No, no, M'sieur, that would not be France."

I have seen these miners, who had been driven into Paris during the war, tramping along the 65 miles of road pushing their belongings in wheelbarrows and little carts, and arriving at the ruins of what had once been their home, with no apparent possibility of operations being resumed for years, but still looking completely happy at being "home" once more.

Each mining concession was equipped with a large hospital with a free clinic for the care and nourishment of children; the companies usually made it a practice to give a salary bonus of a few francs per week for each child in each family under sixteen years of age (thus undoubtedly showing a farsighted labor judgment); when children were born to the families of miners the minor expenses were paid by the company; when they entered the church they usually received some little gift; when they married they usually were given something more substantial and probably a house to live in; and when they died the company buried them in the concession churchyard, where you might see, before the Germans destroyed them, the headstones of generations of French miners, giving mute

proof of the stability of the local class of labor.

The country is rather flat and has a fairly rich soil, much beet sugar being grown in that section. Before the war the well-paved roads which stretched away to the horizon usually were shaded by two rows of giant poplar trees, the average thickness at the butt being over 2 ft.

As Mr. Ryan says, this territory was captured in the early stages of the fight, and the Germans took full measure of the facilities offered. All trees were leveled so as to prevent the approach of the enemy unseen; the slate piles, which because of the type of mining were of enormous size, were tunneled and timbered with posts and caps from the company's stockpile. Thus converted to their use the Germans employed them as observation posts and gun emplacements.

The network of railroads was torn up and cut into short lengths for reinforcement in concrete dugouts, and three companies of pioneers of seventy men each made an extensive study as to means for the future destruction of this industry in the event that they could not hold the country against the French.

The buildings employed were almost universally steel structures and every girder and column was marked by the Germans with the number of grams of powder that would be required to destroy it. When the order for retreat was sounded only a few days before the armistice the hoists were loaded with TNT and lowered in the shafts to an average depth of 300 ft., at which point they were opposite the water strata, which in this section appears to be in connection with the ocean. The charge was then fired, tearing a hole in the side of the shaft lining, through which the water poured in a river falling to a depth of from three to four thousand feet, as the case might be.

The underground workings around Lens were all flooded in this manner, but the same treatment was not accorded other mines as in the rapidity of retreat it is generally considered sufficient to destroy the surface plants, and this was done in the following manner:



Top Works of Dechy as Germans Vacated Them

This is not the result of gunfire but of a carefully planned and executed devastation warranted to make reconstruction as difficult as possible. The dimensions of the big conical winding drum can be gaged from the size of the men standing nearby. The shaft is over 3,000 ft. deep.

*Late Captain C.W.S., American Expeditionary Force.

A small charge was placed on the surface of each steam and air cylinder of each engine. A charge was attached to the steam dome of each steam boiler. The supports of the breakers were shot off so as to drop the buildings 5 or 6 ft., thus preventing cars going underneath to take coal and throwing all the shaker screens out of alignment. Finally the giant headframes were destroyed by blowing two legs out from under them, allowing the monster frame to crush through the roof of the power house. I have about two hundred photographs which I took of this type of devastation and the uniformity of method employed is striking.

It is impossible to overrate the courage and ability with which the French restored these mines to production. According to my estimate at the time I figured that it would take ten years to repair the damage, provided abundant financial assistance and a supply of new equipment was forthcoming. As you know, there has been no financial assistance other than that from French pockets, and, due to the shrinkage in value of the franc, little machinery was ordered from abroad.

With regard to the water in the mines at the time of my inspection, reference to my notebook indicates that it was estimated at 100,000,000 cu.yd. and that at the cost of labor then obtaining it could be removed for approximately 70,000,000 fr. I see also among my notes the remark, "The reason that the dewatering cannot proceed at a greater rate than planned is that the flow of water through the underground workings must be kept within moderate limits; otherwise erosion would occur sufficient to displace the foundations of some of the timbers, and one bad slip in mines such as these might seriously damage the entire property. Furthermore, the roof usually encountered is none of the best and unwatering should be accompanied by constant inspection and the replacement of mine props and the installation of new timbers where needed."

TIMBERS AND TREES DESTROYED

In this connection it is interesting to know that the Germans removed or destroyed not only the entire supply of mine props and timbers but cut down and destroyed every tree in that part of the country. Perhaps it may seem to you in reading this that the description of the thoroughness with which the Germans completed their destruction of this great coal field is all out of reason and that no intelligent race would go to the scientific lengths shown in this case for what appeared to be purely vindictive reasons. As to this, I think you will find the explanation in the closing paragraph of my report on this devastated area, which is as follows:

"But the loss to France is far more serious than the mere money value of the coal, as will be apparent when France's steel industry and resources are considered.

"Previous to the war France mined more iron ore than, for want of fuel, she



A Little of the Destruction Wrought by Germans at Notre Dame Colliery

The buildings employed at the Collieries of northern France were almost universally steel structures, and the Germans carefully marked each girder and column with the number of grams that would be needed for its destruction. This illustration shows what happened when the directions were followed.

was able to fabricate. In fact, she was dependent on German and Belgian coke in a large measure. Her surplus iron ore naturally had to be sold to Germany, where in the Somme and Ruhr basins coke was abundant. This situation gave Germany a strong hold at all times on France's steel industry. The strength of this economic domination is in inverse proportion to France's coking coal production, hence any decrease in French coal production correspondingly lowers the value of her iron ore and the volume of her steel production, her only resources being to sell unfabricated iron ore to the German steel works in the Ruhr at their own price.

"This was the reason for the deliberate, systematic and scientific destruction of the French coal mines. It will further be noted that no great damage was done to France's iron mines, although her steel works were utterly destroyed. Germany wants the French iron ore, and failing to hold the property by military means she has created an industrial condition which accomplishes the same purpose."

At this point it may be well to stop and realize just why France seized the Ruhr when she failed to obtain any reparation to apply to the restoration of what was the Ruhr's only business rival.

I note in Mr. Ryan's article that 140 of the mining shafts were destroyed by dynamite in the method which I have recounted above. I have photographs to prove that miners' houses even more substantial and attractive than the ones shown in this article also were totally destroyed, the usual German trick being to throw a hand grenade in the cook stove as a parting shot.

It may be of interest to you to know how the French succeeded in repairing these damaged shafts. Their process strikes me as being so highly ingenious that I never fail to relate it.

When I told you that I had located many shafts by the roar of the water entering them and by observing the

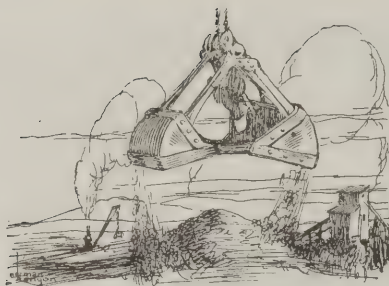
cloud of spray that rose up into the air above them, you can have a faint idea of the mechanical difficulty of checking this flow before complete flooding was accomplished.

However the French engineers are never lacking in resourcefulness, and the method they employed was really exceedingly simple. They first of all erected a temporary headframe to carry the centrifugal pump with which they expected to dewater the mine. Then from this same headframe they lowered what may be described as a caisson consisting of vertical strips of wood like a straight-sided barrel, this structure had a slightly smaller diameter than the circular shaft. This was lowered until it covered the opening through which the water was entering.

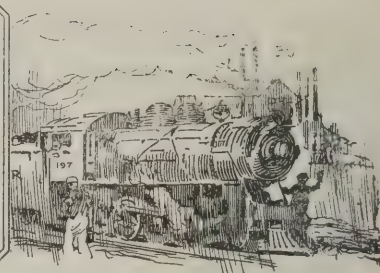
Then by means of jacks suitably arranged in the center of this caisson it was expanded until its ribs fitted tightly against the side of the shaft. In thus expanding the caisson the ribs, of course, moved further apart leaving plenty of space for water to continue to enter. These slots were then calked until all leakage ceased.

This left the shaft with the damage stopped, but the shaft itself useless, due to the presence of this caisson which filled the opening. The next step was to drill small holes through the wooden caisson into the water space, to introduce pipes through these holes, and to pump in a dry concrete mixture which in coming into contact with the water gradually formed a solid cement which fitted tightly against the exposed side of the caisson. After the cement had time to set, the jacks were released and the caisson hoisted out of the shaft, the repair in which presented a perfectly smooth surface.

It is needless to say that seams of coal presenting the same mining difficulties as those in France would be considered absolutely worthless in this country, but with the economic situation existing in France it is difficult to estimate the value of such a natural resource to her.



Production And the Market



Soft-Coal Market Shows Strengthening Trend; Consumer Evinces Scant Interest in Wage Parley

Strengthening tendencies are apparent in the soft-coal market. More seasonable weather has increased the demand for domestic bituminous coals and some industrial concerns in Ohio and other sections are adding to their reserve stocks at the present low prices. The Jacksonville meeting does not appear to be attracting much attention from the consumer, and there is a feeling that no serious trouble will be encountered. Those mines that are working in most instances are operating to capacity and some producers are getting ready to open additional operations to meet the demands, but in some cases they are finding it difficult to obtain men.

Contract making is progressing slowly, but the range of prices appears to be from \$2.25 to \$3.25, as compared with \$2.75 to \$4.25 last year.

No Reason Seen for Drop in Output

Production of soft coal during the week ended Feb. 2 declined slightly when compared with the previous week, though no reason is apparent. On the other hand, the output of anthracite shows an increase, although the demand for domestic coals usually present at this season is lacking. Demand for soft coal had been quickened because of the low temperatures and there are fewer reports of "no market" losses.

Comparatively few changes in prices are reported from the various markets, with the result that *Coal Age* Index as of Feb. 11 stands at 188, an increase of one point, with an average price of \$2.27, also an advance of 1c. from the previous week.

In the Middle West the domestic trade has slowed down, due in part to difficult hauling from the retail yards and a letting up in the severe cold weather that struck that section of the country a couple of weeks ago.

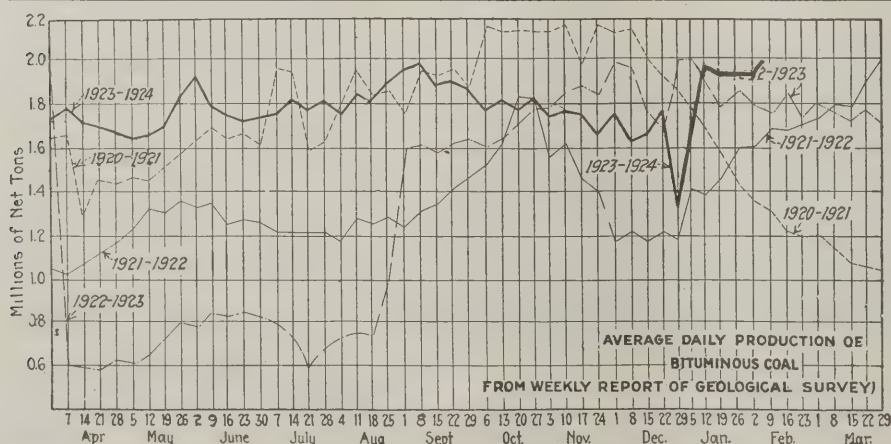
The lower temperatures enabled producers to move their "no bills," but there still remains a large number in southern Illinois. The St. Louis trade in domestic soft coals is active, but anthracite, smokeless coals and coke move slowly. Eastern Kentucky coals are pretty well sold up for the present and the market is slightly firmer. Milwaukee reports a very active market, with business at its peak. Practically similar conditions exist over the Southwest, a blizzard interfering with mine operations early last week.

Active Markets Reported in Ohio

The Ohio markets generally report activity. Smokeless coals are in good demand and deliveries are lower due to a cut down in car supply on one railroad. Free coals are pretty well taken up for the time being, and splint and gas coals show more strength. Steam coals are in fair demand, but with large consumers holding fair reserves there is no tendency to add to them. There is a moderately active market at Pittsburgh, the greatest interest being shown in what will take place at Jacksonville. In New England there is little encouragement in the steam-coal situation and practically no change in the market for Pennsylvania coals. The New York, Philadelphia and Baltimore markets are quiet. There is no activity and buyers of spot coals are taking only enough for immediate needs. Inquiries show no increase.

Output of soft coal for the week ended Feb. 2 was 11,315,000 net tons, a decrease of 254,000 tons when compared with the previous week, according to the Geological Survey, while 1,893,000 net tons of anthracite was produced, as compared with 1,782,000 tons during the week ended Jan. 26.

During January of this year fourteen steamers left



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Jan. 19	10,925,000	11,622,000
Jan. 26 (b)	10,985,000	11,569,000
Feb. 2 (a)	10,686,000	11,315,000
Daily average	1,781,000	1,886,000
Coal year	343,262,000	459,732,000
Daily av. coal year	1,328,000	1,788,000

ANTHRACITE

	2,010,000	1,884,000
Jan. 19	2,010,000	1,884,000
Jan. 26 (b)	2,119,000	1,782,000
Feb. 1 (a)	2,056,000	1,893,000
Coal year	40,449,000	78,164,000

COKE

	343,000	263,000
Jan. 26 (b)	343,000	263,000
Feb. 2 (a)	348,000	262,000
Calendar year	1,600,000	1,240,000

(a) Subject to revision. (b) Revised from last report.

Baltimore carrying 70,225 tons of coal to foreign countries, and one vessel carried 3,491 tons of coke. In January of last year the sailings were three vessels carrying 4,119 tons of coal. Dumpings at Hampton Roads for all accountants during the week ended Feb. 7 totaled 369,171 net tons of coal as compared with 283,447 tons during the previous week.

Midwest Markets Quiet

Trade in domestic coals has slowed down throughout the Middle West. This may be partly due to the difficulty retailers have in moving coal out of their snowbound yards. The call is fair but is not expected to pick up much from now on unless another spell of severely cold weather comes. This means the production of the region is falling and screenings are due for a rise. Not much stiffening on steam coal is noticeable yet, however.

The recent blizzards enabled producers to move out most of the "no bills," but there still remain a good many in southern Illinois loaded with the middle sizes. Central Illinois is less afflicted because of its proximity to the

great Chicago market. It has sold about all of its production readily, but at fairly low prices. Screenings range now from \$1.25 to \$1.35 and lump is \$3@3.25.

In the Illinois mining fields the southern counties are getting from two to four days a week. Railroad tonnage is light.

Conditions in the DuQuoin and Jackson County field are somewhat similar, with the prices matching those of the independent Franklin County operators. The business in this district, however, is not good and steam coal is difficult to move. The Mt. Olive situation is better. The demand for domestic is good and steam is fairly active, but there is a car shortage that interferes with production at times. In the Standard district the last short cold wave helped conditions materially, although there is plenty of coal of all sizes that has been piled up for the last week at the mines. Steam is hard to move and screenings are down to 75c.@80c.

St. Louis Trade Still Alive

Dealers in St. Louis report local domestic trade active and the demand for middle grade coals good principally on account of the cold wave. Some high-grade lump is moving, but it is small in comparison with middle grades, and

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Feb. 12 1923	Jan. 28 1924	Feb. 4 1924	Feb. 11 1924†
Smokeless lump.....	Columbus....	\$7.00	\$3.35	\$3.35	\$3.25@	\$4.00
Smokeless mine run.....	Columbus....	4.75	2.10	2.10	2.00@	2.25
Smokeless screenings.....	Columbus....	4.75	1.50	1.50	1.40@	1.65
Smokeless lump.....	Chicago....	7.00	3.60	3.60	3.50@	3.75
Smokeless mine run.....	Chicago....	4.75	2.25	2.50		2.50
Smokeless lump.....	Cincinnati....	7.10	3.50	3.75	3.00@	4.25
Smokeless mine run.....	Cincinnati....	4.75	2.35	2.75	2.50@	2.75
Smokeless screenings.....	Cincinnati....	4.50	1.80	1.80	2.00@	2.25
*Smokeless mine run.....	Boston.....	7.15	5.05	5.05	4.75@	4.90
Clearfield mine run.....	Boston.....	3.85	2.00	2.05	1.65@	2.40
Cambria mine run.....	Boston.....	4.50	2.60	2.60	2.25@	2.75
Barneset mine run.....	Boston.....	4.10	2.25	2.15	2.00@	2.50
Pool 1 (Navy Standard)....	New York....	5.25	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard)....	Philadelphia..	5.10	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard)....	Baltimore....	4.60				
Pool 9 (Super. Low Vol.)....	New York....	4.60	2.25	2.25	2.00@	2.50
Pool 9 (Super. Low Vol.)....	Philadelphia..	4.60	2.30	2.30	2.10@	2.50
Pool 9 (Super. Low Vol.)....	Baltimore....	4.35	1.80	1.85	1.80@	2.00
Pool 10 (H. Gr. Low Vol.)....	New York....	4.10	1.95	1.95	1.75@	2.10
Pool 10 (H. Gr. Low Vol.)....	Philadelphia..	4.10	1.85	1.85	1.70@	2.00
Pool 10 (H. Gr. Low Vol.)....	Baltimore....	4.00	1.80	1.80	1.70@	1.85
Pool 11 (Low Vol.)....	New York....	3.35	1.60	1.60	1.50@	1.75
Pool 11 (Low Vol.)....	Philadelphia..	3.10	1.65	1.65	1.55@	1.75
Pool 11 (Low Vol.)....	Baltimore....	3.00	1.65	1.65	1.55@	1.65
High-Volatile, Eastern		Market Quoted	Feb. 12 1923	Jan. 28 1924	Feb. 4 1924	Feb. 11 1924†
Pool 54-64 (Gas and St.)...	New York....	2.95	1.60	1.60	1.50@	1.75
Pool 54-64 (Gas and St.)...	Philadelphia..	2.95	1.70	1.70	1.60@	1.80
Pool 54-64 (Gas and St.)...	Baltimore....	2.85	1.50	1.50		1.50
Pittsburgh so'd gas.....	Pittsburgh....	4.10	2.55	2.55	2.50@	2.65
Pittsburgh gas mine run....	Pittsburgh....		2.30	2.30	2.25@	2.35
Pittsburgh mine run (St.)...	Pittsburgh....	2.75	2.00	2.00	1.90@	2.10
Pittsburgh slack (Gas).....	Pittsburgh....	3.25	1.60	1.60	1.50@	1.75
Kanawha lump.....	Columbus....	4.50	2.60	2.60	2.50@	2.75
Kanawha mine run.....	Columbus....	2.60	1.60	1.60	1.50@	1.75
Kanawha screenings.....	Columbus....	2.35	1.35	1.25	1.00@	1.15
W. Va. lump.....	Cincinnati....	4.25	3.10	2.85	3.00@	3.25
W. Va. gas mine run.....	Cincinnati....	2.60	1.80	1.70	2.00@	2.25
W. Va. steam mine run.....	Cincinnati....	2.60	1.80	1.70	2.00@	2.25
W. Va. screenings.....	Cincinnati....	2.25	1.20	1.30		1.25
Hooking lump.....	Columbus....	4.50	2.75	2.75	2.50@	3.00
Hooking mine run.....	Columbus....	2.50	1.85	1.85	1.75@	2.00
Hooking screenings.....	Columbus....	2.10	1.40	1.15	1.00@	1.10
Pitta. No. 8 lump.....	Cleveland....	4.20	2.40	2.40	2.00@	2.85
Pitta. No. 8 mine run.....	Cleveland....	3.15	1.95	2.05	1.80@	1.85
Pitta. No. 8 screenings.....	Cleveland....	3.10	1.60	1.60	1.40@	1.60
Midwest		Market Quoted	Feb. 12 1923	Jan. 28 1924	Feb. 4 1924	Feb. 11 1924†
Franklin, Ill. lump.....	Chicago....	\$5.35	\$3.50	\$3.50	\$3.25@	\$3.75
Franklin, Ill. mine run.....	Chicago....	3.85	2.35	2.35	2.25@	2.50
Franklin, Ill. screenings.....	Chicago....	2.55	1.85	1.80	1.75@	1.90
Central, Ill. lump.....	Chicago....	3.60	3.10	3.10	3.00@	3.25
Central, Ill. mine run.....	Chicago....	2.60	2.10	2.10	2.00@	2.25
Central, Ill. screenings.....	Chicago....	1.60	1.45	1.35	1.30@	1.40
Ind. 4th Vein lump.....	Chicago....	4.35	3.10	3.10	3.00@	3.25
Ind. 4th Vein mine run.....	Chicago....	3.10	2.60	2.60	2.50@	2.75
Ind. 4th Vein screenings.....	Chicago....	2.30	1.85	1.70	1.65@	1.80
Ind. 5th Vein lump.....	Chicago....	3.60	2.60	2.60	2.50@	2.75
Ind. 5th Vein mine run.....	Chicago....	2.60	2.10	2.10	2.00@	2.25
Ind. 5th Vein screenings.....	Chicago....	1.80	1.45	1.45	1.40@	1.50
Mt. Olive lump.....	St. Louis....		3.10	3.10	3.00@	3.25
Mt. Olive mine run.....	St. Louis....		2.50	2.50		2.50
Mt. Olive screenings.....	St. Louis....		1.50	1.50		1.50
Standard lump.....	St. Louis....		3.10	2.75	2.75	2.65@ 2.90
Standard mine run.....	St. Louis....		2.25	1.95	1.95	1.90@ 2.00
Standard screenings.....	St. Louis....		1.45	1.10	1.10	75@ .80
West Ky. lump.....	Louisville....	3.85	2.85	2.85	2.75@	3.00
West Ky. mine run.....	Louisville....	2.35	1.65	1.70	1.50@	1.90
West Ky. screenings.....	Louisville....	2.10	1.10	1.05		90@ 1.25
West Ky. lump.....	Chicago....	3.85	2.85	2.85	2.75@	3.00
West Ky. mine run.....	Chicago....	2.00	1.75	1.60	1.50@	1.75
South and Southwest		Market Quoted	Feb. 12 1923	Jan. 28 1924	Feb. 4 1924	Feb. 11 1924†
Big Seam lump.....	Birmingham..	3.95	3.85	3.85	3.75@	4.00
Big Seam mine run.....	Birmingham..	2.35	1.80	1.85	1.75@	1.85
Big Seam (washed).....	Birmingham..	2.60	2.10	2.10	2.00@	2.25
S. E. Ky. lump.....	Chicago....	4.85	3.35	3.25	3.25@	3.50
S. E. Ky. mine run.....	Chicago....	2.85	2.10	1.85	1.75@	2.25
S. E. Ky. lump.....	Louisville....	5.25	3.25	3.25	3.25@	3.75
S. E. Ky. mine run.....	Louisville....	2.60	1.80	1.80	1.65@	2.00
S. E. Ky. screenings.....	Louisville....	2.35	1.10	1.15	1.25@	1.50
S. E. Ky. lump.....	Cincinnati....	4.25	3.00	2.75	2.85@	3.50
S. E. Ky. mine run.....	Cincinnati....	2.35	1.80	1.80	1.85@	2.25
S. E. Ky. screenings.....	Cincinnati....	2.10	1.15	1.30		1.25
Kansas lump.....	Kansas City..	5.00	5.00	5.00		5.00
Kansas mine run.....	Kansas City..	3.50	3.50	3.50		3.50
Kansas screenings.....	Kansas City..	2.50	2.25	2.25		2.25

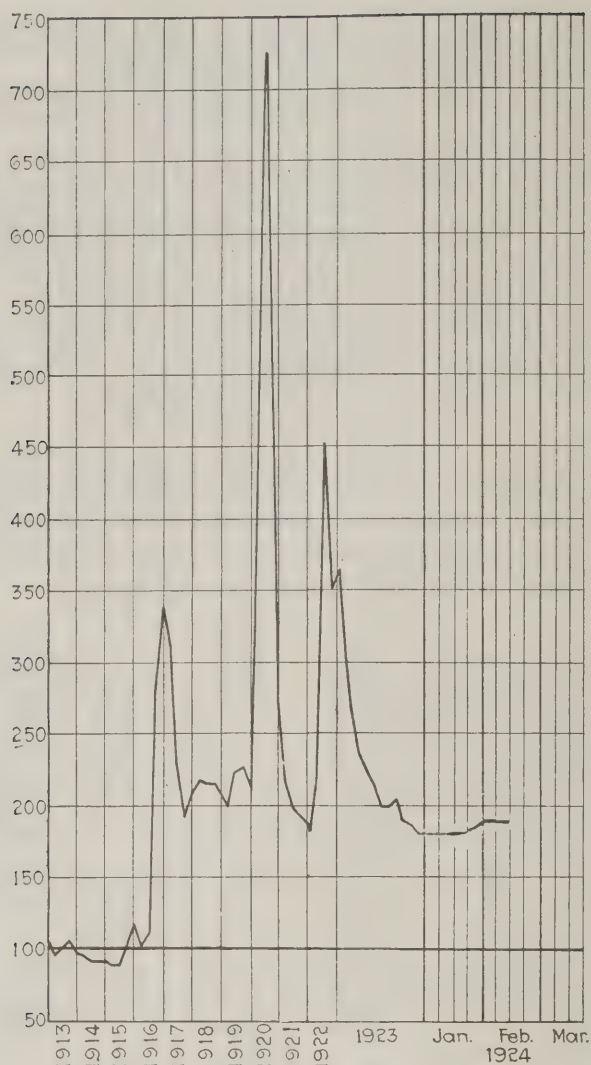
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	Feb. 12, 1923		February 4, 1924		Feb. 11, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York....	\$2.34		\$9.00	\$7.75@ \$8.25	\$8.00@ \$8.50	\$8.00@ \$9.25	\$8.00@ \$8.50	\$8.00@ \$9.25
Broken.....	Philadelphia...	2.39			7.90@ 8.10				
Egg.....	New York....	2.34		9.25@ 12.00	8.00@ 8.35	8.50@ 9.25	8.75@ 9.25	8.25@ 9.00	8.75@ 9.25
Egg.....	Philadelphia...	2.39		9.25@ 11.00	8.10@ 8.35	8.50@ 10.00	8.75@ 9.25	8.50@ 10.00	8.75@ 9.25
Egg.....	Chicago*	5.06		12.00@ 12.50	7.20@ 8.25	7.50@ 8.80	8.00@ 8.35	7.50@ 8.80	8.00@ 8.35
Stove.....	New York....	2.34		9.25@ 12.00	8.00@ 8.35	9.75@ 10.50	8.75@ 9.25	9.50@ 10.50	8.75@ 9.25
Stove.....	Philadelphia...	2.39		9.25@ 11.00	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Stove.....	Chicago*	5.06		12.00@ 12.50	7.35@ 8.25	7.95@ 9.25	8.00@ 8.35	9.85@ 9.25	8.00@ 8.35
Chestnut.....	New York....	2.34		9.25@ 12.00	8.00@ 8.35	9.75@ 10.50	8.75@ 9.25	9.85@ 11.50	8.75@ 9.25
Chestnut.....	Philadelphia...	2.39		9.25@ 11.00	8.15@ 8.35	9.85@ 11.50	8.90@ 9.25	9.85@ 11.50	8.90@ 9.25
Chestnut.....	Chicago*	5.06		12.00@ 12.50	7.35@ 8.35	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Range.....	New York....	2.34			8.25		9.00		9.00
Pea.....	New York....	2.22		7.50@ 11.00	6.15@ 6.30	4.75@ 6.25	6.15@ 6.65	4.75@ 6.25	6.15@ 6.65
Pea.....	Philadelphia...	2.14		7.00@ 9.50	6.15@ 6.20	5.25@ 7.25	6.35@ 6.60	5.25@ 7.25	6.35@ 6.60
Pea.....	Chicago*	4.79		7.00@ 8.00	5.49@ 6.03	4.50@ 5.60	5.40@ 6.05	4.50@ 5.60	5.40@ 6.05
Buckwheat No. 1.....	New York....	2.22		5.00@ 5.50	4.00@ 4.10	2.25@ 3.50	3.50	2.25@ 3.50	3.50
Buckwheat No. 1.....	Philadelphia...	2.14		5.00@ 5.50	4.00	2.00@ 3.50	3.50	2.00@ 3.50	3.50
Rice.....	New York....	2.22		2.25@ 2.75	2.75@ 3.00	1.75@ 2.50	2.50	2.00@ 2.50	2.50
Rice.....	Philadelphia...	2.14		2.75@ 3.00	2.75@ 3.00	1.50@ 2.50	2.50	1.50@ 2.50	2.50
Barley.....	New York....	2.22		1.50@ 2.00	1.50@ 2.00	1.25@ 1.50	1.50	1.50@ 1.75	1.50
Barley.....	Philadelphia...	2.14		1.50@ 2.00	2.00	1.00@ 1.50	1.50	1.00@ 1.50	1.50
Birdseye.....	New York....	2.22			2.10		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1924		1923	
	Feb. 11	Feb. 4	Jan. 28	Feb. 12
Index	188	187	187	296
Weighted average price	\$2.27	\$2.26	\$2.26	\$3.58

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

there is some activity in Standard. Anthracite, smokeless and coke are slow. Wagonload steam showed considerable improvement the last few days. Country domestic is doing well. It dropped off for a few days, but it is coming back for cheaper coals principally. Country steam is soft and in no demand.

Kentucky Moves Much Lump

Over the past week there has been some advance in eastern Kentucky coal due to the fact that a good many operators are sold up for the time being and are quoting high, whether getting business or not, which has a tendency to firm up the market a little. There has been a better demand for gas or byproduct coal, which is beginning to carry a larger premium over non-gas varieties. There also is a better steam business from the North, and good scattered retailer demand from almost all sections.

Eastern Kentucky mine prices have been firmer all along the line over the past week with domestic sizes tightening up 15c. to 25c. while the western Kentucky market is about holding its own, but with prepared coal getting the call and with some houses holding for slightly higher prices.

Western Kentucky screenings have been offered more freely on the local market and at as low as 85c. for the pea and slack grade.

Demand for western Kentucky coal has been fair, but is largely for prepared coal, moving to all sections, but especially the North and Northwest, including Iowa and Michigan, Illinois and Indiana, with a good movement in Kentucky and Tennessee. Movement of prepared has increased selling effort on screenings, which have been a little off in price due to larger production. This is forcing a hard scramble for orders to keep the markets up.

A number of mines that have been down have resumed operations, making the struggle for markets quicken. The strip or daylight mines, meeting bad weather conditions, have not been able to produce coal as cheaply as under better operating conditions, which is helping the shaft operators a little.

Northwest Is Busy

Shipments from the docks at the Head-of-the-Lakes in January were higher than at any period since July, 1922. In all, 25,984 cars left the docks both at Duluth and at Superior, Wis., of which 10,189 were shipped from Duluth. The shipments last month compare with 17,215 in December and 13,683 in January of last year.

Despite the huge shipments, which are mostly on contracts and for buyers who have been shaken loose by cold weather, the price of bituminous coal dropped 25c. a ton all around at Duluth last week. This is a reduction on the prices quoted last week. All coals are affected except Pocahontas, which remains as last quoted. The strength of Pocahontas is caused by the fact that it is proving a most acceptable substitute for anthracite, which is growing scarce in desirable sizes. Stocks on docks now are probably about 4,300,000 tons.

The Milwaukee coal market is very active. The winter business is at its peak, due to widespread low-temperature blizzards. Country business is suffering because of interrupted telephone and telegraph communications and blockaded railway traffic. Coal is moving out fairly well, however. Prices are firmly held.

West Active Again

A blizzard over the Southwest early in the week prevented operation of Kansas and Oklahoma mines two or three days. As a result of the enforced idleness and the increased demand which followed the snow and colder weather, no-bills, which again had begun to accumulate, were cleared from the tracks, and mines were assured of steady operation for some time as soon as weather might permit their reopening. Prices are steady at \$5 for Kansas lump, \$4.25 for nut, \$3.50 for mine-run and \$2.25 for screenings.

The coal market in Colorado during the past week continued to remain reasonably active. Mines worked about four and one-half days, attributing only 18 per cent of the lost time to "no orders." Prices remain unchanged and the supply of labor is ample. The transportation and equipment situations have been very favorable throughout the entire state except in Routt County district (which is served only by the D. & S. L. R.R.), where approximately 94 per cent of the full working time for that district was lost on account of weather conditions preventing any transportation movement.

In Utah every shipper is short on both lump and slack, but middle sizes are piling up on operators' hands and causing a lot of grief and lost time. Retailers have been moving a good deal of coal and stocks are getting low. In Salt Lake City, for instance, the total is estimated at less than 10,000 tons. A week of zero weather would clean them out.

Conditions in Ohio Improved

Market conditions at Cincinnati are considerably improved and wholesale dealers are kept busy. Towards the middle of last week there was a rush for smokeless coals and with the New River production cut down by a 50 per cent car supply on the C. & O. and with the Pocahontas operators in the position of being sold up on their "available" coal for a couple of weeks to come, higher prices were obtainable. Low-volatile slack also moved up under the demand that was coming in from the byproduct plants. Splint and gas coals, especially the domestic sizes, were

strengthened because of the general slowing up in transportation north of the river. Demand was better due to cold weather. Block as well as mine run stiffened, while slack took a spurt. There is a feeling that the urgency of orders was due to some of the industrial centers desiring to replenish their storage supplies. For retail delivery Pocahontas lump is quoted at \$10 by a majority of the dealers, with one or two still holding to \$9. On slack the new range is \$4.75@5.

With weather conditions at Columbus unsettled the coal trade was rather spotty, with domestic buying the best feature. Retail stocks are only fair but because of the lateness of the season dealers are not buying for the future. Pocahontas and other smokeless varieties are in good demand and prices are stronger. Splints also are selling well, but lack of an adequate car supply is one of the drawbacks of the West Virginia operators. Ohio-mined coals are selling steadily and operations have increased to about 30 to 35 per cent of capacity in the southern Ohio fields. Several of the large buyers of steam coals continue to remain out of the market. Stocking is not general as most of the larger consumers have adequate stocks on hand. Contracting is at a standstill both because April 1 is the usual contract period and also because of the uncertainty of the market. Reports received by the Southern Ohio Coal Exchange show a production during the week ended Jan. 26 of 207,625 tons out of a total capacity of 677,173 tons. "No market" was responsible for a loss of 398,546 tons.

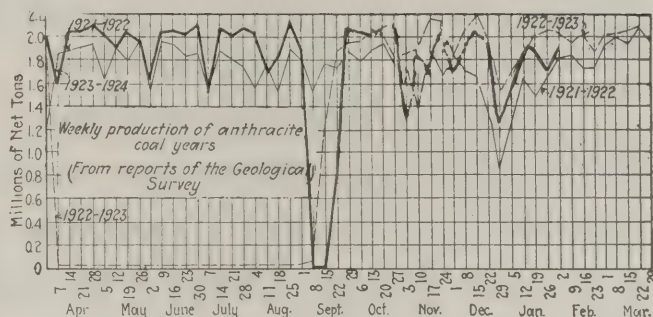
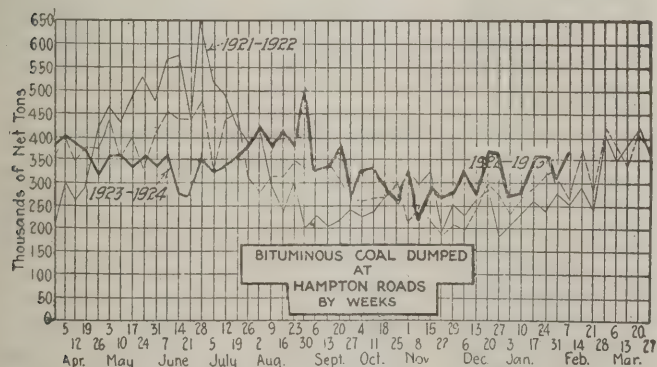
The outstanding feature of the market at Cleveland is the large volume of bituminous-coal receipts 4,323 cars having been received during the week ended Feb. 2, or 460 cars more than the preceding week and 260 cars greater than the previous high record week of Jan. 19. There is considerable distress coal on hand and some has been disposed of at 10c.@15c. below the current market quotations.

The Pittsburgh district market has been moderately active as compared with its condition in December. Competition is very keen and the outlying non-union mines are receiving the chief benefit of any increase in buying. There was an improvement in buying reported in central Pennsylvania during January. Some yearly contracts are reported as having been signed on a basis of \$2.40 for the medium grades and \$2.80 for the better grades of coal. There is a little more activity in the Buffalo market.

New England Steam-Coal Market Dull

The market for steam coal continues to offer little encouragement. Production in the smokeless districts has increased and because there is nothing in the current situation to support a larger tonnage the range of spot prices has suffered another decline. Navy standard Pocahontas and New River can now be had at \$4.75@4.90, a drop of at least 15c. from a week ago. Operators are anxious to net \$2 per net ton at the mines, but occasionally a lower return is accepted in order to free cars and make room for further shipments. In this territory there is next to no inquiry and efforts to interest buyers in contracts so far have been without result.

All-rail there is practically no change. Producers find it hard to understand the lack of business in New England. They feel there must be some opening somewhere, but the holes are filled about as soon as made, and by coals from Hampton Roads. The industries still find it hard going, and few are optimistic over 1924 conditions.



For inland delivery there is only very light request. Quotations there, too, have eased off a little, and \$6.25 is now the utmost price sought. As it is, practically the only coal being sold is in the hands of factors with their own depots, and the tonnage is moved to make room for cargoes due to arrive.

Seaboard Soft-Coal Market More Active

There has been somewhat of a change for the better in the soft-coal market at New York but it has not been sufficient to affect prices. Buying has not increased despite the nearness of April 1 and little interest is being taken in the conferences at Jacksonville. Conditions at Philadelphia show little if any difference from those that existed last month. Inquiries are increasing and salesmen do not find it so difficult to get orders although they are not plentiful. Some extra buying is reported. The trade at Baltimore is flat and little buying is reported. Lack of demand continues at Birmingham, particularly for steam coals. Business is scattering and spot buying is for immediate needs. Dealers are buying domestic coals only as needed.

Little Activity in Anthracite Market

There is very little activity in the anthracite market. The demand centers around stove and chestnut coals, but there is no shortage of these sizes. Retail dealers are not rushed regarding deliveries and consumers are not inclined to buy heavily at this season. Egg and pea coals are hard to move, some of the producers storing large quantities of the latter size. Independent producers find it necessary to quote close to company prices in order to keep their coals moving. The steam-coal situation has improved and demand is stronger. The better grades of independent barley coal are being quoted at figures above the company price of \$3.50. Dealers at Baltimore are not complaining of supplies; in addition to receipts of Pennsylvania anthracite they received about 8,000 tons of Welsh anthracite last week.

The Connellsville coke market did not experience the improvement expected a couple of weeks ago, when several inquiries were made for second-quarter furnace coke. Operators were disposed to quote 25c. advance for second quarter over what has been going for the current quarter and this seems to have caused furnace men to lose interest. The usual asking price for the second quarter is around \$4.50. The spot furnace coke market has been stiffer in the past week and is quotable at \$4@4.15. Foundry coke remains quotable around \$5@5.50 in the spot market. The Geological Survey estimates beehive coke production for the week ended Feb. 2 to have been 262,000 net tons, as compared with 263,000 tons the previous week.

The U. S. Bureau of Labor statistics from the records of U. S. Geological Survey show that on Dec. 22 32.9 per cent of the mines had not worked during the preceding week.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended Jan. 26, 1924	891,326	204,396
Previous week	895,276	204,694
Same week in 1923	869,464	194,382
	Surplus Cars	
	All Cars	Coal Cars
Jan. 22, 1924	236,174	100,781
Same date in 1923	26,485	6,699
Jan. 14, 1924	292,921	129,846
	Car Shortage	
	All Cars	Coal Cars

Foreign Market And Export News

British Coal Output Rebounds with End of Rail Strike; Orders Accumulate

Great Britain's coal output for the week ended Jan. 26 was 4,717,000 tons, according to a cable to *Coal Age*. This compares with 2,848,000 tons for the week ending Jan. 19 and 5,747,000 tons produced in the week ended Jan. 12, which was prior to the strike of the railroad men.

The railroad strike had exerted a paralyzing influence on the Welsh coal trade. Owing to the shortage of railway locomotives, coal could not be conveyed from the pits to the docks. Ships have been held up in consequence and stocks have accumulated at the pit-heads. Aside from this the market is firm and nearly all the pits are booked up until mid-February, and are not taking more orders. Business with Europe is good, except that German orders have fallen off, while Italian business has increased. South American business has improved. It is expected that when the railways have got into their stride again the Welsh market will very much improve in tone.

The Newcastle market has been hit in the same way and considerable difficulty has been experienced in getting coal to the docks for shipment. In the meantime orders have accumulated and the outlook for February is regarded as being distinctly promising.

French Coal and Coke Imports and Exports

France imported 26,268,187 tons of coal during the twelve months ended Dec. 31 as compared with 22,334,126 tons in 1922, an increase of 3,934,061 tons. Of the total Great Britain furnished 17,954,597 tons as compared with 12,098,927 tons in 1922, and the United States furnished 670,823 tons as against 23,255 tons in the previous year. Bel-

gian coal received was 2,179,099 tons, a decrease of 199,598 tons when compared with the previous twelve months. German product received was 1,478,527 tons, as compared with 3,730,605 tons in 1922, while receipts from the Sarre were 3,182,275 tons, as against 3,534,224 tons received in 1922.

Coke imports amounted to 3,628,393 tons, as compared with 5,140,183 tons in 1922, of which 2,073,460 tons was furnished by Germany. In 1922 German coke receipts amounted to 4,303,324 tons. The United States furnished 169,358 tons during 1923, Belgium, 497,839 tons; Great Britain, 384,101 tons and the Sarre, 96,431 tons.

There was exported from France during 1923 127,012 tons more of coal than in 1922, 2,274,447 tons having been shipped during 1923 as compared with 2,147,435 tons in 1922. Of this tonnage Belgium received 1,166,805 tons; Switzerland, 438,461 tons; the Sarre, 241,027 tons; and Germany, 67,740 tons. In 1922 Belgium received 453,075 tons; Switzerland, 704,048 tons; Italy, 59,022 tons; and Germany, 454,950 tons.

Of the 496,348 tons of coke exported in 1923 Italy received 269,060 tons; Switzerland, 163,318 tons; Belgium, 15,298 tons; and Germany, 2,204 tons. In 1922 463,128 tons of coke were exported, of which Italy got 192,880 tons and Switzerland 89,334 tons.

Hampton Roads Market Shows Weakness

Conditions at Hampton Roads were fair last week the market showing a tendency toward weakness, and demand dropping off in all quarters. Foreign business was a trifle more active but the prospect for overseas trade was not bright.

Coastwise and bunker trade was only

fair, and supplies of coal at tidewater were accumulating. Some inquiries for contracts were reported, although the trade generally showed less activity than during previous weeks.

Operators were intimating they would make contracts for \$2.50 net ton mines, which would mean \$5.32 at tidewater, and shippers received some inquiries for bookings at this figure.

Export Clearances, Week Ended Feb. 9, 1924

FROM HAMPTON ROADS

	Tons
For Canada	
Amer. Sch. Jacob W. Hook, for St. Georges...	905
Amer. SS. Coastwise, for Halifax.....	6,467
For Chile	
Jap. SS. Brazil Maru, for Valparaiso.....	3,155
For Cuba	
Dan. SS. Frederiksborg, for Kingston.....	2,039
Amer. Sch. Zebedee E. Cliff, for Cienfuegos...	1,814
For Brazil	
Belg. SS. Burgondier, for Rio de Janeiro.....	6,075
Ital. SS. Giovanna Florio, for Porto Ferrajo....	7,217
For Egypt	
Br. SS. Kenilworth, for Port Said.....	7,418
Ital. SS. Tagliamento, for Port Said.....	7,220
For France	
Nor. SS. Fram, for Castres.....	4,030
Fr. SS. Arkansas, for Havre.....	8,693
For Italy	
Ital. SS. San Pietro, for Genoa.....	7,009
For West Indies	
Nor. SS. Bur, for Fort de France.....	6,412
For Italy	
Amer. SS. West Mahomet, for Genoa.....	4,122

FROM BALTIMORE

For Chile	
Jap. SS. Brazil Maru.....	2,400
For Canada	
Amer. SS. Middlesex.....	7,851

FROM PHILADELPHIA

For Cuba	
Nor. SS. Vinddeggen, for Havana.....	

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Jan. 31	Feb. 7
Cars on hand.....	1,194	1,628
Tons on hand.....	84,466	113,135
Tons dumped for week.....	134,570	125,431
Tonnage waiting.....	16,000	15,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,013	1,133
Tons on hand.....	66,600	75,700
Tons dumped for week.....	75,333	91,474
Tonnage waiting.....	18,470	3,580
C. & O. piers, Newport News:		
Cars on hand.....	1,775	1,291
Tons on hand.....	88,640	64,330
Tons dumped for week.....	43,175	112,712
Tonnage waiting.....	10,085	5,550

Pier and Bunker Prices, Gross Tons

	Feb. 2	Feb. 9†
Pool 9, New York.....	\$4.90@ \$5.25	\$4.90@ \$5.25
Pool 10, New York.....	4.65@ 5.00	4.65@ 5.00
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	5.10	4.90@ 5.00
Pools 5-6-7 Hamp. Rds....	4.30	4.25@ 4.35
Pool 2, Hamp. Roads.....	4.75@ 4.85	4.65

BUNKERS

Pool 9, New York.....	5.20@ 5.55	5.20@ 5.55
Pool 10, New York.....	4.95@ 5.30	4.95@ 5.30
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 4.90	4.90@ 5.20
Pool 1, Hamp. Roads.....	5.15	5.00
Pool 2, Hamp. Roads.....	4.85	4.75

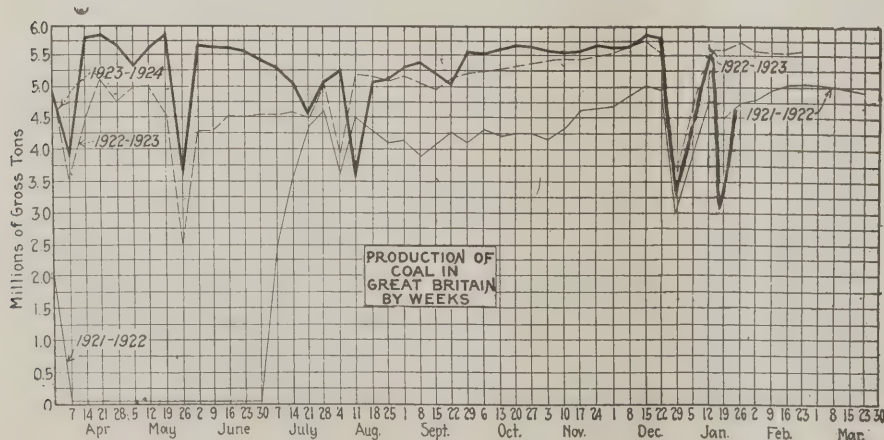
Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to *Coal Age*

	Feb. 2	Feb. 9†
Admiralty, large.....	30s. @ 31s.	30s. @ 31s.
Steam smalls.....	23s. @ 25s.	23s.

Newcastle:		
Best steams.....	25s. 6d.	26s.
Best gas.....	24s. 6d. @ 25s.	25s.
Best bunkers.....	27s. @ 28s.	25s. @ 26s.

† Advances over previous week shown in heavy type, declines in italics.



Traffic News

Lower Rates Sought on Coal For Export

A resolution asking the Norfolk & Western, the Cheapeake & Ohio and the Virginian railroads to adjust the rates on tidewater coal destined for export to the extent of one dollar a ton, has been adopted by the Kiwanis Club, of Welch, W. Va., to the end that mines served by these roads may be in a position to compete with foreign mines for export business.

Operators join in stating that there is not a sufficient domestic demand to permit the mines in West Virginia to operate for more than one and two days a week. Export shipments have dwindled from 13,300,000 tons in 1920 to 2,900,000 tons in 1923, the shrinkage being due to the fact that the present freight rates on coal are so high that southern West Virginia producers are no longer able to compete with foreign countries.

Final Argument on Hard-Coal Joint Rate March 19

Final arguments are to be heard in Washington, March 19 before the Interstate Commerce Commission on the matter of allowing the cancellation of the joint all-rail rate from Buffalo to Minneapolis on hard coal. Stanley B. Houck, counsel for the Twin City Coal Exchange, will present an argument against allowing the withdrawal of the rate. County Attorney Floyd B. Olson, of Minneapolis, will present a brief on the case, but will not be able to attend the hearing on that date.

Illinois Towns Ask Rate Cut

Rockford, Freeport and several other Illinois towns are asking a reduction of coal freight rates to those cities from all Illinois producing groups. The Illinois Commerce Commission hearing on the petition was assigned for Chicago, Feb. 14.

Car Service Has New Quarters

It has been announced by the American Railway Association that, effective Feb. 1, the headquarters of District No. 2, Car Service Division, will be at 2025 First National Bank Building, Detroit, Mich., instead of 1219 Nicholas Building, Toledo, Ohio.

C. & O. to Repair Coal Cars

Contracts for repairing 1,000 steel coal cars have just been awarded by the C. & O. Ry., according to announcement made by W. J. Harahan, president of the company. The repairs will affect the coal trade to a considerable extent, it is stated, inasmuch as it will go far toward a prevention of car shortage should there be the anticipated appreciable revival of the coal business in the spring and summer.

Coal Rate Cut in Illinois

The Illinois Commerce Commission has instructed the Wabash R.R. to establish a rate of 70c. per ton on coal from Springfield, Ill., to Decatur, Ill., this rate comparing with 91c. per ton, the former rate, and giving Decatur one of the most favorable rates in the state. Bloomington has won a victory in its contest for lower freight rates from Lincoln, Ill., the Illinois Commerce Commission denying a rehearing in the Springfield-Lincoln-Bloomington coal rate case.

Industrial Notes

The Tennant Company, with offices in the Union National Bank Building, Houston, now represents the Heine Boiler Co., of St. Louis, in a new territorial division comprising the entire southern half of the State of Texas, J. A. Tennant being in charge of this office. Smith & Whitney of Dallas, Texas, continue as the company's representatives in the northern half of Texas.

Wheeling Coal Co., Warwood, W. Va., near Wheeling, has contracted with the Fairmont Mining Machinery Co., Fairmont, W. Va., for a complete steel tippie with shaker screens and other preparation equipment.

A method of fireproofing jute for brattice cloth has been perfected by J. A. Willard and others and the Canadian Brattice Cloth, Ltd., has been incorporated at Vancouver, B. C., to enlarge and operate a plant on False Creek for its manufacture. At present most of the brattice cloth used in western Canada comes from Scotland.

Milton W. Arrowood announces that he has purchased all the interest held in the Ground Coal Engineering Corp. by the Sanford Riley Stoker Co. since Dec. 22, 1922. The company will now be operated by Mr. Arrowood and his associates in Chicago, under the name **Universal Engineers, Inc.**, as it is believed this name will be well suited for the company's pulverized fuel work and its general line of activities in conveying and handling materials, the success of its method in handling pulverized fuel having led to expansion in other fields. Pending the establishment of offices in New York and Chicago, the company headquarters will be 2 Downing Street, Worcester, Mass.

Barnes & Tucker Co., of Barnesboro, Pa., has ordered from the Fairmont Mining Machinery Co., Fairmont, W. Va., a steel tippie and preparation equipment.

A state charter has been issued to the Summerville Mine Supply Co., Summerville, Pa., the purpose of which is to buy, sell, and deal in coal-mine equipment and machinery. The capital stock of the company is \$15,000 and the incorporators are: Ira B. Brocius, Summerville, treasurer; S. R. Madill, Summerville, and George A. Getty, Summerville.

Association Activities

At the January meeting of the **Smokeless Coal Operators Association of West Virginia** held in Washington, Major W. P. Tams, Jr., of Tams, second vice president of the association presided. President Robert H. Gross, of Boston, having been seriously ill for the last six or seven weeks and William C. Atwater, of New York, president of the William C. Atwater Co., being abroad.

The association accepted with regret the resignation of George R. Collins of Charleston as treasurer of the association. Mr. Collins retires owing to ill health. G. H. Caperton, of Charleston, was elected to succeed him as secretary. Mr. Collins also

resigned as a member of the board of governors representing the Tug River district, John T. Wilson of Bluefield being elected in his stead.

The association gave much of its time to reports from transportation committees with special reference to the present status of the effort to obtain an all-rail through freight rate from the smokeless fields of West Virginia to the Middle Atlantic and New England states. Attention also was given to the preparation of defending West Virginia's interests in the coming fight on freight rates west, as a part of which operators of the Pittsburgh fields are endeavoring to widen the present freight rate differentials against West Virginia in favor of operators of Pennsylvania. The Faith Smokeless Coal Co. and the Morrison Coal Co., both of Glenn Morrison, Wyoming County, were admitted to membership.

Late in January the **Greenbrier Smokeless Coal Operators Association** held a session at the Kanawha Hotel, in Charleston, when routine matters and conditions generally affecting the industry were discussed. The following were in attendance: W. S. Wood, Quin Morton, D. C. Kennedy, H. H. Blackburn, John B. Laing, James Laing, Mason Bell, E. S. Simpson, J. G. Hood, W. M. Jasper, O. M. Richardson, J. N. Turner, W. H. Naylor, Dr. J. Y. Leach, J. Wade Bell, H. S. Wilson, Robert T. Bell and W. G. Crichton.

At the last meeting of the **Clarksburg Coal Club** discussion revolved about the possibility, upon the expiration of the present wage contract, of an adjustment in scale rates in the Harrison County field which would give the territory an opportunity to compete with other fields. Increases in freight rates and inability to reach certain markets, it was developed during the meeting, have precluded the production of a larger tonnage of coal in the Harrison County field within the last year. The operators at the meeting also discussed developments at the convention of United Mine Workers and matters affecting the local field. Hugh G. Smith, president of the club, presided at the meeting. It was stated by operators that despite the large production in West Virginia during 1923, amounting to over 103,000,000 tons, Harrison County had contributed a much smaller proportion to the total than usual.

They were frisky in their announcements of the meeting of the **Rocky Mountain Coal Mining Institute** at Denver Feb. 13-15. A large yellow circus-looking handbill announced "Last and final notice! Three days of mental food, with a strong seasoning of fun. Girls! Girls! Girls! Lots of 'em. Wives, daughters, sweathearts. Bring 'em with you. We'll do the rest. Unparalleled announcement! George B. Pryde positively will be with us in person. Whales and Elephants. All the heavyweights of the industry will be there to see Bill Brennan on the flying trapeze. He positively will not perform. So come and join the fun. Denver Hotel rates will not be raised." Ben Shubart is secretary and conceived this whizzical notice which was decorated with various sketches and about all the different faces of type the print shop could exhumate from its mustiest racks.

Charles Dering, president of the **American Wholesale Coal Association**, has designated the following committee to take charge of arrangements for the Association's annual convention: Jay W. Johns, Pittsburgh, chairman; J. A. Collette, Pittsburgh, and G. H. Merryweather, Chicago. The convention will be held at White Sulphur Springs, W. Va., June 3 and 4.

Coming Meetings

American Institute of Mining and Metallurgical Engineers. Annual meeting Feb. 18-21, 29 West 39th Street, New York City. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

Upper Potomac Coal Association. Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

Canadian Institute of Mining and Metallurgy. Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

Northwestern Pennsylvania Coal Operators' Association. Annual meeting March 4, Butler, Pa. Secretary, T. F. Diefenderfer, Butler, Pa.

News Items From Field and Trade

ARKANSAS

Sale of the Arkansas Anthracite Coal & Land Co.'s property at Clarksville, made in accordance with decree of the court, has been confirmed by Federal Judge Frank A. Youmans. The sale was made by H. Denman, receiver, to R. A. Blackwood, who bid \$99,000.

ILLINOIS

Affairs of the Southern Gem Coal Corporation have come to a grand pause for the time being. The company, now in the hands of W. S. Wilson and Judge C. B. Thomas, of East St. Louis, as receivers, has not produced a pound of coal since an eight days' run under the direction of Judge Thomas and Mr. Wilson late in January. The books are now being audited to learn the exact status of the concern. The offices soon will be moved to Pinckneyville, leaving only a sales office in Chicago. An effort is to be made to reopen the mines soon. Jesse Dimond and John M. Dillavou have left the company, but Chester A. Harris continues as vice-president. The directors have elected D. M. Parkhill, of Benton, to be president and secretary, H. M. Rea as treasurer. The status of Simon Levy's "snowbird" contract for the entire output of two Franklin County mines of the corporation is in doubt. Thus far Mr. Levy has received nearly \$100,000 worth of coal.

Charles F. Schrage, for years vice-president and treasurer of the Peabody Coal Co. of Chicago, is withdrawing from his connection with the company. **Walter A. Fisher**, assistant treasurer, succeeds him, although no official announcement has yet been made.

Officers for the Chicago Collieries Co., Danville, have been named as follows: Ben B. Taylor, president; T. C. Keller, vice-president; William Dolan, treasurer; C. E. Parker, secretary. These men, with Joseph Meitzler, A. Plaut and T. T. Keller compose the board of directors. The election was held at Catlin. **The Taylor-English Co. elected the following officers:** Ben B. Taylor, president; William Dolan, treasurer, and H. E. Douglas, secretary. These men, with George Meiser, Ft. Wayne, Ind.; Clarence Davis, Danville, Ill., and T. A. Taylor, Catlin, Ill., compose the board of directors. The Chicago Collieries Co. which absorbed the Lone Oak Coal Co. Jan. 1, has changed the name of the Lone Oak mine to the Chicago Collieries No. 3 and expects to have 300 men employed this season.

E. J. Gibson of Danville, has been elected president of the **White, Barger, White Coal Mining Co.** of that city. The company has been reorganized, Mr. Gibson purchasing 51 per cent of the stock of the company. The new organization will continue operations on the property, south of Danville, on the Chicago & Eastern Illinois R.R., and has obtained options on 80 acres more, where stripping operations will be continued. Negotiations are pending with Indianapolis parties for purchase of the property. The company was incorporated five years ago for \$100,000.

The Illinois Fuel Co. was awarded judgment for \$51,811.48 by Circuit Judge Hugo Grimm, of St. Louis, Feb. 5 in its suit against the Mobile & Ohio R.R. A jury trial was waived. The suit was based on a contract for 50,000 tons of mine-run coal at \$2.45 a ton subject to readjustment of price under certain circumstances. The coal company claimed \$125,126.77 under the contract of which the railroad had paid \$68,954.02.

INDIANA

Two hundred miners who have been employed on day and night shifts at **Francisco Mine No. 2**, four miles west of Princeton, will be idle for several weeks, it has been announced. The shutdown is due to fire inside the mines which is believed to have been caused by defective wiring. Mine officials have sealed the mine in order to suffocate the fire from want of oxygen.

The Dugger Mutual Coal & Mining Co., of Dugger, has been incorporated with a capital of \$100,000. The directors of the company are Eli Edwards, Perry Deckard, Fred

Mason, Otho Seldomridge and Thomas L. Jones.

Cairy Littlejohn, chief mine inspector and secretary of the Indiana Board of Mines and Mining, is seriously ill at the Methodist Hospital in Indianapolis, with a complication of diseases.

Recent electric-power contracts have been signed by several Indiana coal operating companies with the Central Indiana Power Co., which is now putting the new 100,000-kw. steam plant at Terre Haute into operation. The Glencoe Coal Co., of Terre Haute, has contracted for electric power equivalent to 600 hp.; the Binkley Coal Co. for 300 hp. for its Essanbee mines; the Shirkie Coal Co. for 500 hp. for its Shirkieville mine and the Newport Coal Co. for 300 hp. for use at Newport.

KENTUCKY

Several coal tax bills have been introduced in the General Assembly. One provides for a tonnage tax on coal based on either 2½ or 3 per cent of the sales value of the coal produced and sold.

On the night of Jan. 29 persons using a pass-key entered the district office of the United Mine Workers at Harlan and took the union's complete set of books, including cash book, ledgers, and minute books of six locals which kept their records at the Harlan office. On Jan. 1, it was reported that a stick of dynamite with cap attached was found hanging in the building, and since that time the union officials quit sleeping at the headquarters office.

An arrangement has been closed with the Phoenix Coal Mining Co., of Louisville and Nashville, with mines at Drakesboro, whereby the **Nashville Coal Co.**, of Nashville, Tenn., a jobbing concern, will take the entire output of the Phoenix mines under contract. The Nashville Coal Co. has arranged to open an office in Louisville, in charge of C. W. Logan, who has been sales manager for the Dixie Fuel Co. The Nashville Coal Co. has the output of the Southland Coal Co., of Henderson, and the Panama Coal Co., of Robards, under contract.

It is reported from Hopkinsville that the **Dixie mine**, of the Memphis Coal Co., at Mannington, has been leased to **Holly Jackson and G. B. Watson**, of that place, who have started operations again. It also was stated that this is the only tippie mine in Christian County doing a railroad shipping business that is operating at present.

MINNESOTA

The Lignite Coal & Byproducts Corporation, of St. Paul, has filed application with the State Securities Commission of North Dakota to sell stock to the amount of \$100,000 in a \$1,000,000 corporation. The company is headed by Dr. Hans Holzwarth, a German chemist, and is incorporated under the laws of Delaware. It proposes to build a plant at Richardson, N. D. P. Hoenerback, of Richardson, is president. A similar petition has been made to the State Securities Commission of Minnesota.

MISSOURI

Surface water flooded the **Jacob Gohring coal mine**, three and one-half miles west of Fulton, on the Columbia road, doing damage that cannot be repaired and that forced the closing of the mine. Mr. Gohring said that the rock top of the mine broke at night and let the water flood in. The shaft was put down three years ago.

NEW YORK

An exhibit of the hard-coal industry under the direction of the General Committee of Anthracite Operators, at 13 East 45th Street, New York City, is being largely attended. The exhibit is similar to that opened in Philadelphia several weeks ago.

P. G. Paris, director of the Westport mill investigation and testing laboratory of the Dorr Company engineers, has resigned to return to the Bethlehem Steel Co., with which he was formerly affiliated. He will be connected with the patent and research department and will be a consultant on ordnance work. The directorship of the

Westport Mill will be taken over in the near future by **J. A. Baker**, who was formerly connected with the Dorr Company.

Fines totaling \$80,000 were imposed against the Buffalo, Rochester & Pittsburgh Railway Co. and the Rochester & Pittsburgh Coal & Iron Co. on Jan. 30, when they pleaded guilty to charges of violating the Elkins act. The case was before Judge Morris, in federal court at Buffalo. The two companies were alleged to have agreed that the railroad should not collect demurrage charges. The period in question was 1922, when the coal strike was on.

Stockholders of the Lehigh Valley R.R. will be able to subscribe to the stock of the **Lehigh Valley Coal Co.** until June 15, the right having been extended from April 15, according to a letter sent out by President E. E. Loomis, of the railroad company.

NORTH DAKOTA

The Lignite Coal & Byproducts Corporation has been formed to develop the lignite fields of North Dakota. **Hans Holzwarth**, an engineer, who is to be the president, announced during an address delivered in Minneapolis, that a distillation process developed by Thyssen & Co., in the Ruhr under the supervision of the former chief engineer of the company, is to be used in a \$350,000 plant at Richardson, N. D., to convert lignite into briquets with the heat value of anthracite; into rare and valuable gases, into pitch, tar, fuel oil, benzene, and if profitable, into a score of other products.

Production at the mine at Haynes, N. D. owned by the State of South Dakota has reached a high point during the past year, touching average monthly shipments of 150 cars. These figures are far from capacity production, but are really around 50 per cent.

OHIO

The Virginia & Kentucky Coal Co., Cincinnati, has been chartered with an authorized capital of \$25,000 to mine coal and sell and deal in coal and coke. Incorporators are M. Wellman, F. H. Dunker, Elizabeth Dunker, Margaret Shumate and J. B. Shumate.

The Preston-Morgan Coal Co., of Columbus, has been chartered with an authorized capital of \$50,000 to mine, buy, sell and deal in coal and coke. The company has a mine located near Nelsonville. In addition to handling their own product the company will also do a general jobbing business. Offices are located in the Atlas Building. Organization has taken place by the election of C. L. Preston, president and Vance Morgan, secretary and treasurer, both of whom were formerly connected with the Snake Hollow Coal Co., of Columbus. Other incorporators are E. L. Preston, F. L. Preston and Mabelle E. Preston. **The Snake Hollow Coal Co.**, located at 547 Atlas Building, has been partially reorganized since the chartering of the Preston-Morgan Coal Co. George M. Merritt having been made president and George W. Merritt, sales manager, taking the place of Charles L. Preston, who heads the Preston-Morgan Coal Co. The company maintains operating offices at Nelsonville and in addition does a general jobbing business.

The Harribel Coal Co., Bridgeport, has been incorporated with a capital of \$100,000 to buy, sell and mine coal. Incorporators are P. F. Gilhooly, D. W. Bowen, David McGary, John E. Fulton and S. M. Barr.

OKLAHOMA

The Pine Mountain Coal Co. of Heavener has increased its capital stock from \$47,000 to \$65,000. This company carries on coal-mining operations in the vicinity of Heavener and is planning to enlarge its operations there.

C. H. Hyde has filed before the Corporation Commission of Oklahoma a petition asking that the commission take up the question of coal prices in Oklahoma. Mr. Hyde represents the Farmers' Union of Oklahoma in the action taken. It is alleged that prices charged the farmers for coal at Henryetta are unreasonable and excessive, and it is asked that the commission take cognizance of the situation and under its authority in anti-trust matters that it regulate prices charged for coal in the state.

The Lamont Fuel Co. of Henryetta has been organized with a capital stock of \$25,000. The company will conduct coal-mining operations in the vicinity of Henryetta. Incorporators are J. E. Lamont, Sue Lamont and H. A. Booth, all of Henryetta.

PENNSYLVANIA

Joseph J. Walsh, State Secretary of Mines, has named a special committee to investigate the cause of the Shanktown mine disaster, in which thirty-six miners lost their lives. The committee consists of Thomas S. Lowther, of Indiana, Pa.; T. J. Lewis, of Punxsutawney, and Nicholas Evans, of Johnstown. All of the members of the investigating committee are bituminous-mine inspectors and they started their investigation Feb. 6. The committee will be joined during its investigation by J. W. Paul, of the U. S. Bureau of Mines.

The State Workmen's Compensation Board has modified its ruling relative to hospital expenses in compensation cases. The original ruling, adopted in 1919, provided that in accidents happening after Jan. 1, 1920, "where there are both medical and hospital charges, or hospital charges alone, the board will rule \$100 as a maximum charge of the latter." This \$100 maximum payment to hospitals has now been removed but the burden of proof that the expenses have been greater than this amount is placed upon the hospital. The board will consider all cases on their merits.

The Okonite Company, Passaic, N. J., has recently opened a branch office at Pittsburgh. It will be in charge of Edward A. Damrau, district manager.

The Department of Mining and Industry at Harrisburg reports that during the forty-seven weeks that the mines were operating 18,873,000 net tons of anthracite was mined in Lackawanna County. In 1922, when work was suspended for five months and eleven days, only 11,283,004 tons was produced. Last year's tonnage, however, fell short of the output of 1919, 1920 and 1921, when 19,631,494, 20,023,567 and 19,695,315 net tons was mined, respectively. The total output in Pennsylvania for the year 1923 is shown in the reports to have been 89,600,000 net tons.

Not a single fatality occurred in 1923 from gas or dust explosions in the bituminous mines of Pennsylvania, according to Joseph J. Walsh, Secretary of Mines. There were 195,000 persons employed in the bituminous mines. Secretary Walsh said that there is sufficient methane expelled daily from the bituminous mines to make 30,000 tons of firedamp. Eight hundred million tons of air was pumped into the mines to drive out the gas and, according to the Mines Department chief, the air passing through the mines last year in the ventilating systems weighed approximately eight times as much as the coal mined.

A state charter has been issued at Harrisburg to the Southern Anthracite Collieries Co. of Wilkes-Barre, with a capital stock of \$5,000. The incorporators are T. H. Rippard, Wilkes-Barre, treasurer; Walter J. Bennett, Towanda, and Harry A. Mackie, Kingston. The purpose of the corporation is to acquire coal and coal land.

The Davis Coal & Coke Co., Uniontown, has been incorporated with \$25,000 capital. The company will mine coal and manufacture coke and sell them. John A. Henry, Uniontown, is the treasurer of the company and the incorporators are W. J. Reilly and M. W. Callaghan, of Uniontown, and J. L. Miller, Wilkingsburg.

A state charter has been issued to the Blanchard Youghiogheny Coal Co., Pittsburgh, mining and preparing coal for the market. The company has a capital stock of \$5,000 and J. S. Trageser, Pittsburgh, is treasurer. The incorporators are William G. Blanchard, P. W. Rainer and W. C. Jamison, Pittsburgh.

UTAH

A. D. Pierson, former head of the sales department of the Utah Fuel Co. and widely known throughout the mountain states and Pacific Northwest as a coal man, has left for San Francisco, where he will act as district sales-manager of the Utah Coal Sales Agency, a branch of the United States Fuel Co. of Salt Lake City. Of late Mr. Pierson has served the United States Fuel Co. as railroad fuel agent. He will be accompanied to the Coast by Frank W. Morrison, chief clerk.

Coal production in Utah in 1923 totaled 4,627,570 tons, compared with 4,892,657 in 1922. The State Mining Department said another 40,000 could be added to the 1923 output on account of mines worked by farmers.

The Star Coal Co., of Ogden, has filed articles of incorporation showing capital stock amounting to \$1,100,000, divided into 100,000 shares of common stock of par value of \$1 and 100,000 shares of preferred stock of \$10 par value. Charles H. Smith is president and James L. Donnelly secretary-treasurer. The property of the company is in Lincoln County, Wyoming.

The Utah Briquetting Co. has applied to the State Securities Commission for permission to sell 5,000 shares of common stock at \$10 per share. The company proposes to manufacture briquets for fuel from slack coal and lignites.

WEST VIRGINIA

Interests identified with the Youghiogheny & Ohio Coal Co. have organized the Simpson Creek Collieries Co. and have taken over the property and holdings of the Simpson Creek Coal Co. in West Virginia. It was announced at the annual meeting of stockholders at Baltimore on Feb. 6. This property consists of approximately 2,700 acres of thick-vein Pittsburgh coal in Taylor and Barbour counties, in the Fairmont region. The consideration involved in the transaction was not made public. It was announced that the Simpson Creek Coal Co. would retain its corporate existence, with its present staff of officers.

The Kingston Pocahontas Coal Co., operating at Hemphill, announced a reduction in wages effective Feb. 1, notices to that effect having been posted at the mines. It is stated that there has been a reduction in all classes of labor amounting to 10 per cent at the Exeter operation and affecting 125 men. At the Warwick operation of the same company the cut amounts to about 20 per cent and affects about 350 men. For some time these plants have been running only about 20 days a month. The company hopes, by adjusting its wage scale, to be able to run the mines day in and day out.

According to compilation made by the West Virginia Department of Mines 70,188,203 gross tons of coal was produced in the state during the fiscal year ending June 30, 1922, through the use of 5,786,752 lb. of permissible explosives. A table prepared by the department shows that 396,561 kegs of powder and that 380,268 lb. of dynamite were used, with 888 operations reporting. The cost per keg of powder to the miner, taking the state as a whole, was \$2.39 and the cost per pound of dynamite 22c. More powder was used in Logan County than in any other county in the state in the fiscal year, the quantity being 88,008 kegs of powder and 495,263 lb. of dynamite. Mines in McDowell County used more dynamite than the mines in any other county in the state, the quantity being 132,792 lb. In the same county 86,008 kegs of powder was used. McDowell County mines led those of any other county in the quantity of permissible explosives used, 1,334,254 lb.

Two large blocks of coal have been shipped by the Consolidation Coal Co. to Italy for exhibition purposes. One block weighing six tons was removed from Mine No. 22 of the company, at Monongah, and sent to Baltimore to be shipped to Genoa, Italy, as a part of the company's industrial display. This block was 4½ x 4½ x 8 ft. and is described as one of the largest ever removed from northern West Virginia. It is low sulphur coal. Another block weighing five and a half tons, 9 ft. high and 4 ft. square was shipped on Feb. 3 from the Hoffman No. 3 mine, near Eckhart, in the Georges Creek field, to Baltimore and is now on its way to Milan, Italy, where it will be displayed at an industrial exposition. The coal is from the Georges Creek big vein. It required seven days work by four miners to cut and remove the large block.

As a result of wage reductions in some of the fields of southern West Virginia some mines are operating on the 1917 scale. No general or concerted action, however, has been taken among the operators of non-union mines in adjusting wages to meet prevailing market conditions. Such action has been taken only where it was necessary in order to continue operations or to resume operations. Some of the mines in the New River field are operating under such readjustment also some in the Winding Gulf and the Kanawha fields. The basic wage for mine labor in the New River field amounts to about \$7.50 a day. The reduction approximates about \$2 a day in some instances. As a rule wherever the new scale has been posted the miners have accepted the decrease and in some instances have asked for it, in order to permit a continuance of operations.

WISCONSIN

The Carnegie Dock & Fuel Co. has won its tax case in the U. S. District Court at Superior. The company was taxed about \$8,000 for railroad coal held on its docks. The District Court held that the coal was railroad property, despite its location, and was non-taxable. This case was in the nature of a test, as all other docks in Superior have similar tax problems.

January shipments from the Head-of-the-Lakes docks will run close to 24,000 cars, as compared with 17,000 cars in December. Much of this movement is on back orders. It is estimated that 4,600,000 free tons are still on the docks.

WASHINGTON, D. C.

The committee appointed by the National Coal Association to study the English coal exchanges consists of the following members: F. W. Wilshire (Chairman), vice-president, Consolidation Coal Co., New York City; T. F. Farrell, second vice-president, Pocahontas Fuel Co., New York City; H. N. Taylor, president, United States Distributing Corporation, New York City.

W. M. Fridell, district manager, Washington Coal Co., announces that the company has opened a new office in the Kresge Building, 11th & G Sts. This concern is a large wholesale coal dealer.

CANADA

Canadian Collieries (Dunsmuir), Ltd., is unwatering No. 8 mine, at Courtenay, Vancouver Island, and will commence mining operations as soon as the mine is free from water. Locally, the mine is known as the mystery mine, because some ten years ago it was equipped with the most modern machinery available at that time but no coal has been taken from the property since, probably because of low market. Included on the property were 60 houses for employees, 20 of which, however, were destroyed by a brush fire last spring. The coal in some of the company's other mines is now being mined at long distances from the surface and No. 8 mine can be operated more cheaply.

The Vancouver Island Branch of the Canadian Institute of Mining & Metallurgy met in Cumberland, B. C., on Jan. 12. Charles Graham, district superintendent of the Canadian Collieries (D), Ltd., presided. George O'Brien, safety engineer with the Canadian Collieries, gave a talk on "Ancient and Modern Methods of Gas Detection and Mine Illumination," in which he referred especially to the efficiency of the Burrell Gas Detector. He predicted that it would not be long before the flame gas detector was entirely eliminated in coal-mine work.

A demonstration of the coking of several carloads of Nova Scotia and New Brunswick soft coal took place at the official opening of the new coking plant of the Hamilton Byproducts Coke Ovens, Ltd., at Hamilton, by Charles Stewart, Minister of the Interior and of Mines. Dr. Charles Camsell, chairman of the Dominion Fuel Board, and a number of other government and company officials were in attendance. The result was regarded as highly satisfactory confirming the tests made by the Dominion Fuel Board at the laboratory at Ottawa. Mr. Stewart deferred making any positive statement until an analysis had been made by the government chemists, who will continue their investigations at the plant for a week or so. He, however, expressed himself as most hopeful that their findings would be favorable and prove that a solution of the fuel problem had been reached by the coking of soft coal for domestic use. The Hamilton plant represents an investment of \$4,000,000 and was designed and built by the Smet-Solvay Co.

During the month of December, 1923, there were produced in British Columbia 210,151 tons of coal, an increase as compared with the output for November of 9,636 tons. Of this the Vancouver Island field is credited with 135,361 tons, or 64.46 per cent of the provincial total, an increase as against the previous month's figures of 2,966 tons. The Nicola-Princeton Mines produced 20,067 tons in December, which is 775 tons less than in November, while the output for the Crow's Nest Pass field during December was 54,723 tons, an increase of 7,445 tons, or 26.04 per cent of British Columbia's production for December.

New Equipment

An Underfeed Stoker

The Combustion Engineering Corporation, of New York, has recently developed a new stoker called the Frederick Multiple Retort. It operates upon the true underfeed principle and is built in central and superstation types.

The retorts have a relatively large

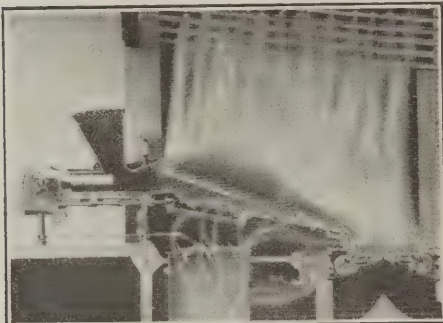


Fig. 1—Stoker Using Underfeed Principle

The fuel is first fed to the coking region and then on into the center of the fuel bed, where it burns over tuyeres of novel design.

main feeding ram 9½ in. in diameter, feeding approximately 20 lb. of fuel per stroke. The strength of the connecting rod, steel crankshaft and bearing brackets is considerably increased to provide a large margin of safety. The shearing pin is designed to receive a positive shearing stress at all times.

Two sprockets of different ratio are employed on the speed shaft, allowing each gear box to be operated at a different capacity. In the large types this makes the maintenance of an even fuel bed more positive.

The secondary ram, as shown in Fig. 2, is said to be one of the most notable of recent advances in the development of stokers; the fuel-feeding and fuel-agitating parts are composed of tuyeres forming an active fuel-burning surface. The tuyere design—also a

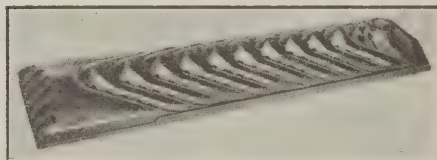


Fig. 2—Secondary Ram

The design of this ram is such that it pushes the fuel and supplies air to the re-arranged coal.

new feature—has curved vanes which insure proper guiding of the air into the fuel bed and an even air distribution without any shock.

The underfeed section is inclined 20 deg. from the horizontal and its large area within a certain furnace dimension provides for the prevalent tendency to increase combustion rates and makes it possible to do so without excessively high combustion rates per square foot of grate surface. This increase in underfeed grate area is accomplished

by dispensing with the usual long extension grate. In this way it is possible for the secondary ram to gradually force the green or uncoked coal into the entire fuel bed.

A row of non-clinking furnace blocks is installed above the retort caps as part of the stoker. These blocks form an air space to which air is supplied from the stoker windbox. The air passes through the hollow retort caps, cooling them, and then passes across the fuel bed through the perforation of each block.

Each stoker also is equipped with air-cooled dumping grates, which prevent the forming of clinkers.

E M B Resistance Again Obtainable

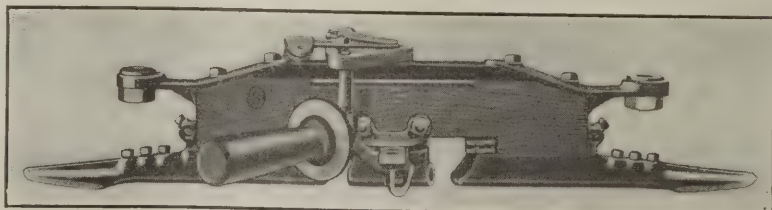
During the war many mining men found that E M B Resistance was not obtainable and no doubt they will be pleased to know that this resistance is now being handled by the C. H. McCul-



Fig. 1—E M B Resistance Elements

lough Engineering Co., 2327 Oliver Bldg., Pittsburgh, Pa.

This resistance is produced from long drawn out ribbons of unbreakable and rustless material. Each bank of resistance consists of a long jointless piece of this material set in the usual form of resistance box frame. The material making up the resistance is drawn absolutely uniform in cross-section and therefore, according to the manufacturer, there is no risk of local fusing. To take out taps or connections, terminals of high-grade gun metal are bolted to loops in the resistance and therefore the spacing of controller attachment points is very readily made.



Section Insulator Switch with Grounding Attachment

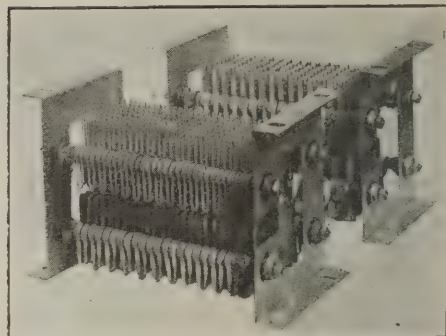


Fig. 2—Resistance Banks for Mine Locomotives

For mining service, these resistances have been applied to various types of machines, being most successful on mine locomotives, coal-cutting machines, coal loaders and hoists where there always is considerable vibration.

Locking-Type Section Insulator Switch

A locking-type section insulator switch, primarily designed to comply with the Pennsylvania compensation rating schedule, but a desirable design for any mine, is the latest addition to Ohio Brass Co. section switches.

The switch has a knife-switch blade and contact clip on the top which are engaged when the switch proper is opened. A permanent grounding cable can be installed in a lug on the switch, so that when the trolley circuit is opened, the dead side becomes grounded. The switch clip on the top has holes for insertion of a padlock, which locks the switch open.

These two features make compliance with the Pennsylvania schedule quite simple, as they incorporate all of the requirements for a section insulator into one piece of apparatus and preclude the need of special attachments or special methods of overhead construction.

The lock switch also has the new method of suspension provided on the later O-B switches, which consists of support brackets set at a comparatively low point on the ends of the insulating member. This shaping permits the use of insulated hangers without need for cutting into the roof for clearance or for raising the switch. The switch is supported in a higher position so that the general height of the trolley is not affected where a section switch is installed.

Setscrew lugs at each end of the switch provide a means for running a feeder line through the switch, the feeder line thus being opened when the trolley circuit is opened.

COAL AGE

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Those Massachusetts Coal Tests

IN THIS issue O. P. Hood records his findings in Massachusetts as to the quantity of ash in anthracite. It is a little disturbing to read that it is necessary to take 1,000 lb. samples. Portentously we are told that a correct method of sampling coal has been devised and that to this end 1,000-lb. samples must be taken. How bold it is to question such a redoubtable standard as this seems to be! But the dictum is so positive that it sounds convincing. However, perhaps it is not more necessary to take a thousand pounds than to carry *pi* to ten places when calculating horsepower from the area of a piston or to use ten places of decimals in calculating co-ordinates for a mine survey.

After all there is in the lives of all of us something more important than meticulous accuracy. Some people will haggle over a cent and lose a dollar, will fuss over three or four inches in the width of a farm and then to save the expense of another survey will take the next area on faith; measure to hundredths of a foot yet fail to close a survey by four or five minutes.

The Bureau of Mines seems possibly in danger of this. It would do well to have a standard less meticulous and apply it more often. It seems too much like cutting down a forest to find how many board feet can be obtained from it.

The public is not so much interested as to whether its coal has one or two per cent more or less ash than a certain standard, but it is interested in knowing that it does not have twenty or thirty per cent more and in stopping all those who are putting such unburnable rubbish in the home, the factory and the market.

The law is not so much to exhibit authority with the responsible producer but to make matting unbearably hard for the irresponsible man just as soon as he tries to get into the market.

Trying to make too close and too expensive a survey will result ultimately in no survey being made. As engineers and not theorists the Bureau of Mines should seek to serve the public in the most practical way possible, and that is done not by attempting too much refinement in analysis but by a broader survey of conditions with less perfect analyses.

We are not convinced by the argument that as the value of a ton of coal is greater than that of a ton of ore so large a sample should be taken. The ore is improved by crushing. That indeed is the first step in beneficiation. Coal is spoiled by the same process. Crushing coal is not a beneficiating step but a degrading one. The difference is not one of words but of facts. If all the coal were bettered by crushing, the operator willingly would let the government crush it all and take a 50-ton sample, but seeing that this is not true even a 1,000-lb. sample looks large.

To revert to another phase of Mr. Hood's papers, in large letters should be written the fact that the Bureau found dealers mixing dirty and clean coals together,

hoping to make the dirty coal salable. The extent to which this is done, especially in times of shortage, should make anthracite operators take action. The public is shown shipping slips from responsible operators and is delivered coal in which that company's product may form only a small percentage.

Against the Day of Rain

WHEN it is fine weather, says the old proverbial saying, it is needless to repair the roof, and when it rains the roof cannot be repaired. This holds true of correcting the evil of dirty coal. Just now there is not much trouble with coal quality and the public clamor is stayed, so why fuss about the matter? Let it lie, is the general dictum. Nevertheless during this fine weather is the best time to repair the roof of industry and not during the day or days of rain.

Today the industry can take matters in its own hands. It can convince the public that it means business. When a strike threatens or comes it will be too late. The public may—probably will—enact some statute the industry will not like. Before it does so the coal producer will be besmirched. He may get more than government inspection. He may get government regulation; even government ownership. A little shingling of the roof now may save more drastic action later.

No one can hide one's face to the fact that during all shortages of anthracite and bituminous coal all kinds of impure product found its way into the market. In the anthracite region men, either from that region or from others, loaded culm banks unwashed. Men who knew nothing more about coal than that anything remotely resembling it would sell went into the business of producing it or at least of gathering it up.

So bad was it along one line of railroad that the principal producer caused the coal in cars loaded by others to be sampled so that if an investigation came that company could assure Congress of the real source of the coal and exonerate itself. The investigation never came, but the indignation did, and the principal coal company on that road, the one connected with the railroad, unquestionably got the blame and yet had no chance to make a disclaimer.

In fact all the big companies in the anthracite region came in for a share of it, for when dirty coal comes into the market the outstanding companies must bear the brunt. It must be they who are at fault, says the man on the street, for see how rich they have become. The average man cannot understand that a large company more often grows on honesty than on crooked dealing.

In the bituminous field it was little different. The waste from washeries mysteriously disappeared being loaded into cars. Some of this inferior coal may have been sold for just what it was, and the buyer in that case may not have been deceived, but some doubtless were. Here again the whole industry suffered. How-

ever, it is not so detrimental when industrial purchasers are defrauded. As they buy in carload lots they can make their claims for damage direct, and they can go elsewhere in future. Buying in large quantities, it is worth their while to bring suit, and the producer, knowing that fact, is obliged to be reasonably careful.

But the domestic buyer is often obliged to deal with one merchant, no matter how ill he serves him, and even if he has a choice the dealer may be able to convince him that the coal was bought as a good product and that he is more sinned against than sinning. Furthermore, dealers can easily bring pressure on buyers. A purchaser often fears to complain. He might be refused coal when next he wanted it; he might even quietly be blacklisted. After all it is difficult to remove coal from a cellar, and once there it stays there and the buyer pays. Certainly it does not pay to go to court for a winter's coal or less.

"Let the buyer beware" may be good English and American law. If, however, a man gives us a bad bill or a bad dollar, do we believe that we are to blame and that we should have been on our guard? It is well to remember that much good law is bad morals and to quote bad law in defense of the questionable conduct even of our unfair competitors is little but a folly.

John, Rex, Still Rules

THE loose talk about an impending split in the United Mine Workers because of dissatisfaction with the rule of John L. Lewis is not convincing. Lewis is in no worse position before his own people now than most other presidents of the United Mine Workers have been at various times in their invariably tempestuous careers. Nobody can be head of the miners' union without serving as target for all the decayed fruit within the reach of the union malcontents. There always was and always will be rebels in the union and some day they will run Lewis out just as rebels so frequently have done to other presidents. But there are no signs that Lewis is now on his way. He has as much power as he ever had to make his people respect contracts.

The fact that reds made a loud noise in the miners' convention at Indianapolis last month means nothing much. The total number of real radicals did not pass 250, but 250 reds, seeing they could worry 1,700 in a convention, naturally kept up their disturbance. Quite a number of others joined in for fun, judging by their remarks. A two-weeks' miners' convention simply must have a bit of diversion to break up the droning of committee chairmen.

Even the fact that the administration had a close shave in the one roll call of the convention—a vote on the question of whether Lewis should be stripped of the power to appoint organizers—does not indicate that the union is on the point of splitting. It does mean, however, that dissatisfaction with Lewis on that particular matter is widespread and that the feeling has rolled up so much intensity that something will have to be done about it. Lewis is crafty enough to do something.

He will manage, before the next convention, to use his appointive power so judiciously that the issue will not be so formidable again. The chances are that organizers will give a better appearance, in the future, of earning their monthly \$300 pay checks. They will serve the whole organization instead of its president.

Anyway, Lewis will devote more of his undoubted genius to making those organizers popular with the rank and file. He nearly lost his right to choose them; he cannot afford such a loss. If he could not appoint them, a few disloyal organizers, elected by districts, might well produce a real schism in the union. There is no dangerous schism now. John L. Lewis, virile as a power plant, still rules.

"Consolidate!" They Cry

FEVERISH movement toward consolidations of mines in various bituminous-coal fields is gaining headway daily. Operators both strong and weak turn their thoughts upon it—the former in the hope that it will improve conditions of operating and marketing; the latter in pure desperation. In some regions the proposal is overshadowing almost every other subject except wages.

Of course, consolidations are logical at a time like this. An industry 30 per cent overdeveloped and for years harassed by cut-throatism within itself certainly needs stronger business units and fewer fly-by-nights. But consolidation is no panacea for all the ills of coal. It should not be looked upon as a rejuvenating monkey gland to be hastily and recklessly ingrafted on any and all devitalized coal companies. If such companies cannot justify their existence separately, consolidations should not and probably cannot save them.

The natural desire to bunch together for mutual protection has led operators to consider some grotesque schemes for business groupings. Most such schemes are hopeless. For instance, in a field where many small producers have worked their own undoing time and again by mutual distrust and stealthy price cutting, what hope would there be in a "consolidation" which consisted only in the various companies selling through a common agency? There would be no accurate control over the entire output of the mines involved. There would be no reduction of mine costs through central management. There would be much opportunity for discrimination as between members. The cohesion of the group would be weak. It would fly apart on small provocation and upset the market and conditions generally. It would be no consolidation at all. Any half-hearted plan for weakly linking up mines or partially pooling properties is a futile dream.

The only permanent and substantial benefits from consolidation will be enjoyed by those properties which have an unquestioned right to continue serving the public and which form natural and logical groups under single ownership and control. However, we may expect to see and hear a good deal during the next few months about other sorts of coal properties being buffeted about through one scheme after another until the elimination process has done its worst.

But this consolidation wave will not engulf every independent company. It will help natural processes wash out bone and dirt, leaving the industry somewhat purged. While this is going on, good operating men everywhere, both in consolidation and out, will continue to be surprised at their own ingenuity in whittling down the costs of coal, the mechanizing of mines will spread apace, and about 5,000 good properties will continue prosperously to supply the nation's tremendous demand for half a billion or more tons of coal every year.

Famous Old
Merrimac Mine,
which furnished
Coal to Confederate
Ironclad of that
Name in Civil War



Mine is Owned
by Merrimac
Anthracite Co.
and lies on
Norfolk & Western
and Virginian
Railways

Can the Valley Coal Fields of Virginia Compete With Those of the Anthracite Region?

Coal Is Semi-anthracite, Slightly Lower in Rank Than the Lykens Valley Product, but That Is an Advantage
—Ash Content High, Being from 14 to 28 per Cent

MORE promising than the rest of the coal areas of Montgomery, Pulaski and Wythe counties of Virginia are those which have been named the Valley coal fields. They recently were examined by the U. S. Geological Survey and the Geological Survey of Virginia to ascertain their extent and value.

The most important questions concerning these coal areas are: What is the quality of the coal? Is it an anthracite, and if so can it successfully compete with that of Pennsylvania? If it is not an anthracite, has it distinctive properties of its own that will please the consumer and lead him to continue its use?

The accompanying table contains all the recent government analyses of this coal. These should be carefully studied by anyone who contemplates investing in this field or handling the coal, for they afford the means of determining the rank, grade and market possibilities of the fuel.

COAL IS NOWHERE A TRUE ANTHRACITE

The Geological Survey reports unqualifiedly that this coal is not an anthracite. An anthracite, according to the accepted meaning of the term, is a coal so low in volatile constituents that it burns with a bluish flame only and not the short yellowish flame that is characteristic of the Valley coals. A comparison of the analyses of samples of anthracite shows that in coals which burn with a blue flame the volatile matter is one-tenth or even less than one-tenth of the fixed carbon.

NOTE—The facts in this article are supplied by U. S. Geological Survey, which expects later to publish a printed report.

As the supply of Pennsylvania anthracite is decreasing and its price is steadily mounting there is an eager and growing demand for a satisfactory and cheap substitute. Many of those proposed are more or less satisfactory, but one of the most promising, especially for use in the Middle Atlantic States, the Mississippi Valley, and the Great Lakes region, is a semi-anthracite that is mined in fields in southwestern Virginia, in or near the Great Valley, in Montgomery, Pulaski and Wythe counties.

This relation generally is expressed as the quotient of the percentage of fixed carbon divided by the percentage of the volatile matter. This is called the fuel ratio. The fuel ratios of the Valley coals are given in the last column of the table of analyses. This table shows that the coal of highest rank from the Valley fields has a fuel ratio of 8.5. The fuel ratio of anthracite of the lowest grade is 10, so that all the coals here considered are below the rank of a true anthracite.

This coal evidently is not an anthracite and should not be placed upon the market under that name. The next question is: Has it distinctive properties which will enable it to compete with Pennsylvania anthracite or which will cause it to be so liked by the consumer that he will prefer it to any other coal on the market?

The answer to this question must depend largely upon how well the Valley coal is prepared before marketing, but if it can be so treated that the ash will not exceed 8 per cent this coal may possibly obtain a market of its own that can be held against all comers.

The coal with which the Valley product is most often compared is the Lykens Valley coal, which occurs at the west end of the Southern Anthracite field of Pennsylvania. This coal commands a substantial premium above the highest rank or "dry" anthracite, because it contains more volatile matter and therefore burns with a short yellow flame that makes it attractive as a grate fuel. Its higher percentage of volatile matter also makes it ignite more readily than ordinary anthracite, and this is another point in its favor.

The Valley coals are slightly lower in rank than the

Lykens Valley coal, but they are not low enough to be called smoky coals, and consequently there seems to be no reason why these Virginia coals should not find as ready a market as the Lykens Valley coal, provided the ash is reduced to the percentage above noted.

If the Valley coal is not an anthracite, what should it be called? It has just been shown that this coal should not be classed as anthracite because its percentage of volatile matter is too high, but the analyses show that it is only slightly below that rank. In other words, it must necessarily fall into the next lower rank. The next rank below anthracite is semi-anthracite, and this rank includes coals whose fuel ratios range from 5 to 9.9.

The table of analyses shows that practically all the coals of Montgomery, Pulaski and southern Wythe counties fall within this rank, though they differ considerably among themselves. The coals of the Price Mountain and the Pulaski fields head the list and are followed closely in descending order by the coal mined at Empire, at Gunton Park, and lastly by other coals of the Little Walker Mountain and Brushy Mountain fields.

The Valley coal now being mined should therefore be marketed as a semi-anthracite, but if properly cleaned it will perhaps be an even more attractive fuel for some purposes than the "dry" anthracite of the Pennsylvania fields.

The coals of the Reed Creek and Bland fields seem to fall below the rank of semi-anthracite, but as all the

samples available for analysis consisted of more or less weathered coal they may not correctly represent the real unweathered coal. If unweathered material were available analyses might show that the coal belongs to the same rank as the coal of the fields to the south.

SOME BONY COAL QUITE HIGH IN VOLATILES

At most places in these fields the coal beds that are mined show a great variety of coal, some of it very soft and flaky, some hard and bony, and some that resembles black sand. No two operators or even miners agree as to the real nature of these peculiar kinds of coal or as to whether they should be classed as coal or as bone. In order to settle some of these questions samples of two of these varieties were analyzed.

Sample 94,182 is so-called "sand coal" from the Merrimac mine, in the Price Mountain field. This coal is common in the Merrimac bed wherever it has been mined and prospected. The analysis is rather surprising, as the "sand coal" contains more volatile matter than the coal in the rest of the bed. Thus, a mine sample which was obtained in a cut across the coal bed and which included all except the distinctly bony layers showed on analysis 9 per cent of volatile matter and 17.1 per cent of ash, whereas the "sand coal" from the same locality showed 22.3 per cent of volatile matter and 25.2 per cent of ash.

The explanation of the high percentage of volatile matter is found in the composition of the coal. Under

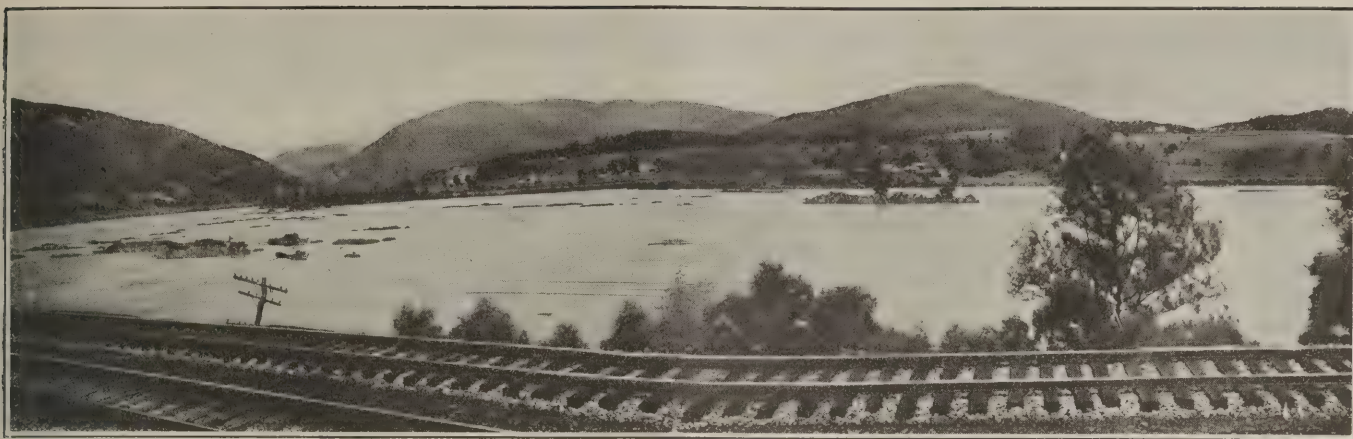
Proximate Analyses of Coal Samples from the Valley Fields of Montgomery, Pulaski, Wythe and Bland Counties, Va.

(All analyses made by the U. S. Bureau of Mines)

Name of Mine, Prospect, or Operating Company	Coal Bed	Lab. No.	Analysis of Sample as Received					British Thermal Units	Analysis of Pure Coal		Fuels Ratio FC VM
			Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur		Fixed Carbon	British Thermal Units	
Brushy Mountain Field, Montgomery County											
Slusser & Doss	Merrimac	94,184	4.8	10.0	69.7	15.5	0.5	12,240	87.4	15,350	6.9
M. J. Slusser Coal Co.	Merrimac	19,358	1.9	12.3	66.8	19.0	0.7	12,160	84.4	15,360	5.4
M. J. Slusser Coal Co.	Merrimac	22,629	1.6	12.3	68.1	18.0	0.5	12,340	84.7	15,340	5.5
M. J. Slusser Coal Co.	Merrimac	22,630	1.9	13.5	69.8	14.8	0.6	12,710	83.8	15,260	5.2
M. J. Slusser Coal Co.	Merrimac	30,689	2.1	13.9	68.7	15.3	0.6	12,610	83.2	15,280	4.9
M. J. Slusser Coal Co.	Merrimac	30,690	1.7	14.1	69.4	14.8	0.5	12,850	83.1	15,380	4.9
Diamond Coal Co.	Merrimac	93,530	2.3	12.7	58.7	26.3	0.5	10,770	82.2	15,080	4.6
Diamond Coal Co.	Merrimac	93,531	2.7	12.9	68.2	16.2	0.5	12,460	84.0	15,360	5.3
Plunkett & Wall	Merrimac	19,357	2.5	12.4	67.5	17.6	0.5	12,360	84.5	15,480	5.5
Seymour Price and Co.	Merrimac	19,360	4.7	11.5	65.4	18.4	0.6	11,820	85.1	15,380	5.7
College Mine	Merrimac	93,536	2.4	11.8	70.5	15.3	0.5	12,760	85.6	15,500	5.9
College Mine	Merrimac	93,537	2.7	12.4	68.8	16.1	0.5	12,470	84.7	15,380	5.5
A. Dunphy Coal Co.	Merrimac	95,621	0.7	12.9	65.2	21.2	0.5	11,970	83.5	15,330	5.1
Linkous and Kipp	Merrimac	93,533	2.9	11.7	69.7	15.7	0.5	12,570	85.6	15,450	5.9
Linkous and Kipp	Merrimac	93,534	2.7	11.9	67.3	18.1	0.5	12,230	84.9	15,440	5.6
J. H. Keister	Langhorne	93,539	2.9	12.3	72.0	12.8	0.3	12,890	85.4	15,290	5.8
Superior Anthracite Coal Co.	Merrimac	95,615	2.0	12.7	65.0	20.3	0.8	11,900	83.6	15,320	5.1
Little Walker, Mountain Field, Pulaski County											
Pulaski Anthracite Coal Co.	Merrimac	19,431	2.4	11.6	63.3	22.7	0.7	11,310	84.5	15,100	5.5
Pulaski Anthracite Coal Co.	Merrimac	30,694	1.6	13.3	61.5	23.6	0.7	11,400	82.2	15,240	4.6
Pulaski Anthracite Coal Co.	Merrimac	94,186	2.1	12.0	61.9	24.0	0.5	11,230	83.7	15,190	5.1
Pulaski Anthracite Coal Co.	Merrimac	94,187	1.6	11.7	61.6	25.1	0.7	11,170	84.0	15,220	5.2
Cloyd Mine	Merrimac	20,722	2.5	10.8	63.1	23.6	0.4	11,250	85.4	15,220	5.9
Empire Anthracite Coal Co.	Langhorne	30,695	3.1	9.8	69.9	17.2	1.1	12,310	87.7	15,450	7.1
Empire Anthracite Coal Co.	Langhorne	75,888	4.4	10.1	71.5	14.0	0.5	12,520	87.5	15,330	7.0
Empire Anthracite Coal Co.	Langhorne	75,889	4.8	9.7	71.0	14.5	0.6	12,460	88.0	15,450	7.3
Empire Anthracite Coal Co.	Langhorne	94,189	2.5	9.9	68.2	19.4	1.6	11,980	87.3	15,330	6.9
Empire Anthracite Coal Co.	Langhorne	94,190	1.6	9.9	70.0	18.5	0.4	12,240	87.7	15,330	7.1
Price Mountain Field, Montgomery County											
Lykens Hill Coal Co.	Merrimac	19,403	1.7	9.4	66.6	22.3	0.7	11,570	87.7	15,220	7.1
Merrimac Anthracite Coal Corp.	Merrimac	30,692	3.6	9.5	67.6	19.3	0.5	11,850	87.6	15,380	7.1
Merrimac Anthracite Coal Corp.	Merrimac	94,180	1.4	9.0	72.6	17.0	0.5	12,510	89.0	15,320	8.1
Merrimac Anthracite Coal Corp.	Merrimac	94,181	2.7	9.7	70.5	17.1	0.5	12,110	87.9	15,110	7.3
Merrimac Anthracite Coal Corp.	Merrimac	94,182	1.6	22.3	50.9	25.2	0.3	8,690	69.5	11,890	2.3
Brunfield Coal Co.	Merrimac	95,619	2.5	8.8	74.6	14.1	0.5	12,880	89.5	15,420	8.5
Eureka Coal Co.	Merrimac	94,185	3.8	9.2	69.7	17.3	0.7	11,990	88.3	15,190	7.5
Pulaski Field, Pulaski County											
High Carbon Coal Co.	Merrimac	94,192	4.5	8.2	63.9	23.4	0.3	10,880	88.7	15,080	7.9
Max Meadows Field, Wythe County											
W. B. Gunton's prospect		30,696	3.8	9.4	62.2	24.6	0.8	10,960	86.9	15,310	6.6
Pulaski Smokeless Coal Co.	No. 1	93,937	2.9	9.6	63.8	23.7	1.6	11,200	86.9	15,270	6.6
Pulaski Smokeless Coal Co.	No. 1	93,938	3.1	9.7	66.6	20.6	0.7	11,700	87.3	15,330	6.9
Pulaski Smokeless Coal Co.	No. 2	95,461	1.8	9.8	60.0	28.4	0.6	10,530	86.0	15,100	6.1
Millers Creek prospect		20,721	6.1	11.1	49.7	33.1	0.3	8,950	81.7	14,720	4.5
W. Fork Millers Creek prospect	No. 3	93,540	3.1	11.4	66.2	19.3	0.5	11,920	85.3	15,360	5.8
Reed Creek Field, Wythe County											
Dr. J. P. Graham's prospect		95,620	1.3	18.3	70.7	9.7	2.3	13,830	79.5	15,520	3.9
C. C. Brown's prospect		93,670	2.8	20.4	53.2	23.6	0.6	11,330	72.3	15,410	2.6
Bland Field, Bland County											
T. C. Thompson's prospect		95,405	3.6	12.0	35.2	49.2	1.0	6,660	74.7	14,090	3.0
Howard Stowers' prospect		95,406	2.7	12.9	37.5	46.9	1.5	7,280	74.4	14,460	2.9

The form labeled "pure coal" is only moisture and ash-free coal. No. 95,621 is a grab sample of dull splint coal. No. 94,182 is a grab sample of so-called "sand coal." No. 95,620 is picked coal from a weathered stockpile. Nos. 20,721,

93,670, 95,405 and 95,406 are from old caved prospects, and the coal is doubtless affected by weathering.



New River from the Parrott Coal Mine, New River Field, Virginia

The Parrott mine is operated by the Pulaski Anthracite Coal Co., on the Norfolk & Western Ry. It is located in the Merrimac bed, the same which is operated by the celebrated mine of that name. The area across the New River is Montgomery County.

Though the river is the same, this field, despite its name, is far removed from the better known New River coal region of West Virginia, which is on the lower reaches of this same river. The measures here are far older than those in the West Virginia

field, the volatile content of the coal is much lower, and the coal has considerably steeper pitches. The dip varies from 35 to 50 deg., making the area of extractable coal only about half a mile wide, provided the dip continues thus far without diminution.

the microscope the granules, which resemble grains of black sand, were seen to be seeds and spores of plants—the most waxy or fatty material that is found in coal. This waxy material gives to the “sand coal” its high content of volatile matter. Its high content of ash relegates it to the class of bone, and it should be thrown out by the pickers unless in some way its good materials may be utilized and its bad ones eliminated.

The Merrimac bed in many places contains a layer of dull coal that resembles gray splint. A sample of this material was obtained from a car of coal from the mine of the A. Dunphy Coal Co., which is just south of the old College mine on Toms Creek, northwest of Blacksburg.

Sample 95,621 consists of dull splint-like coal, and the analysis shows practically no difference between this sample and one representing the entire coal bed in the College mine, except that the coal from the Dunphy mine contains more ash. Here again the material should be classed as bone and discarded unless the percentage of ash can be materially reduced.

THERMAL VALUE OF PURE COAL HIGH

The table of analyses shows the poor points of the Valley coal as well as the good points. The good points include the extremely low content of sulphur and the high heating value of the real coal substance expressed in British thermal units under the heading “Analysis of pure coal” in the table. The striking uniformity of the quantities in this column shows that even the possibly weathered samples would have a heating value comparable with the coals of higher rank were it not for their large content of ash. A comparison of the figures in the two columns headed “British thermal units” affords a ready means of finding the loss in heating value due to the ash and moisture in the coal as mined.

The worst feature of this coal is its high percentage of ash, which in the samples cut in operating mines runs from a minimum of 14 per cent to a maximum of 28 per cent. So high a percentage of ash really prohibits its successful marketing, and operators must make more vigorous efforts than they have made heretofore to reduce the ash, or else they cannot hope to establish a permanent trade in the face of keen competition. It is hardly possible to say what quantity of ash is permissible, but a strong effort should be made by

careful picking and washing to bring the quantity within 8 per cent. If such a reduction could be made it would increase the heating value to about 13,700 British thermal units and would provide a domestic fuel that need not fear competition in any market.

Boiler and Power-House Operation

“THE Supervision and Maintenance of Steam-Raising Plants,” by Charles A. Suckan, is the title of a new book just published by Ernest Benn, Ltd., 8 Bouverie St., E. C. 4, London, England.

In keeping with necessity and the development going on in large power plants toward the more economic and efficient use of fuel and advanced methods in steam raising, the author of this book has brought out many technical and practical phases of the work.

The book begins with a section entitled “Working the Power Unit.” Beginning with the organization of the power plant and describing various types of boilers, the author leads on to the subject of fuel combustion, which deals with different types of furnaces. In passing on through different methods of firing, many important details in connection with the power plant are ably discussed. Points on laying out the power plant, setting up the various structures, and their operation and maintenance are thoroughly practical.

In general the book covers the latest practices in boiler and power-house operation and points the way to improvements and developments for the future.

Splices and Tapes

AN INTERESTING pamphlet on the subject “Splices and Tapes” just issued by the Okonite Co., Passaic, N. J., deals with the importance of a perfect splice, the important properties of tape and how to recognize these properties and make a perfect splice. The promiscuous purchase of rubber and fabric tape is altogether too common a practice. This is in part due to the fact that there is no definite understanding as to what qualities a tape should possess.

The best wiring job is sometimes spoiled because of the use of a poor grade of tape at the joints or a misapplication of tape. From the troubles that frequently result it is apparent that the difference in cost between a perfect and a bad joint is hardly noticeable.

How Much Ash Is Found in Commercial Anthracite?

Test of Coal in Massachusetts Yards Discloses Variation from Lowest Ash of 10.2 per Cent to Highest of 46.1

By O. P. Hood

Chief Mechanical Engineer, U. S. Bureau of Mines, Washington, D. C.

DURING the past summer the U. S. Bureau of Mines took 127 samples of anthracite, each of 1,000 lb., representing nearly 30,000 tons of such coal in dealers' yards in seventeen cities in the State of Massachusetts. There were three objects in view: To discover the average and the variation in the quantity of ash in anthracite in some easily described area; to demonstrate standard sampling methods and to learn something about the feasibility of itinerant coal sampling. Massachusetts was selected because its principal cities could be visited in a single season. A demonstration of the standard sampling of coal seemed necessary in Massachusetts because a coal-quality law had been passed in the state which had to be administered by persons unfamiliar with the sampling of coal.

The technique of coal sampling has received the same careful study that has been given to the sampling of gold and silver ore, and as a matter of fact the value of coal per ton is greater than the value of many such ores as are bought and sold entirely on the value disclosed by proper sampling and analysis. The proper method of sampling has been approved as an American standard and should be followed. A standard sample must contain at least 1,000 lb. and be selected so as to be thoroughly representative of the lot under consideration.

This must be repeatedly crushed, mixed and quartered in a prescribed manner, until the last quarter is all finely crushed and weighs about 5 lb. Only in this way can the chance inclusion or exclusion of a piece of bone coal or slate produce a negligible effect, and the results of resampling be expected to check fairly well with the first sampling. The labor of handling and crushing so much coal, being considerable, is likely to be evaded, but in no other way can a just result be obtained.

Widely varying results obtained by different samplers tend to discredit such work, and poor sampling should have no standing in the courts. The Bureau samples were all taken in the prescribed manner, so that they are representative of the coal sampled. The Bureau used a small truck equipped with a coal crusher, arranged to be driven by the truck engine. They were taken between July 10 and Nov. 4, 1923. The cities visited and the number of samples taken in each are given in the accompanying table.

PLACES WHERE SAMPLES WERE TAKEN AND THE NUMBER OF SAMPLES TAKEN

City	Samples Taken	City	Samples Taken
Boston, Mass.	41	Brockton, Mass., (One Petroleum Coke)	11
Somerville, Mass.	4	Worcester, Mass.	16
Brighton, Mass.	1	Springfield, Mass.	10
Jamaica Plain, Mass. .	1	Northampton, Mass. .	2
Cambridge, Mass.	3	Holyoke, Mass.	2
Swampscott, Mass.	4	Providence, R. I. (R. I. Coal)	6
Lynn, Mass.	6	Welsh samples, Boston, Mass.	2
Haverhill, Mass.	1		
Bradford, Mass.	1		
Lawrence, Mass.	6		
Fall River, Mass.	5		
New Bedford, Mass. .	5	Total	127

The weighted average ash content was: For furnace size, 13.2 per cent; egg, 13.7; stove, 13.7; chestnut, 16.2; pea, 15.6; range, 19; buckwheat No. 1, 18.9 per cent. In the 8 samples of furnace coal the lowest ash was 10.5 per cent and the highest 14.6 per cent; of twenty-nine samples of egg the range was from 10.2 to 17.5 per cent; of 20 samples of stove coal, 11.3 to 15.9 per cent; of 23 samples of chestnut, 10.3 to 46.1 per cent; of 20 samples of pea, 12 to 27.3 per cent; of 4 samples of range, 13.1 to 28 per cent; of 8 samples of No. 1 buckwheat, from 13.6 to 29.5 per cent.

In the chestnut coal the highest six samples ran 46.1, 40.7, 28.3, 25.6, 18 and 16.5 per cent ash. The six cleanest samples ran 10.3, 12.2, 12.9, 13, 13.2 and 13.4 per cent ash.

Some but not all of the high-ash coal had been condemned by the state authorities. Some high-ash coal was being mixed in dealers' yards with lower ash coal.

The coal producer judges the quality of the coal by taking a small sample and by hand separating it into three piles, one of coal, one of bone and one of slate. A piece which he guesses has less than 40 per cent ash would be called coal, a piece having from 40 per cent to 65 per cent ash would be called bone, and anything having a larger amount of unburnable material would be called slate. Material can be found having almost any proportion from a very low per cent of ash to a very low per cent of carbonaceous material. The operators' standards of preparation allow in each size certain percentages of bone and slate, and also a quantity of finer sizes, but it is impossible to translate this into the quantity of ash allowable. The figures obtained by this survey give an idea of the actual quantity of ash in anthracite sent to one district in the summer of 1923, when the opinion of dealers was that the quality of the coal in general was good.

To Clean Carbide Lamp Without Injury*

By CHARLES LABBE

The usual method of cleaning spent carbide from a miner's acetylene lamp is to tap the bottom part of the lamp against the shoe and to shake out the carbide into a waste can, tapping the lamp against the rim of the can until most of its contents are dislodged. A better way is to provide a steel wire brush made from a piece of $\frac{1}{4}$ or $\frac{5}{16}$ -in. wire rope a foot or less in length. One end is served with iron wire about an inch above the end, which is then frayed out. The other end is wire wrapped about one-half inch from the end. The center portion is wrapped with tape. The short stiff end is used to loosen the carbide and the longer end for brushing it out of the cup of the lamp.

One of the weaknesses of the carbide lamp is not found in its own defect but in the way it is used. It is hammered most woefully by its user. This swab will save the container from many a hard rap on its rim, edges and bottom.



Wire Brush for Cleaning Carbide Lamps

A handy tool to keep at the receptacle where spent carbide is dumped.

*Engineering & Mining Journal-Press.



"Befo' de Wah" Mine Yields Curious Relics

Engineers Prowling in Long Abandoned 1844 Bell Property of West Kentucky Find Bull Wheel, Pit Cars and Track All Made Without a Nail or Scrap of Metal—Ancient Ventilation System Works Perfectly

BY E. W. DAVIDSON
Associate Editor, *Coal Age*
Chicago, Ill.

IT IS a bit difficult nowadays to go down into a coal mine of 1844. Yet three engineers did just that. They were examining the old Bell property, near Sturgis, Ky., famous three-quarters of a century ago, in the course of studies they made preliminary to the recent rehabilitation of the mines under the present name of the Bell Coal & Navigation Co. Two hundred and ten feet of little old shaft separated the three from coal-mining days of "befo' de wah." They negotiated the distance, turned time back so to speak, and entered a strange mine containing ingenious crudities of long ago which, crude as they are, command respect from good mining men of today.

UNCOVER MOUTH OF LONG ABANDONED SHAFT

The three men were W. F. Davis, of Belleville, Ill., general superintendent of the new Bell Coal & Navigation Co.; J. A. Richmond, of St. Louis, Mo., chief mechanical engineer, and William Herbert, an engineer of Bessemer, Ala. In their examination of the noted old coal property, four miles southwest of Sturgis, in western Kentucky, they uncovered the mouth of the long-abandoned shaft—an opening known down through local history as Miners' Shaft—and decided to enter it.

NOTE—Headpiece shows equipment for clearing the way for an inspection of the mine. With a thresher engine to raise steam, with a little winch to operate the "hoist," and with a pump lowered on an improvised cage, Miners' Shaft was more or less dewatered and opened up.

A 15-ft. headframe was built over the 4 ft. 6 in. x 12-ft. three-compartment hole, a small winch was mounted nearby to operate by steam supplied by a traction engine, and the adventurers on an improvised cage, made a few experimental trips downward.

A good deal of débris had to be cleared out of the bottom, and the hole had to be dewatered by a pump lowered on the cage before the men finally flickered their candles around the bottom—the first lights that had penetrated there in the memory of any but one or two of the oldest settlers in that part of the country. They stepped into a dank dead atmosphere.

Their first sight was of a well-preserved bottom of about 4 ft. headroom, with clean-cut ribs extending up the main heading. Evidences of geometrical exactness marked everything they saw. The ribs of that main entry running back from the shaft were as true and clean as a carefully concreted entry of today. The marks of skilled hand work were on the mine ribs.

OLD FURNACE WORKS "FINE"

Proceeding a short distance up the main entry, the men found a door, long decayed, leading through a breakthrough to the right into a parallel entry. Following this back toward the shaft, they arrived at the old furnace, close to the shaft bottom, which once had ventilated the mine. The next step was to board the upcast air compartment of the shaft and erect a low



Taking a Coal Sample out of the Mine

Two of the engineers with a helper are seen here in one of the entries. W. F. Davis, the third engineer, made the picture. Marks of a hand drill are plainly to be seen scarring the rib.

canvas and wood stack on top. Then a fire was kindled in the old furnace with some misgiving as to whether the inner workings of the mine were sufficiently open to permit the furnace to ventilate the place.

"But it certainly worked fine," comments Mr. Richmond. "In less than a minute the air stream was going strong, and before long we felt satisfied we could go back into the workings and see what was there."

With no map and with no knowledge of what they might see except such suggestions as they had gotten in a hazy description of the property by an old neighbor, they started again at the shaft bottom, this time with cap lamps as well as candles. The main entry and the parallel "Durham entry"—so called because local tradition had it that miners from Durham, England, drove it—ran about 1,800 ft. up an approximate 5 per cent grade to a junction with main cross entries.

According to local history the cross entry on one side led into workings operated on shares by Welsh miners and the other into Durham territory. These two sets of co-operative coal operators were reputed to have scoffed at each others' skill as miners and to have maintained such keen rivalry that it periodically broke out in free-for-all fights both in the mine and outside.

Standing at the junction of the main heading with the side entries, it was evident to the three explorers of the mine that the two entries had been driven by

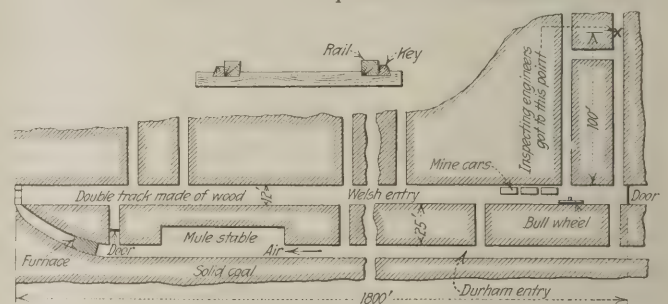
different types of miners. The Durham entry had been sheared on the right and shot from the left while the Welshmen—whether they were all left handed or not—had sheared on the left and shot from the right. The marks of skillful pick work were plainly seen on one rib of each entry and unmistakable drillhole traces on the opposite side. About 4 ft. of coal had been shot down at each fall.

NOT A NAIL OR BIT OF METAL IN CARS OR TRACK

Also standing at this junction, amid a collection of most interesting wooden construction—mine cars, tracks, slope-hoisting device and whatnot, all made without a single nail or bit of metal—it was easy for the three to get a general idea of the mine's main haulage. Loads had been brought in from both headings to the top of the main entry by animal power. Between there and the bottom gravity did the job.

A huge wooden bull wheel was originally mounted at the top of this 1,800-ft. grade. A single track ran from it down to the shaft, with a passing track at the half-way point. Obviously a load was lowered down the grade while an empty on the opposite end of a rope running around the wheel was drawn up.

The bull wheel is a rare piece of mechanism—one of



Bottom Layout of the Old Mine as the Engineers Found It

Old mines, of which examples may be found at Bostonia, near New Bethlehem, Pa., and near Shawmut, Elk County, in the same state being driven by mine workers of similar origin to those who worked at Miners Shaft, though at a slightly later date, show roadways just as meticulously perfect and track of somewhat similar character. Strap iron on edge, however, was used at the latter place in place of wood rails. This was notched and not spiked to the ties.

the rarest, probably, in American coal mining. Today it reposes cumbrously in the office of W. K. Kavanaugh, president of the Southern Coal, Coke & Mining Co., of



Displacing Air of Civil War Days

The engineers, anxious to enter the ancient mine, first built this little stack over the up-cast air compartment of the shaft, fired up the antiquated ventilating furnace 210 ft. below and awaited results. "It worked fine," says "Jack" Richmond, one of the adventurers. "In a minute the air flow was going strong." Soon they walked in—the first men to invade the place in the memory of the oldest settlers.



An Open Door Leading Direct to 1844

The mouth of Miners Shaft, and a peek down the shaft itself, four miles from Sturgis, in western Kentucky. Engineers entered it, descended 210 ft. and walked from today back into coal mining of long, long ago. There they found ingenious equipment lying just as it had been left two generations earlier.

St. Louis. Mr. Kavanaugh would like to put it in a historical museum if someone would convince him which one should have it.

The old wheel, about 56 in. in diameter, had broken down its wooden mounting, but it was intact. It is made of Southern gum and hardwoods of various kinds



Old-Time Hand Mining Was Accurate

This snapshot, taken by flashlight in an aircourse in the mine as it appeared after standing idle since before the war, gives some idea of the geometric exactness with which ribs were sheared with picks.

and shows the skill of woodworking craftsmen. Not a nail was used to hold it together; pegs and glue served the purpose. Flat 2x8-in. spokes were keyed with wooden wedges into a hand-hewn solid ash axle—an octagonal log 4 ft. long.

Fragments of a wooden brake which had been operated on one end of the axle were to be seen lying about. It was merely a long 12-in. plank cut in one edge to fit the bull-wheel shaft and hinged at one end close to the braking point so as to allow powerful leverage. A good idea of the construction of the old wheel can be gained from the accompanying photographs of it. The ends of the octagonal log axle were sawed off so that the big relic could be hoisted up the little shaft.

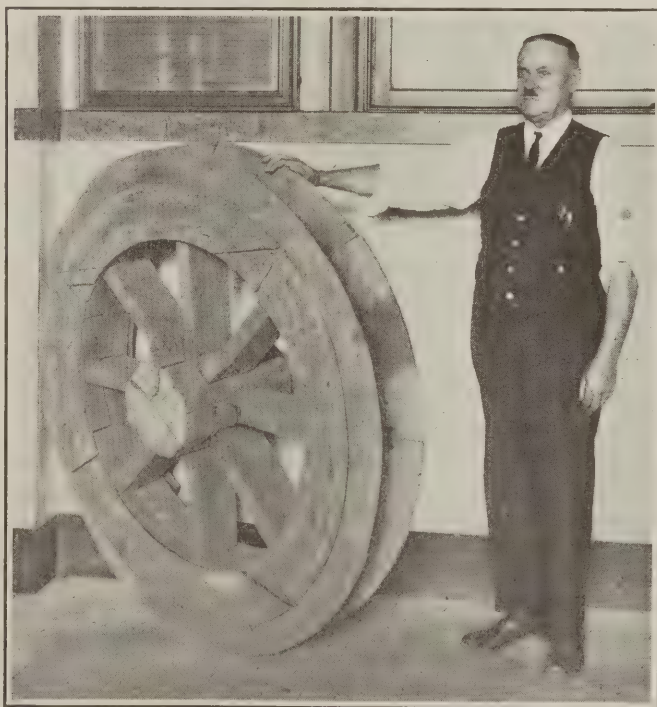
A half dozen ancient pit cars were lying about the place, their running gear gone, but their wooden bodies still stoutly mortised and tenoned together as shown in another illustration. Each car was 3 ft. 6 in. long and about 26 in. deep. Only a few sections of the all-wood track used in the mine before the Civil War were to be

found. The rest had rotted away. In the track, too, there was no sign of any metal. Ties about 6 in. square supported 2x4-in. rails set edgewise in notches and keyed with hardwood. At the turns rails were bent into curves that appeared to be in nearly perfect alignment in spite of their age. No trace of the switches could be found.

The underground adventurers spent parts of several days in the old mine, but because of the obstacles they encountered they never penetrated much deeper into the workings than the top of the gravity plane. Peering into necks turned from the main entries, they concluded that rooms had been driven to great lengths, but exact measurements were not made. Most of the coal appeared to be about 48 in. thick.

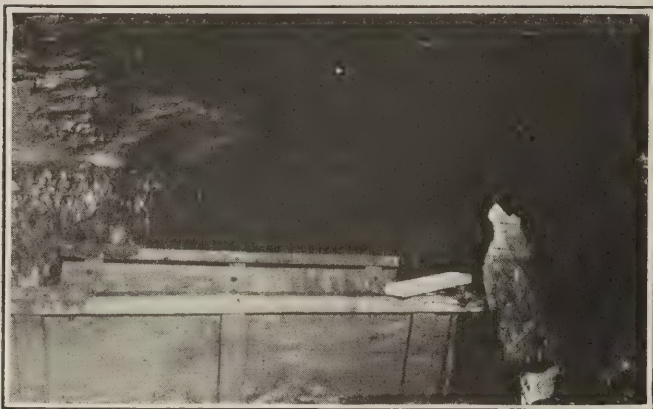
The history of the place as compiled by Mrs. Clarence R. Wilson, of Sturgis, links up the mine with long-ago politics. The property was owned and operated in 1860 by John Bell, the nominee of the Constitutional Union party, for President of the United States in that year in the four-cornered race against Lincoln, Breckenridge and Douglas. John Bell operated two or three other openings into that same seam of coal. Little was done with the property after the war because of a confusion of litigation.

In early days Bell coal was recognized as high-grade fuel for steamboats. The late Captain John Nelson, who died almost a centenarian a few months ago in his home near the property, used to tell of the historic race from New Orleans to St. Louis of the river steam-



Here Is the Old Bell Mine Bull Wheel

In the days "befo' de wah" it operated at the top of a gravity slope in a western Kentucky mine, long abandoned. J. A. Richmond, of St. Louis, who stands beside it, was one of three mining engineers who discovered it. The wheel, made without a single nail, is looking for a resting place in a museum.



What the Underground Adventurers Found

At the top of the gravity slope running 1,800 ft. from a junction of main entries down to the shaft bottom lay this collection of relics. Not a single nail was used in the construction of either the big sheave wheel or the little wooden cars, whose trucks had decayed with time. Wooden pegs and mortise and tenon joints were still tight. The object leaning against one of the cars is not a petrified, headless miner, but merely a slab of roof.

ers Natchez and Robert E. Lee, in which Bell coal played a part. The Lee, Captain J. W. Cannon, beat the better designed Natchez over the 1,252-mile upstream course by 3 hours and 14 minutes, taking Bell coal from a barge in midstream without stopping. The race is an epic of the Mississippi River, and the story of it once was much told around the three slope mines which grouped about the Miners Shaft.

Nothing else so spectacular ever happened in the history of this coal, but the output of the property is said to have maintained a good reputation as a fuel for metallurgical use in Civil War times and today part of it is used in gas manufacture. Some day it may be coked on a large scale if a large production is obtained.

REJUVENATION HAS BEEN BEGUN

The rehabilitation of the property, underground and on top, is beginning to convert the mines from potholes into real producers. Also it is giving the rolling mills around the top works something of the appearance of a forest park. An artificial lake lies in one of the little valleys, a small modern hotel for miners and a wide-porch lodge for company men perch on wooded hills, and winding roads add their contribution to the park effect. Modern engineering is having its way, top and bottom, in these mines, but nothing is going in that for picturesqueness can equal the old bull wheel that has come out and the old wheel's contemporary types of mine equipment which still lie where Davis, Richmond and Herbert found them, in "befo' de wah" surroundings.

The Miner's Torch

"Master Minds"

ON A diner between Cleveland and Washington recently I happened to be thrown with a lumberman and a clergyman. The lumberman remarked that his industry was the most misunderstood industry in America. "Why," said he, "the public seems to think that we are all robbers and crooks and they believe we are fighting the conservationist at every turn and playing fast and loose with the lumber reserves of the country. In fact the big men of our industry have become so worked up over the things that people are saying about us that they have raised a fund with which to carry on a national advertising campaign, the purpose of which will be to get the true facts about the industry before the public. In these articles no arguments will be advanced and no attempt will be made to draw conclusions. We will give only the facts and allow the public to draw their own conclusion."

Misery sure does love company! All these years I have been thinking that the dear public considered the coal industry the yellow dog of them all, and here comes a man willing to argue the matter.

I remarked that I was anxious to know what results they will get from their publicity as I had been thinking for years that the coal industry should make a similar investment. This brought the minister into the discussion. "Speaking of publicity," he said, "you must have noticed that we churchmen have been getting a lot of free publicity of late because some of our clergymen can't agree about the Creed, and now to cap the climax, as it were, I see by the *Literary Digest* that a New York newspaperman ridicules our profession as one that lacks the leadership of men with imaginations; in fact, is under the spell of second-rate minds."

How many times and in how many different places have I heard this same complaint made about the leadership of the coal industry! Give us leaders with imaginations and we'll sail through with flying colors is the cry at every important gathering of coal men.

Then I suddenly recalled a remark made by a professor in a history class while I was at college. "In looking back through the centuries you will discover that in each generation there are only a few brains that can be classed as first class," was about the way he put it. Think of it! Here I remembered a remark forgotten for twenty-seven years and recalled it when it was exactly what was needed to explain a paradox. Who says everything you learn in college is useless?

If there are only a few master minds in our generation why is it reasonable to suppose that they should all be found hooked up with the coal industry when the so-called learned professions can't attract their quota?

But if there are not enough first-rate minds to go around in our industry what's to hinder a lot of men with second-rate or even third-rate minds from getting busy and asserting themselves? Perhaps if they would, we would see an end to many of the problems in the lumber industry and the religious field and the coal industry; at least that is what we decided in the diner that night—the three of us.

Power Shovels Save Drudgery of Hand Mucking

Labor Scarcity Renders Mechanical Loading Necessary—Power Shovels Enable Bigger Cuts to Be Pulled and Obviate Blockholing—Specially Designed Rock Cars Facilitate Tunnel Driving—Splitting Trick Would Speed Work

DEVELOPMENT tunnels driven in the Pottsville district and Schuylkill Valley of Pennsylvania in most cases are either 7x10 or 8x12 ft. in cross-section. In a 7x10-ft. tunnel the quantity of rock brought down at a single blast approximates 50 tons. In the past all this rock had to be loaded out by hand labor during an 8-hour shift.

In order properly to appreciate what has been accomplished by power shovels in the way of rock mucking in the anthracite fields conditions existing prior to their installation should be considered. Many types of mechanical loaders had at sundry times been employed in this work, but for various reasons all had proved unsuccessful. Of course some were tried out before they had been perfected as they are today, while others were totally inadequate to the work in hand.

In making a 6-ft. cut in a rock tunnel 8 or 9 cars of rock would be shot down, each car having a capacity of 127 cu.ft. The loading of this rock by hand methods was about all that one gang of muckers could do in a shift. Such a gang was composed of a muck boss and 4 or 5 laborers. In some instances, of course, one gang might handle as much as 12 or 13 cars, but this performance was exceptional. Only after much persuasion, and then only occasionally, would the men handle more than the customary 8 or 9 cars per shift.

SOMETIMES THE MUCKERS FLATLY BALKED

In not a few cases they would refuse to handle the muck at all after they had sized up the pile and concluded that it contained, say, 12 to 14 carloads. Naturally if the muckers refused to work, the drillers lost the succeeding shift. As a logical result the drillers on the next shift would reduce the depth of holes drilled so as to decrease the rock brought down to a quantity that would suit the muckers. This, of course, reduced the average depth of cut pulled.

Measured over a period of two months, the depth of cut pulled by different operators averaged from 5 to 6 ft. The extreme independence of the mucking crews, of course, was traceable to a shortage of the kind of men who were willing to engage in this arduous work. Naturally, but few of these crews could compare with what the old timer knew as hard-rock muckers. Though some gangs were admittedly fairly good they were exceptions to the general rule. Throughout the anthracite fields most men preferred to engage in labor that was easier, even though they were paid lower wages for doing it.

POWER SHOVEL RELIEVES ACUTE LABOR SHORTAGE

The conditions outlined became so acute during 1923—throughout August and September many development tunnels were idle for lack of men—that it became obvious that some means other than man power must be found to load the muck. Early in the year, therefore, one of the largest operators in the Pottsville region installed a power loader for this purpose, the Hoar shovel being the type chosen. The tunnels in this

company's mines are 7x10 ft. in cross-section and are driven fairly level, only sufficient grade being given them to provide drainage.

The accompanying time study is typical of present-day performance of these shovels although on the particular day when this study was made conditions were more unfavorable to the machine than usual. This was due to two reasons: First, because the muck had been scattered further by the blast than usual and, second, because the muck crew on the preceding shift had failed to carry the track forward in proper shape.

In this instance, as in most cases, a single track of 42-in. gage was carried in the tunnel. The cars used in the run to be described stand 4 ft. above the rail and are 4 ft. 7 in. wide and 8 ft. 4 in. long. They are special rock cars built solely to serve the mechanical loaders and were developed by the coal-company engineers. A switch is placed from 250 to 350 ft. away from the working face. Mules haul the cars to the shaft, which is about 1,500 ft. distant.

TABLE I—RELATIVE PERFORMANCE IN HAND AND ROCK MUCKING

	Hand	Machine
<i>Colliery "A"</i>		
Cuts mucked.....	70	24
Feet driven.....	403	169
Feet per cut.....	5.76	7.04
Cost per cut.....	\$25.00	\$16.68
Cost per foot.....	\$4.34	\$2.37
<i>Colliery "B"</i>		
Cost per cut.....	\$33.00	\$15.79
Cost per foot.....	\$6.19	\$3.40

It will be noted in this time study that 41½ minutes was consumed in loading car No. 1. This total loading interval is made up of 24½ minutes of loading time and 17 minutes of time consumed in moving the shovel. The reason for this movement of the shovel was the scattered muck to which reference has been made. At no time during the loading of this car was the muck more than 6 in. to 1 ft. deep. From this the importance of keeping the muck close to the face will be appreciated at once.

Some drillers succeed in loading their holes so thoroughly in accord with existing conditions that they rarely scatter the muck any great distance from the face. In the case of car No. 2 the muck was still thin, this being shown by the number of moves made. Each move of the shovel means an advance of 5 ft. into the muck pile so that the total distance from the face to which the rock was blown in each instance readily may be approximated.

Switching time on each car varies from 4 minutes to nearly half an hour. Therefore it will be readily appreciated that the total time required for cleaning up a face could be greatly lessened by reducing the delay arising from this cause. It should be borne in mind, however, that this mucking crew, consisting of the machine runner, a laborer and a miner—the latter is responsible for the safety of the other two—is paid for a full 8-hour shift and that consequently speed in mucking is not of great importance to them so long as they get the cut cleaned up, the track laid and make all



Mechanical Shovel Loading Rock from Open Cut

Shoveling rock that has merely been blasted loose is hard work whether done by hand or by machine. This illustration shows a Hoar shovel working in a rock cut. The operation of this machine is much like that of a full-revolving steam shovel although its size, of course, is much smaller. By the use of shovels of this type in rock tunnels underground, blockholing, or the blasting of pieces of rock already shot down, has been entirely obviated, the machine successfully handling even the largest pieces.

other provisions for the next shift. Under advantageous conditions, as may be judged from this time study, this is easy of accomplishment.

It will be noted from this time study that although it required a total of 6 hours 11 minutes to clean up the shot, only 2 hours 46½ minutes was actually consumed in loading cars, and that of this 24½ minutes was taken up in loading the first car leaving practically 2 hours for loading out the rest of the muck. Switching caused a delay of 2 hours and 23 minutes and moving the machine entailed a delay of 32 minutes.

In contract work outside the mining regions where speed is a prime requisite rock blasts are being loaded out in a 4-hour period. This, however, means a split trick for the muck crew, which is not being used so far as is known in any anthracite mine. It is, however, being utilized by some contractors in tunnel work elsewhere.

Comparing operation of the power shovel with hand labor in tunnel driving in two separate collieries we have the results shown in Table I.

It will be observed that in colliery A the average length of cut made was 1.28 ft. greater than that obtained when hand mucking was employed. Only 5 hours 49 minutes of the 8-hour shift was actually consumed in mucking operations. It is obvious that muck from a heavy cut can be more advantageously and quickly handled if it lies close to the face. All data set forth refer to 7x10-ft. tunnels.

HIGH ROCK CARS INTRODUCE DIFFICULTIES

In considering the mucking of 8x12-ft. tunnels somewhat similar conditions are encountered, except that in most cases the cars to be filled are much higher, sometimes standing as much as 5 ft. 6 in. above the rail. The standard model shovel will not load these cars except in one end, so that a special form of this machine loader has been designed for this work. This was developed primarily for use in the anthracite mines of Pennsylvania. Basically it is the same as the standard model. Its frame, however, is higher and heavier.

Some coal operators have developed special rock cars for use in mucking and allow 12 of these cars to each

shovel. This arrangement, of course, necessitates that these cars be hoisted separately from the coal cars so that they may not be mixed with them. The many advantages resulting from the use of cars intended especially for the handling of rock more than offset the trouble on the surface entailed by their use.

Where cars from 5 ft. to 5 ft. 6 in. high are used in a 7-ft. tunnel it is extremely difficult to build a shovel that will load them to capacity. This is because such a high car leaves so little room between its top and the roof. A hand shovel might be introduced into the space left available, but this space is extremely small for the introduction of any mechanical means of loading.

HARD WORK IN MUCKING IS NOW GONE

Through the introduction of the power shovel, blockholing has been entirely eliminated. No pieces are now blasted from the face that the shovel is unable to load, even though some of them weigh up to a ton. After a cut has been mucked out the shovel is withdrawn by a mule or locomotive and placed on the aforementioned switch located several hundred feet from the face, ready for the firing of the shots.

Power shovels have taken all of the hard work out of rock mucking. Since their introduction it has become difficult to find a hand shovel anywhere about the rock workings when one is needed in order to do a little cleaning up at the face.

TABLE II—TIME STUDY OF ONE DAY'S SHOVEL OPERATION

Car No.	Switching On	Switching Off	Moving Cars to Shovel	—Loading Cars— On	Off	Time	—Moving Shovel Forward— On	Off	Total Time per Car
1*	7:30	AM	commenced to move shovel into heading Commenced mucking at 7:56 AM	7:56	7:58	2	7:58	7:59	1
				7:59	8:01	2	8:02	8:02½	1½
				8:02½	8:04½	2	8:04½	8:06	1½
				8:06	8:08½	2½	8:08½	8:09½	1
				8:09½	8:12	2½	8:12	8:14½	2½
				8:14½	8:15½	1	8:15½	8:18	2½
				8:18	8:21	3	8:21	8:22½	1½
				8:22½	8:26	3½	8:26	8:27½	1½
				8:27½	8:30	2½	8:30	8:31½	1½
				8:31½	8:35	3½	8:35	8:37½	2½
						24½			17
									41½
2	8:37½	8:52	14½	8:52	8:55	3	8:55	8:56½	1½
				8:56½	8:59	2½	8:59	9:01	2
				9:01	9:05	4	9:05	9:07	2
				9:07	9:10	3	9:10	9:11½	1½
				9:11½	9:15	3½	9:15	9:17½	2½
				9:17½	9:20	2½	9:20	9:21½	1½
				9:21½	9:23	1½			
						20			11
									31
3	9:23	9:44	21	9:44	9:58	14	Moved while waiting for car		14
4	9:58	10:14	16	10:14	10:23	9	10:23	10:25	2
				10:25	10:31	6			
						15			2
5	10:31	10:43	12	10:43	10:58	15			17
	Less 2 min. operator fixing lamp					2			
						13			15
6	10:58	11:20	22	11:20	11:36	16			16
	10:58	11:16	Puttng section of track ahead of shovel						
7	11:36	11:46	10						
	11:38	11:55	Puttng in track	11:55	12:06	11	12:06	12:08	2
				12:08	12:14	6			
						17			2
8	12:14	12:38	24	12:38	12:47	9			19
	12:47	1:06	Puttng in track	1:06	1:12	6			
						15			15
9	1:12	1:16	4	1:16	1:29	13			13
10	1:29	1:48	19	1:48	2:07	19			19

Last car cleaning up face (3 minutes taken up picking down loose rock in face). Total time to clean up cut including all delays 6 hours 11 minutes. Total switching time 2 hours 22½ minutes. Total time loading cars 2 hours 46½ minutes. Total time moving shovel into muck 32 minutes. On this cut much delay was caused by track being torn up and not replaced. This was an exceptional condition, not encountered under ordinary working conditions. Total weight of rock handled, about 48.6 tons. First car cleaning up scattered muck; muck very thin.

Best Shop Practices in Cutting and Tapping Machine Threads for Repair Work

Preparing the Material Before Cutting the Thread—Use of the Stock and Die—Tapping Threads in Different Metals—Sharpening the Tools

BY GUSTAV H. RADEBAUGH
Mechanical Engineer, University of Illinois, Urbana, Ill.

A TAP is a hardened, highly tempered steel tool for cutting internal threads and has a thread and flutes cut in it to give cutting edges. The blacksmith tap is tapered $\frac{3}{4}$ in. to the foot. It is used on tapping jobs where it is not necessary to maintain a standard. The set of machinist's hand taps, Fig. 1, A and B, are not tapered but maintain one size from the first thread to the last.

Of these two styles of taps many different sizes are made. Ordinary taps run in various sizes in steps of sixteenths, but taps one sixty-fourth or one thirty-second oversize also can be bought. The hole for a tap should be drilled of a diameter equal to that of the bottom of the thread. Some taps have marked on the shank the size of drill that should be used in drilling the hole for tapping.

The pipe tap, Fig. 1, C, is used for cutting pipe threads. The threads of pipe, which are different from those for machine bolts and machine screws, are made according to two standards, the Briggs and the Whitworth, the first being that more commonly used. A tap wrench is used for turning the tap in the hole. When tapping cast iron, oil is not needed, but in tapping steel a good fatty oil should be used. The die and die stock, Fig. 2, are used for cutting threads on bolts and screws. A die stock is furnished for each size of thread. The standards for die blocks are the same as those for taps. Thread standards always cause more or less difficulty because of the great number of sizes and designs. Thus the machine-bolt standard differs from that used for the threads employed in automobile construction. A common standard for $\frac{1}{4}$ -in. bolts is twenty threads to the inch; for $\frac{3}{8}$ -in. bolts, sixteen threads to the inch and for $\frac{1}{2}$ -in. bolts, twelve or thirteen threads to the inch.

Cutting Threads with Die and Tap.—On repair jobs, when fitting bolts, nuts and screws, the operative sometimes has difficulty because he does not fully appreciate the importance of thread standards. The pitch of a screw is the number of threads to an inch, and it is important when fitting a screw to know that the number of threads on the screw and in the job are the same.

In this country extensive use is made of the United States Standard thread, which can be identified by a

flat on the thread points. The V-thread, which is in the shape of a V with a 60-deg. angle, can be identified by the thread coming to a sharp point. There are one or two other styles of threads, but those already mentioned are the more commonly found. The shapes of the V-Standard, Whitworth Standard, United States Standard, Acme Standard, British Association Standard and Square Thread are shown in Fig. 3.

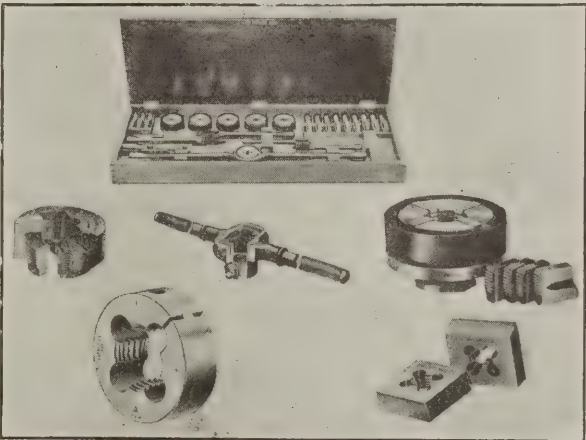
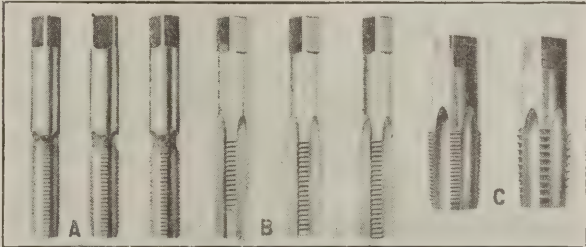
The number of threads per inch for bolts and nuts such as are used on mining machines usually conform to the United States Standard. This standard is shown in Table I. For bolts and screws used on automobile construction the American Society of Automobile Engineers some years ago adopted a standard which may be identified by its fine pitch. For instance the S.A.E. thread for a $\frac{1}{2}$ -in. bolt is twenty threads per inch. This standard has the U.S.S. form of thread.

For the convenience of the trade all tap and die manufacturers mark on the tool the standard number of threads per inch, size of thread, and sometimes indicate on the tap the size of drill which should be used to provide the hole for tapping.

When taps and dies are used to cut steel they must be lubricated. A good grade of animal lard oil, sperm oil or a mixture of graphite and tallow—10 per cent graphite and 90 per cent tallow—are the best lubricants to use when tapping or threading steel or iron. A good

TABLE I—TAP-DRILL SIZES FOR U. S. STANDARD BOLT THREADS

Diameter of Bolt, In.	Threads per Inch	Size of Tap Drill
$\frac{1}{8}$	20	No. 7
$\frac{5}{16}$	18	$\frac{1}{4}$ in.
$\frac{3}{8}$	16	$\frac{5}{16}$ in.
$\frac{7}{16}$	14	$\frac{27}{64}$ in.
$\frac{1}{2}$	13	$\frac{27}{64}$ in.
$\frac{9}{16}$	12	$\frac{31}{64}$ in.
$\frac{5}{8}$	11	$\frac{17}{32}$ in.
$\frac{3}{4}$	10	$\frac{21}{32}$ in.
$\frac{7}{8}$	9	$\frac{49}{64}$ in.
1	8	$\frac{7}{8}$ in.
$1\frac{1}{8}$	7	$\frac{63}{64}$ in.
$1\frac{1}{4}$	7	1 $\frac{1}{8}$ in.



Figs. 1 and 2—Taps and a Machinist's Set
The upper figure shows untapered sets at A and B and a tapered set at C for pipe threads. In the lower figure is a popular set of taps and dies.

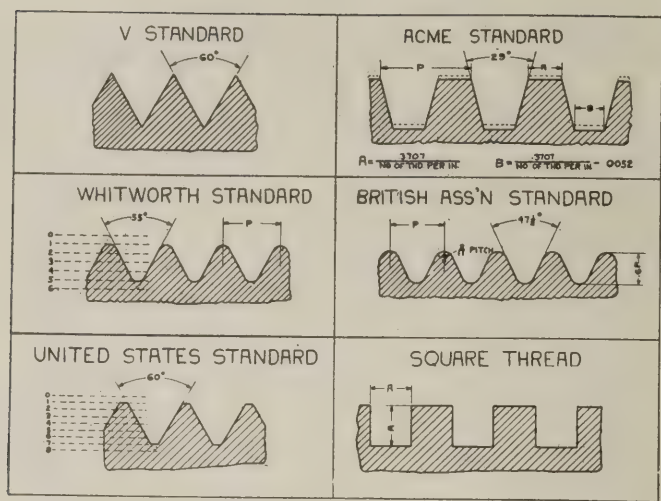


Fig. 3—Standard Screw Threads

Much confusion and difficulty often is experienced by the use of different styles and types of threads. Manufacturers of mining equipment can do much in the way of standardization and thus help to keep the equipment in repair.

soap compound is better than a mineral lard oil. Machine oil is a poor lubricant for thread cutting. When tapping cast iron, oil should be used sparingly, for it causes the chips to stick to the flutes of the tap.

If a hole is to be drilled for tapping, it is important that a drill of proper size be used. This can be determined by finding the diameter of the tap or bolt at the bottom of the threads or by referring to a chart of tap-drill sizes such as is shown in Fig. 1.

In threading soft steel by hand with the hand stock and die, the end of the material to receive the thread should be beveled, as in Fig. 4; that is, the sharp corners should be removed at an angle of about 45 deg. This can be done by using the coarse, or bastard, file, as shown in this illustration. This operation is important, for when it is done it makes it easy to start the die and enables it to do its work without injury. The threads also will be cut more correctly.

The end of the stock may be rounded, before cutting the thread, by the use of a hammer, as shown in Fig. 5. The end of the stock is struck medium hard blows with the hammer, the stock being held in about the same position as if it were being drawn to a point. To do this the stock need not be heated.

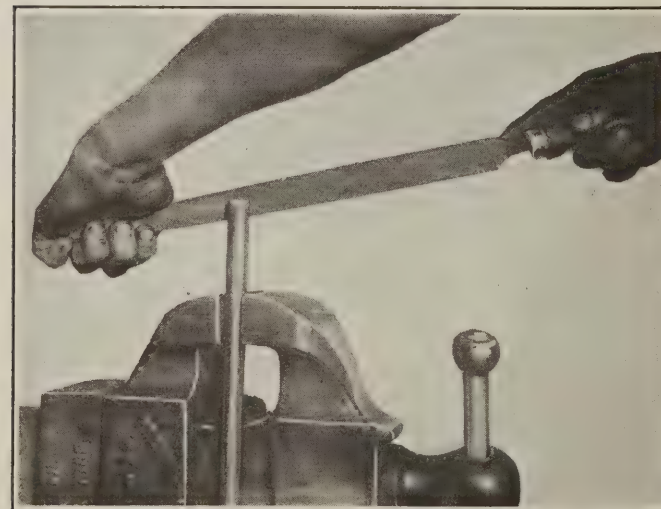


Fig. 4—Preparing the Material for Threading

The end of a piece of rod to be threaded is filed, making the work much easier, more rapid and indeed more nearly correct also.

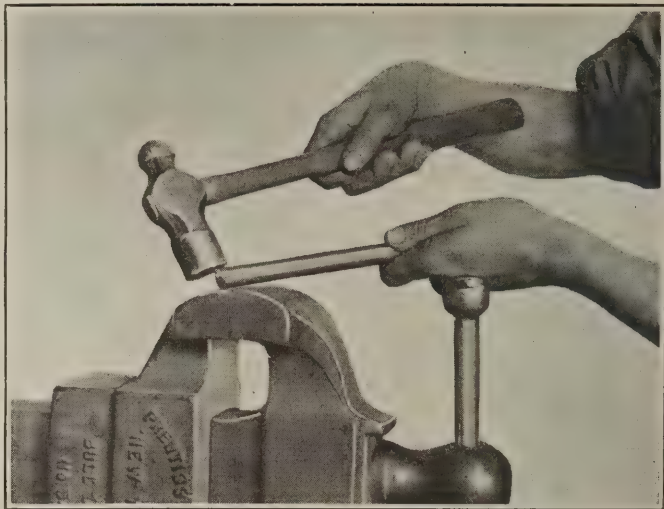


Fig. 5—Shaping Rod for Reception of Die

This may be done without heating the material. It will enable the operative to cut a straight thread. The stock to be threaded is held while being shaped as if it were being drawn to a point and is usually done to assist starting the threads.

Dies are divided into two classes: Those which must pass over the thread several times in the cutting of the finished thread and those that complete the thread in one cut. In the latter class there are adjustable, spring and solid dies. They are made from tool steel and tempered very hard.

A die can be sharpened by grinding back the front face of the cutting teeth or chasers. Adjustable and spring dies are best suited for general repair work. When cutting a thread, the die block is held in a die stock, one of these stocks serving for several sizes of dies. As the die is not suited for reducing the size of the stock being threaded it is bad practice to use a standard-size die to cut threads on stock that is rolled $\frac{1}{8}$ in. oversize.

To cut the thread the piece to be threaded is placed in the vise with the rounded end up. The die is placed on the bar and with a downward twisting or turning motion it is forced on the stock, as shown in Fig. 6. After two or three turns forward the die should be given a slight turn backward. This enables the operative to remove the cuttings and allows the oil to find its way to the points of the cutting teeth. If a full thread up close to a shoulder is desired, the die is

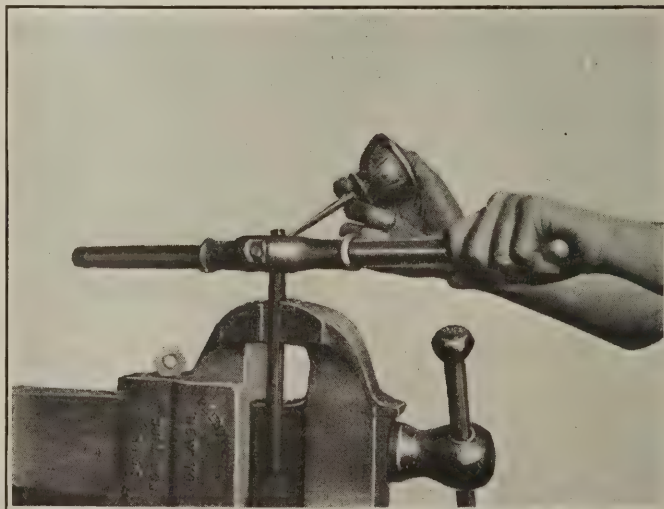


Fig. 6—Using the Stock and Die

Many thread-cutting sets permit of slight adjustment; this aids materially when repair work is being done.

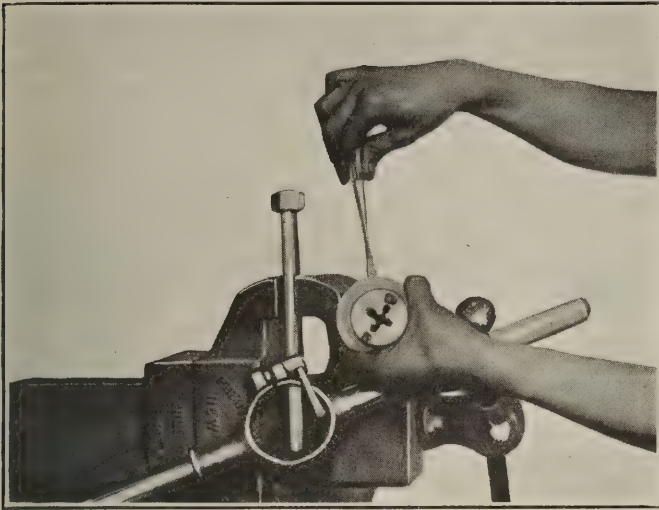


Fig. 7—Adjusting the Die

Slight variation in the threads in a nut are frequently annoying but are easily remedied with an adjustable die, which may be set to cut over- or under-sized threads.

turned over and the cutting operation is continued up to the shoulder. Dies are made for right- or left-hand threads. When using a left-hand die it should be turned counter-clockwise.

When cutting a thread with an adjustable or spring die, the size of thread always should be tested with a standard tapped nut. The die may then be adjusted, as shown in Fig. 8, by using a screwdriver. The designs of adjustable dies are such that this adjusting is simple and can be made quickly. The adjustable die can be altered as much as $\frac{1}{2}$ in. over or under the size marked on its side. The spring die will adjust about $\frac{1}{8}$ in. over or under size, but it is bad practice to extend this adjustment beyond these limits.

Tapping a Hole.—The tap is a tool used to produce internal threads. Hand taps are listed in sets, three taps comprising a set; the taper, plug and bottom taps. The taper tap is best suited for starting tapped holes. It can not be used, however, for completing a job unless it will pass clear through the work. The plug tap, which has the first three teeth tapered off, makes a full thread nearly to the bottom of a hole. The bottom tap is used to extend this full thread to the very bottom.

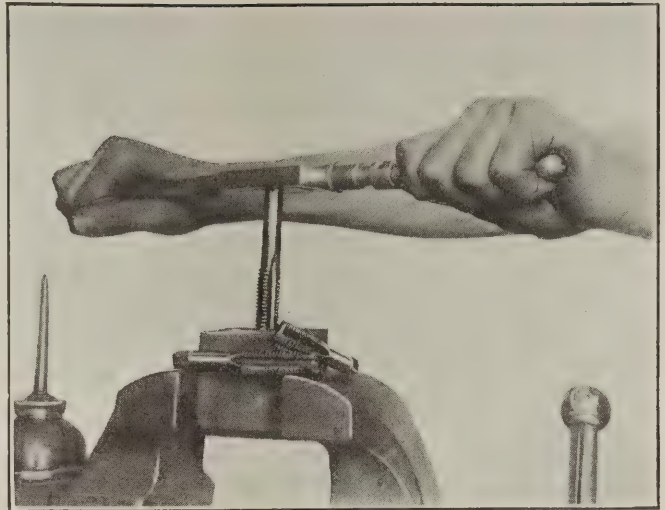


Fig. 8—Tapping a Hole

The secret of not breaking the tap in this operation lies in exerting the same effort at all times on both handles, unless this is done a slight side strain will break the tap.

It should be used after the plug tap to avoid breakage.

This tap is the best to use for all-around work. It must be understood that to get a hole tapped the proper size it is not necessary to use all three of the taps in a set. In Fig. 8 is shown the correct position for tapping a hole. The secret of proper tapping is to equalize the effort expended on the handles of the tap wrench.

How to Remove a Broken Tap.—Fewer taps will be broken if the proper lubricant is used. When a tap is broken near the surface of the metal it is cutting it can be removed easily by driving on both sides, as shown in Fig. 9. By doing this the tap is not wedged against one side of the hole as when using one drift, but the tap is forced to rotate.

Another method of removing broken taps is by heating the part containing the broken tap in a forge fire or with a gasoline blow torch, thus softening the steel tap. It is then drilled out. Injecting into the hole a solution of nitric acid—one part acid to five parts water—also has proved effective. The action of the acid on the steel loosens the tap and it can then be backed out by using a drift punch or a pair of pliers. The

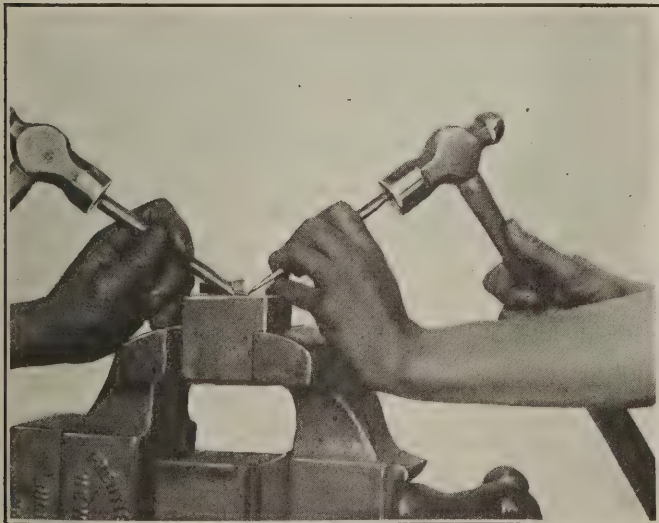


Fig. 9—Removing a Broken Tap by Drifting

This is one of the simplest methods for removing a broken tap. By wedging up on both sides at the same time the tap usually can be removed.



Fig. 10—How to Determine a Thread Size

Gages similar to the one in this illustration should be part of every machinist's repair kit. This is the only sure way to correctly determine the pitch of the thread.

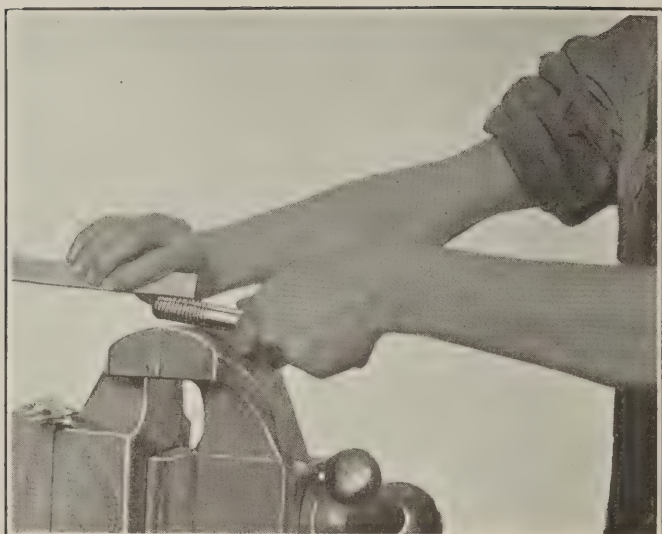


Fig. 11—Determining the Thread Pitch

The best way to determine the pitch of a thread is by the use of a gage, the pitch being marked on the side of each blade. The method shown here is not so accurate for determining the pitch of the thread because it is easy to count the threads incorrectly.

British Co-operative Coal Trade Making Giant Strides

Dominates Market in Some Cities—Private Dealers
Almost Eliminated in Places—Movement Gained
Impetus from War-Time Control

BY WILLIAM NOTZ

Washington, D. C.

AT THE present time a complete change is taking place in the coal business of Europe due to the increasing activities of co-operative consumers' societies. The trade in household coal is affected primarily. The movement is gaining such rapid headway that in several of the leading coal-consuming countries co-operative societies have already become the largest coal distributors. In a number of large cities they practically dominate the local market; in others they have developed into formidable competitors of the private coal dealers, and in a few cases have well-nigh eliminated the latter altogether.

One of the main objects of these societies is to bring the consumer as close to the producer as possible and thus eliminate the middleman's profit. They do not aim at making profit. While they sell their goods to their members for cash at the prevailing market price, all profits are ultimately returned to members in proportion to purchases in the form of dividends. These organizations gradually branched out from selling and went into the field of manufacturing. More recently they have been evolving plans to acquire and control the most important of the raw materials that enter into the production of the chief necessities of life, such as foodstuffs and coal.

CO-OPERATIVE MOVEMENT WIDESPREAD IN EUROPE

It is astonishing to observe what a large proportion of the population of European countries is linked up with the co-operative movement. In England about fifteen million persons are affiliated with such societies through some member of each family. In Scotland more than half of the population, and in Germany approximately three million families purchase a large part of their

acid remaining in the hole should then be washed out.

To find the number of threads per inch on a bolt or in a nut the screw-pitch gage is used as shown in Fig. 10. This gage has a number of thin blades on which are cut two or more teeth, the distance between which corresponds to the distance between two threads on a screw of given pitch, the number of which is stamped on the blade. By a comparison of the threads on the bolt with a selected blade from the screw-pitch gage the exact pitch of the bolt can be determined. On some of the coarser threads the rule is used as shown in Fig. 11. This is not an accurate method, but it proves helpful in finding thread pitches.

COMMON THREAD PITCHES CAUSE CONFUSION

Often in fitting a $\frac{1}{2}$ -in. bolt with nuts it is found that the nut will not screw on the thread, even though the diameter indicates that it is of correct size. By measuring the threads per inch on the bolt and in the nut you may find a 13-thread nut and a 12-thread bolt. There are two common thread pitches for $\frac{1}{2}$ -in. stock, namely 12 and 13 threads per inch. This fact frequently causes confusion.

necessities from co-operative shops. According to the latest estimate there are fully thirty million persons accredited members of co-operative organizations in different parts of the world, and the movement is growing steadily.

While the co-operative system of distribution has been in operation for nearly a hundred years in parts of Europe, the sale of coal on a large scale by wholesale and retail co-operative societies is of comparatively recent date. It is largely an outgrowth of war-time conditions. When the government assumed control of necessities of life in England and Germany, food and fuel controllers eagerly seized upon the excellent distributive organizations that the thousands of co-operative societies had built up. In Germany there are at present about 50,000 co-operative societies and in the United Kingdom approximately 1,400. Each society operates a number of retail establishments, and like a vast network of chain stores these organizations spread out over city and country and link together hundreds of thousands of families and millions of consumers into one organic entity.

SOCIETIES EXPANDED AFTER THE WAR

When war-time control ended, the success that co-operative societies had achieved in the handling of coal prompted them to continue and expand that line of business along with other commodities usually dealt in such as foodstuffs, clothing and household articles.

English Co-operative Wholesale Society.—The English Co-operative Wholesale Society led the way. It probably is the largest organization of its kind in the world. The co-operative retail societies of England, Scotland and Ireland have each a wholesale organization of their own. The largest of the three is the English Co-operative Wholesale Society, popularly known as the C.W.S. Its headquarters are at Manchester. It has more than 50,000 employees and the value of its wholesale distributive trade amounts to about four hundred million dollars per year. It owns and operates more than a hundred manufacturing plants, and proudly styles itself "The largest democratic trading institution in the world."

The C.W.S. has divided its coal business into three

districts, centering in Manchester, Newcastle and London. The general supervision rests in the hands of the board of directors of the C.W.S. at Manchester. Each of the district coal offices is in the hands of a district manager. The C.W.S. sells only to its own registered retail societies, no sales being made to outsiders or non-members. This is required by the Industrial and Provident Societies Act of 1893, under which the English co-operative societies operate.

Not all retail co-operative societies purchase their coal supplies exclusively from the C.W.S. In the London district only two give all their coal trade to the local wholesale office. The others distribute their purchases about 50-50 between the C.W.S. and private dealers. The largest co-operative retail society in London buys about 40 per cent of its coal from the C.W.S. But on the whole the various retail societies are steadily buying larger quantities from the C.W.S. Aside from other reasons, many are prompted to do this because the C.W.S. has on numerous occasions when a coal shortage occurred, taken good care of its loyal customers. Besides, it has made it a point to furnish good coal at as low a price as possible.

The distribution of coal in the Manchester district alone amounts roughly to one million tons a year. All three districts together annually handle approximately two million tons. Of this total about 90 per cent goes for domestic consumption and the rest for industrial purposes.

C.W.S. OPERATES ITS OWN COLLIERY

In line with the general policy of the International Union of co-operative societies regarding the control of raw material, the C.W.S. has already taken active steps to mine its own coal. Several years ago it purchased valuable undeveloped coal fields in Yorkshire, which it contemplates developing at an early date. Moreover, in 1917 it purchased the Shilbottle colliery, in Northumberland, which will have a weekly output of 7,000 tons after repairs now under way shall have been completed. The entire mine is being electrified.

In the absence of large collieries of its own the C.W.S. purchases its supplies on the coal exchanges of London, Manchester, Leeds, Birmingham and Newcastle. The district managers do the buying and deal with the pit masters at the exchanges. It is not customary to purchase on long-time contracts. Shipments by rail and water are made directly from the pits to the yards of the retail societies in quantities varying from a few carloads up to a thousand tons.

In addition to the railroad and colliery coal cars used for transporting its supplies, the C.W.S. owns coal cars of its own. The London district operates 712 cars or wagons carrying from 8 to 12 tons each. The Manchester district owns 130 coal cars. For these wagons the C.W.S. charges the current coal freight rate to the retail societies. At the rate obtaining at present this nets a handsome profit to the C.W.S., which it turns over to the shareholders, the retail societies and their members in the form of dividends.

The London district coal office of the C.W.S. stands well at the top in the general wholesale trade of domestic coal in that metropolis. It is under the efficient management of A. E. Cockbaine, who is a practical coal man and has been connected with the co-operative movement for 25 years. The membership of the London co-operative retail societies is so large that if they were to act as a unit through the London office of the C.W.S.,

they might readily become the controlling factor in that large consumers' market.

The co-operative societies in Plymouth (with a membership of 50,000 and a coal trade of 80,000 tons per year), Leeds and Edinburgh (the latter with a membership of 62,000) hold a similar commanding position in relation to local coal prices.

From 350,000 to 400,000 gross tons of domestic coal are handled annually by the London office. The average handling cost for the London district amounts to but 3½d. (7c.) per ton. Prior to the world war the gross profit for this district averaged 3d. (6c.) per ton. The above figures do not include the industrial coal handled.

Scottish Co-operative Wholesale Society.—The Scottish Co-operative Wholesale Society, Ltd. (S.C.W.S.), Glasgow, serves a similar function for the retail co-operative societies in Scotland. It is the largest dealer in house coal in Scotland and purchases domestic coal for upward of 200 depots in Scotland, besides industrial fuel for about 20 mills and works. Its coal department had a turnover in 1922 amounting to 283,552 tons of household coal. This was an increase of 41,852 tons over the previous year. The society paid for it at the mines a total of £304,281. The mills and manufacturing works of the S.C.W.S. during 1922 used 45,430 tons of coal as fuel.

While the English C.W.S. sells only to its registered retail member-societies, the S.C.W.S. sells also to private parties who are not members of a local co-operative society. But such orders must be sent in to the S.C.W.S. through a local retail member society. The S.C.W.S. owns 115 coal cars, of which several are hopper-bottomed and of 30 tons capacity.

St. Cuthbert's of Edinburgh.—St. Cuthbert's Co-operative Society of Edinburgh, though otherwise affiliated with the S.C.W.S., carries on an independent coal trade and is the biggest coal dealer in Scotland's capital, doing 75 per cent of the local coal business. It is the only consumers' co-operative society in Edinburgh and has a membership of 62,000. This society is considered by many to be one of the best operated in the world. Thomas Young is its manager.

BUYS COAL DIRECT FROM COLLIERIES

In 1922 the coal sales of St. Cuthbert's amounted to 130,000 tons. It buys its coal directly from the collieries and transports it in its own cars, of which it has 260 of 10 tons capacity each, to its coal yards in Edinburgh. The society operates 7 coal yards from which deliveries are made by its own lorries.

The total distributive expense is 8s. per ton from the railroad car to the consumer's bins. This covers all expenses, including feeding and shoeing of horse, veterinary charges, stable expenses, coal bags, depreciation, etc. The fact that the members of St. Cuthbert's live in close proximity to one another makes long delivery routes unnecessary and gives the society an advantage over private coal dealers.

ONLY A THIRD OF THE TIME GOBBING ROCK.—Mr. Brosky points out that in the article "With Hand Shoveling 10 Tons per Man and 26 Tons per Loader Already Attained," in the issue of *Coal Age* of Feb. 7, on page 202, it is stated that "At least two-thirds of a loader's time is utilized in gobbing the parting." In justice to him it should be stated that this was a printer's error and should read "At least one-third, etc."

News Of the Industry

Miners and Operators Agree to Renew Old Contract for Three Years

Special Dispatch to Coal Age

SCALE IS RENEWED

Late Monday, February 18, the present bituminous wage scale was approved at Jacksonville, Fla., for a term of three years by the unanimous action of the sub-committee of miners and operators of the Central Competitive Field.

In their second caucus last week the operators withdrew their former proposal for an indefinite wage reduction, and gave most of their time, according to Phil Penna, of the Indiana Operators' Association, to discussion of the miners' request for a four-year contract until they adjourned until the joint meeting with the miners the following morning. According to Penna, a motion was made for a return to the 1917 wage scale, which would mean 24c. a ton reduction for tonnage men and \$2.50 a day reduction for day men. There was no discussion of this motion.

DISCUSS DISTRICT SETTLEMENT

Considerable time was devoted to discussion of a proposal that the prospective joint wage agreement be made effective by districts, subject to settlement of internal differences, instead of in the entire Central Competitive Field at once. This would mean that separate districts might determine conditions and defer action on the wage agreement until district conditions were settled satisfactorily.

The sub-scale committee of operators and miners threshed over the question of a one-year or a four-year wage contract for four hours on Feb. 13 and adjourned without reaching any understanding.

Following adjournment Phil H. Penna declared that while nothing had been definitely settled there will be no strike April 1. "In my judgment," said he,

"there is not a possibility of a strike. Both sides realize that a process of elimination through the operation of economic laws is the only salvation."

The deliberation virtually came to a standstill on Thursday while the operators argued their differences and tried to agree on a contract term they would sign. The miners demanded that they sign for four years.

The operators agreed to a renewal of the wage scale, it was learned definitely, and are united in opposing the miners' request that "internal conditions" be referred back to the districts for solution in district joint conferences.

Operators of steam-coal mines are said to be willing to sign for three years, but some representatives of independent mines in western Pennsylvania declared opposition to anything longer than one year, it was reported.

Prosecution Decides to Put Keeney on Trial First

A surprise was sprung when the state elected to try C. F. Keeney, president of district 17, United Mine Workers, instead of William Blizzard, president of subdistrict 2, on the indictment from Logan County charging Keeney and others with being accessories before the fact in connection with the murder of John Gore, a Logan County deputy sheriff, at the time of the "armed march" of 1921. The cases against the union leaders were called in the Circuit Court of Fayette on Feb. 11.

The defense at the opening of the trial offered a number of special pleas, all revolving around the main contention that the defendant had not been brought to trial within three terms of court except in specified instances where continuances had been obtained by the defense. Prosecuting Attorney Love pointed out that three terms within the meaning of the law had not passed and alluded to the fact that most of the intervening terms were accounted for by changes of venue which carried the cases successively to Jefferson, Morgan and Greenbrier counties. It was contended by the defense that a default entered at one of the terms in Jefferson County covered only specific ones, the state holding that it covered all the indictments. Judge J. W. Eary supported the contention of the prosecution.

Nova Scotia Strike Ends; Miners Get Increase

The strike of the miners of the Dominion Coal Co., subsidiary of the British Empire Steel Corporation, in Nova Scotia, was ended on Feb. 11 when an agreement for one year was signed by representatives of the company and the United Mine Workers, at Montreal. The agreement, which is retroactive to Jan. 16, provides for the following increases over the rates in effect on Jan. 15: Datal men underground 30c. per day; datal surface men 25c. per day; shooters, loaders and contract men, including helpers, 7c. per ton; hand-pick miners, 8c. per ton; local contracts, 6 per cent.

It is estimated that the increases will involve an additional to the payroll of the 12,000 miners of over \$1,000,000 annually. The price of domestic coal supplied to the miners is increased from \$2.25 to \$3.60 per ton. Instructions were wired to the miners to return to work.

At numerous meetings held by the locals of the United Mine Workers of the Nova Scotia coal fields on Feb. 12 to consider the agreement made by their representatives with officials of the British Empire Steel Corporation, it was decided not to resume work until a referendum had been taken. Those opposed to acceptance of the terms agreed in contending that the increase in the price of domestic coal to miners from \$2.25 to \$3.60 per ton, largely wipes out the wage increases granted.

There also is some resentment against the order wired from Montreal to return to work on the ground that their representatives exceeded their authority in ordering a resumption of work before a referendum had been taken. On the morning of the 13th the whistles blew for work, but there was no response except at Dominion No. 1 Colliery, where the local had voted to return to work.

R. M. Wolvin, president of the British Empire Steel Corporation, signed the contract for the corporation; W. Dalrymple and Andrew Steel for the union. Silby Barrett and Robert Baxter signed the agreement for the Nova Scotia miners. Sir Newton Moore and F. W. Gray signed as witnesses.

The British Empire Steel Corporation regards the agreement reached as satisfactory in that it covers in more detail contracts previously entered into with the union, particularly as affecting working conditions in the collieries. It is hoped that an improvement in operating conditions at the mines and a more thorough understanding between the two sides will result.

"Exact Cause Not Definitely Known," Says Shanktown Explosion Jury

Inspectors Declare Source to Be Arcing of Rheostat of Mining Machine, Burning Gasket and Firing Gas and Causing Dust Explosion

A jury selected by Dr. A. H. Stewart, Coroner of Indiana County, to inquire into the cause of death of thirty-six men who lost their lives in the Lancashire mine at Shanktown, Pa., on Jan. 26, returned the following verdict:

"That on Jan. 26, 1924, about 3 o'clock p.m., in Lancashire Mine No. 18, located at Shanktown, Green township, Indiana County, Pa., the deceased miners came to their death as the result of an explosion of gas in said mine. The exact location of the origin of the explosion and the exact cause of said explosion is not definitely known." The inspectors who conducted the investigation and several miners who escaped following the explosion gave testimony.

The inspection commission appointed by J. J. Walsh, State Secretary of Mines, consisting of T. J. Lewis, Nicholas Evans and Thomas S. Lowther, inspectors of the twelfth, twenty-fourth and twenty-fifth bituminous districts, respectively, gave somewhat different testimony. Their report follows:

"The mine is a slope opening, mining the B, or Lower Kittanning, seam of coal, and is driven in a distance of about 5,700 ft., with an average dip of about 5 per cent. The system of mine development is with four main entries, the two center ones being used as inlet airways—one of them as a haulage road and the other as a traveling way—the two other entries, one on the right and the other on the left, being used as return airways. Flat mains are driven to the right and left from the main-slope entries and room entries are driven off the flat mains.

"The ventilation is produced by a 7x3-ft. reversible fan, driven by a 75-hp. motor using a.c. current, which operates as an exhaust and runs at a speed of 210 r.p.m., producing 75,000 cu.ft. of air per minute and a 2.5-in. water gage.

"On our examination of the record books of the mine foreman and fireboss, we found that on several occasions explosive gas had been reported at the face of one or more of the live entries, the reports showing that gas was being emitted in all the development entries that were being driven at the time the explosion occurred.

"All the live workings below No. 6 right flat were being worked with closed lights, the miners and daymen using electric cap lamps and the mine officials, shotfirers and machine runners using flame safety lamps for gas-testing purposes. The coal above No. 6 right flat is exhausted, and No. 6 right soon will be worked out.

"The employees in No. 6 right flat were using open lights, as explosive gas was never known to have been emitted in this section of the mine. It was ventilated by an independent inlet air current from an opening to the

surface on the right side of the mine above No. 6 right. After the explosion occurred all the employees in this section escaped safely to the surface through this opening, except one, who ran out to the main-slope haulage road and died from the effect of afterdamp.

"We entered the mine on Wednesday morning, Feb. 6, by way of the main-slope haulage road and proceeded with our examination of the conditions caused by the explosion until we reached the water near the face of main-slope entries. We found accumulations of explosive gas in these entries, but did not find any evidence to show that the initial point of the explosion had been at the face of the main slope.

"We then proceeded to No. 7 left flat and carefully examined conditions along the flat entries, room entries off the flat and also the rooms that were working in this section. We found some accumulation of explosive gas in all working entries and some of the rooms in this section. Thence we traveled into the No. 8 right flat section and worked until late in the afternoon without completing our investigation.

"We resumed our inquiry on the morning of Feb. 7, proceeding directly to the workings in No. 8 right flat.

"We found a closed-type electric mining machine at the face of the airway of that heading. This airway was being driven back and outward. Here canvas had been used to direct the air current to the working face. The machine was placed against the face of coal in position for undercutting. Explosive gas had accumulated in these flat entries.

"We also found a closed-type mining machine at the face of the airway of No. 1 butt room entry off No. 8 right flat. At these faces also explosive gas had accumulated. In this airway we found evidence of intense heat and much force developed outward, and this, connected with other evidence obtained, indicated that this had been the initial point of the explosion. The mining machine at the face of this airway had just completed the undercutting of the coal, and the machine was being re-

placed on the truck, to be moved to some other place, when the explosion occurred.

"By carefully examining this machine, we found evidence that caused us to suspect that defects in the electrical parts of this machine had caused the explosion. By dismantling parts of it, we found that an arc had occurred in the rheostat which caused intense heat and burned out the gasket between the frame of the machine and the plate by which the rheostat was covered. This gasket was consumed for a distance of about 6 in. This burning of the gasket would allow the flame to pass upward into the atmosphere.

"The whole machine must have become charged, and arcing possibly may have been produced at any one or at all grounding points. As this place emitted some explosive gas and as the machine had just completed undercutting the coal, raising a cloud of coal dust, the atmosphere of the place must have been in prime condition to propagate an explosion from the flame which the machine emitted.

"Therefore, we are unanimously of the opinion that due to improper and inefficient assembling of the machine, an arc was formed which caused an explosion in an atmosphere charged with dust and explosive gas.

"For the future safety of the employees and for the protection of this property, we recommend: that the mine hereafter be worked exclusively with approved safety lamps, that all mining machines used for undercutting the coal be of the improved closed type, approved by the U. S. Bureau of Mines, that no open-type motors be used except in places ventilated by inlet air currents, that no switches, circuit-breakers or fuses be of the open type, but be enclosed in explosion-proof casings or break under oil, as required in paragraph 65, Sec. 4 of Art. 11 of the mining law, and that no trolley wires be extended beyond inlet air currents.

"We also advise that all shots be fired by qualified shotfirers, using only permissible explosives, and portable shotfiring machines enclosed in tightly constructed cases. All holes charged for blasting should be tamped with clay or other incombustible material the full length of the hole and all airways should be driven in the same direction as the entries and maintained parallel at the working faces so as to eliminate the excessive use of canvas for ventilating purposes."

Surface Works at Shanktown Mine

Note the fan house on the hill. The fan housing leaked a little after the explosion but was easily put into working order. Probably coal dust played only a minor rôle in the explosion, the mine producing a large quantity of water.



Joseph Struthers, Secretary of Engineers Club, Dies

Joseph Struthers, mining and metallurgical engineer, former secretary of the American Institute of Mining & Metallurgical Engineers and secretary at the time of his death of the Engineers Club, died of pneumonia, at 10 a.m., Monday, Feb. 18.

Mr. Struthers was born in New York, his father being of Scotch origin and his mother of English. He was educated at the College of the City of New York, 1880-81, and graduated as Bachelor of Philosophy at Columbia University, becoming Doctor of Philosophy in 1895. He joined the staff of instructors of the departments of mineralogy and metallurgy at Columbia in 1885 and continued in that work till 1900. He became assistant editor and later editor of *Mineral Industry*, producing, or aiding in the production of, Vols. 8-11. He was field assistant, U. S. Geological Survey, in 1903 and special agent of the U. S. Census Bureau, in charge of reports on the mineral industry of the United States, in 1904. That year he became assistant editor of the American Institute of Mining & Metallurgical Engineers and finally secretary, during which time trips were made by that institute to the Panama Canal (1910) and Japan (1911). In 1904 he was secretary of the Division of Mining at the St. Louis Exposition. Since 1909 he had been secretary and treasurer of the Engineers' Club.

Senate to Approve Probe of Alaska Coal Leases?

The Senate is expected to approve the proposal that an investigation be made of the transfer by the Navy to the Interior Department of leasing unit No. 12, in the Matanuska coal field. This unit was set aside as a reserve by President Wilson, in 1920, following a visit to Alaska of Josephus Daniels, then Secretary of the Navy, and John Barton Payne, then Secretary of the Interior. After the two secretaries had given first-hand consideration to the prospects of naval coal development in the Matanuska field, the departments entered into an agreement to conduct extensive exploratory work to determine the value of that coal deposit as a reserve for naval use.

John E. Ballaine, an Alaskan constructor, in a letter to President Coolidge and members of the Senate insists that former Secretary of the Interior Fall and Secretary of the Navy Denby entered into negotiations for the transfer and lease of the rich naval coal reserves of Alaska to promoters.

Mr. Ballaine charges that big interests are at work trying to hinder the development of Alaska. He declared the coal lease was not effected, but the Navy Department, through the efforts of Rear Admiral J. K. Robison, had refused since to permit use of Alaskan coal by the navy. He added that proposals for the coal leases were like those used later in the Teapot Dome oil transactions.

The quality of the coal has been



F. W. Gray

Recently appointed assistant to the president of the British Empire Steel Corporation, which has many coal mines in Nova Scotia. Always a protagonist for Canadian coal, Mr. Gray recently read a paper on that subject before the Canadian Institute of Mining and Metallurgy, receiving the W. R. Wilson award for that contribution.

conceded for many years to measure up to Navy standards, but underground development revealed that the formation is faulted badly and that the coal seams are crushed to such an extent that the engineers who followed the work are convinced that it would not be possible to mine the Matanuska coal at a cost which would make it possible to compete with the high-grade coals of southern West Virginia.

The actual transfer of the Matanuska reserve was made on May 1, 1922. A study of the property was made by the Bureau of Mines and it finally was decided to close the mine. Before this was done it had been ascertained that no coal operator, who could show the necessary financial backing, was willing to undertake the operation of the mine. Coal deposits in Alaska can be operated only under the leasing system. Several properties now are being operated under such a plan by Alaskan capital. The output of Alaskan coal in 1923 was 40 per cent greater than in 1922.

Brydon Names Committee to Arrange for Convention

John C. Brydon, president of the National Coal Association, has selected the following committee to arrange for the next annual meeting of the association: W. E. E. Koepler (chairman), Pocahontas Operators' Association, Bluefield, W. Va.; C. E. Bockus, Clinchfield Coal Corporation; W. H. Cunningham, Cunningham, Miller & Enslow; W. L. A. Johnson, Southwestern Interstate Coal Operators' Association; F. S. Love, Union Collieries Co.; P. H. Penna, Indiana Bituminous Coal Operators' Association; W. J. Sampson, Witch Hazel Coal Co. After the place has been selected for the convention, two other members will be added to the committee.

Hoover to Continue Reports On Business Conditions

Reports on business conditions and industrial production published by the Department of Commerce will continue to be issued, an official statement issued Feb. 16 said, although Attorney General Daugherty in a recent letter to Secretary Hoover indicated that trade associations might be sharply restricted in gathering statistics which enter into the reports. The Attorney General held that the furnishing of such data to the government probably was lawful, but that dissemination of it by trade associations themselves to members probably was unlawful.

"The Department of Commerce will continue to publish its monthly survey of current business," the statement said. "The information which associations furnish will be used within the limits of department appropriations and facilities in the publications to the extent that it proves suitable.

"The department does not express any views as to the legal status of any association from which it receives the information or any approval of its activities."

Electrical Engineers Discuss Automatic Mine Equipment

Electrical engineers of the northern anthracite region were the guests of the Scranton Electric Construction Co., of Scranton, Pa., at the Engineers' Club, Feb. 8. After the dinner Chester Lichtenberg, switchboard engineer with the General Electric Co., gave an illustrated lecture on the automatic substation. In the course of his talk Mr. Lichtenberg showed the evolution and development of the automatic substation for converting alternating-current electrical energy to direct-current energy for use in and about the coal mines, and also showed illustrations of automatic alternating-current switching stations.

After the lecture E. B. Wagner, electrical engineer of the Lehigh Valley Coal Co., spoke about the success of the Drifton automatic substation, the first installation of this kind made in the mining field. This substation is one of three now operated by his company. In an appeal to the manufacturers to give greater consideration to the adverse conditions under which mine electrical equipment must operate Mr. Wagner gave some interesting figures showing that there is a potential market for about 1,500 locomotives in the anthracite region alone. It was estimated that 15 per cent of these would be of the storage-battery type. The generator capacity required would be about 108,000 kw., most of which probably will be furnished through 600 automatic substation equipments.

Discussion on the question of the motor-generator set versus the rotary converter for mine service brought out the fact that one large manufacturer found that in 1920 rotary converters for haulage service exceeded motor-generator sets in the ratio of 60 to 40; in 1923 the motor-generator set was predominant, the percentages being reversed.

High-Cost Operators Panicky at Likelihood Of Long-Time Wage Agreement

Intelligent Observers See Salvation of the Industry in Long Period of Uninterrupted Competition, Which Would Weed Out Superfluous Mines and Workers

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Operators of high-cost mines in the union fields are in a state of panic in the face of the probability of the negotiation of a long-time wage agreement, which carries with it the certainty of a long period of uninterrupted competition. Not all of them have learned that there is no salvation in a temporary shortage such as is created by a strike. It may be said, however, that it is only an inconsequential proportion of operators who are so shortsighted as to hope for a strike. An overwhelming majority of operators concede that surplus capacity and the surplus of men must be reduced drastically. Most of them agree with Secretary Hoover that the best way to bring this about is by the continuation of production without interruption.

While figures are not available to indicate the losses which are accruing because of the unproductive capital tied up in surplus mines and equipment, the extent to which the public is supporting coal miners can be grasped by a glance at the following figures:

	Men Employed	Output, Tons
1890	192,402	111,302,000
1900	304,375	212,316,000
1910	555,533	417,111,000
1918	615,305	579,386,000
1919	621,998	465,860,000
1920	639,547	568,667,000
1921	663,754	415,922,000
1922	687,958	422,268,000

This enormous increase in the number of workers which the industry is supporting can be accounted for only by the fact that the wage scales attract too many men into the industry. It is natural that the worker prefers to labor two days per week and earn \$1,500 per year than to receive the same annual income for six days' work per week. In considering the increased number of men in the industry, sight must not be lost of the fact that production by machine has been increasing constantly with a resultant higher output per man.

With the promise of a long period of peace in the industry it would seem that the principal fruits of such a situation would go to the non-union fields. On the face of things, the entire market would seem to be theirs, up to the point of freight-rate limitation. The remarkable success which is attending the mechanization of non-union mines has a serious portent for the union fields. The difference in wage scales even now is great. At some mines, at least, the minimum pay has gone as low as \$3. Drivers and other semi-skilled men are being paid \$3.50. There are non-union mines, it is understood, in which \$4 is the top wage. Cutters are getting 4c. a ton and loaders, in some instance, are getting 32c. a ton.

In the face of such costs, it would seem that the non-union fields could capture most of the market worth

having. To an increasing extent, however, the advantage enjoyed by the non-union producers is being met by unofficial understandings at individual mines between management and men whereby wage reductions are accepted to keep the property in operation. The practice is known to be spreading and some are of the opinion that the union will close its eyes to it so as to allow the employment of the maximum possible number of union men and because by this practice non-union wages will be forced to a level where a fertile field will be created for the seeds of union propaganda.

Mr. Lewis' recent emphasis of the fact that no questionable methods are to be employed by union missionaries is not taken to mean that there is any less determination to extend union territory. It simply means that the policy now in force is much more likely to be effective. The missionary work no longer is being done by the rough-neck element in the union. There is reason to believe that carefully picked union emissaries are now strategically placed in the ranks of the workers in most of the non-union operations. These men will not resort to intimidation. They were chosen because of their intelligence, their plausibility and, their ability to gain the confidence and respect of their fellow workers. While it seems probable that a long period will pass without a strike, a battle royal, nevertheless, impends. Instead of being between employer and employee it will be between union and non-union interests.

Last of the Coal Mohicans

Last of the coal mines to be unionized in Illinois, the old Brush mine, at Carterville, about which such a struggle waged from 1898 to 1905, has passed into history. The tippie is all that remains intact. Removable steel from inside the mine has been taken out and soon the scene of Illinois' longest labor war will revert to prairie land. Troops were sent to Carterville when the struggle was at its height. Miners and strikers fought in bitter warfare, standing in the open without protection. They fired with a wild aim and wasted tons of ammunition, but all warriors came off without a scratch, as they aimed to miss. Houses around the mine still bear the marks of the bullets. Samuel T. Brush, the owner of the mine, finally gave up the struggle of fighting the union and sold the mine to the Madison Coal Corporation, which at once unionized the mine.

Urges Better Ventilation in Anthracite Mines

The Lehigh Coal & Navigation Co. has been requested by the State Department of Mines of Pennsylvania to remedy alleged dangerous conditions in the three collieries operated by it in Carbon County. A report just submitted to the department by three anthracite inspectors, appointed by Secretary of Mines Joseph J. Walsh, copies of which have been sent to Samuel D. Warriner, president of the company, and Thomas Kennedy, president of District No. 7, United Mine Workers, shows that ventilation conditions in the collieries were inadequate when the investigation was made and that there was not sufficient fresh air to dilute the dangerous underground gases. The inspectors reported that they observed "extreme laxity" in the use of safety lamps in the mines, many of the miners going into the shafts without being equipped with the locked safety lamps as required.

The inspectors, Frank Kettle, J. J. Strickler and Edwin C. Curtis, reported that they had inspected the Nesquehoning, the Greenwood and the Lansford mines and said that in each of these mines "the volume of air circulating along the faces of some of the chambers was not sufficient to dilute, render harmless and sweep away smoke or noxious gases as required by Sec. 4, Art. 10 of the act of June 2, 1891."

VENTILATION INADEQUATE

Continuing, the report stated that the system in use to ventilate the faces of certain gangways and chutes was "not good practice." The ventilating fans located on the surface of the mines, the inspectors reported, did not produce "sufficient pressure to force through the mines a volume of air sufficient to remove the danger from gases."

"Practically all of the runways and crosscuts through which we traveled," the report continued, "were too small to permit an adequate supply of air at the pressure produced by the ventilating equipment."

"We cannot impress too strongly upon the officials the positive necessity of seeing that every workman employed in the gaseous mine be equipped with a safety lamp for testing purposes," the report emphasized. "We also desire to call attention to an extremely dangerous practice indulged in by some of the miners, namely, that of hanging their safety lamps on props or timber long distances from their working faces and permitting them to remain there during the day. Those careless persons should be brought to realize that they have an obligation to meet in the way of protecting themselves and others employed in the mine."

"We also suggest that the man in charge of the station at the entrance to a locked safety-lamp section be empowered to prevent any person from passing his station until he has in his possession a locked safety lamp."

The inspectors appended to their report a statement that certain construction work was already in progress at some of the mines designed to improve the ventilation in the mines.

Calls Coal Commission Report On Wholesalers Unfair

The report of the U. S. Coal Commission on the business of the wholesale coal dealers, "through the method by which its conclusions are arrived at and through the language stated in announcing its conclusions, appears to be intent upon creating prejudice on the part of the public against the wholesale coal dealers," according to an analysis made by Edward E. Gore, business analyst, for the American Wholesale Coal Association. "The statements presented," the report concludes, "carry an unfair inference and the conclusions announced are not such as would be reached by those who are familiar with the manner in which business is transacted."

The report states:

"The periods selected for investigation and comment, being the month of November, 1922, as compared with the month of November, 1921, and the week ending Nov. 25, 1922, were a most unfortunate election if the Coal Commission intended to approach the subject in a spirit of fairness, since the periods referred to marked the most violent fluctuations in the prices of coal and the existence of the greatest panic among consumers of coal ever known in the history of the trade.

"Comment is made upon the fact that during the week ending Nov. 25, 1922, the fluctuation in prices resulted to the dealers in differences ranging from a loss of \$2.25 per ton to a gain of \$3.90 per ton on sales of bituminous coal, while the variations in the prices of anthracite during the same period amounted to as much as \$4.53 per ton.

"No better evidence could possibly be produced that the period selected was one of a panic in the coal market and manifestly not a period to be used as a basis for statements intended to inform the public of conditions in the coal trade.

"These violent fluctuations in price should, however, have the effect of convincing the general public that there is in existence between the wholesale dealers in coal no such arrangements as would result in stifling competition. On the contrary, evidence of the most active competition is complete.

"The U. S. Coal Commission seeks to limit the earnings of wholesale coal dealers to a fixed rate of return on their invested capital, wholly ignoring the fact that invested capital is a secondary consideration—the success of a wholesale coal dealer being predicated not upon the amount of capital that he controls but upon the amount of coal that he can sell."

Continuing, Mr. Gore says: "The Coal Commission intimates that an increase in the number of wholesale coal dealers must result in higher prices because of competition on their part in obtaining tonnage to sell.

"The Commission's attitude with respect to this matter is in direct contravention of the general understanding that there are in the United States facilities for the production of nearly double the amount of coal that the country can consume and it is well established that competition among coal producers is as keen, or keener, than



Erskine Ramsay

Mining engineer, coal operator and capitalist, who has presented the first \$100,000 for the construction of an Engineering Hall at the Alabama Polytechnic Institute, Auburn, Ala.

in any other line of like importance.

"The U. S. Coal Commission, while showing the average percentage of gross profit derived from the sale of coal by wholesale coal dealers, fails to make any comparison between the rate of gross profit in the coal trade with the rate of profit derived from the sale of other commodities by jobbers or wholesalers.

"There are few staple commodities and none of any other kind that are sold by wholesale dealers at a lower margin than that taken by wholesale coal dealers. This the public should understand before judgment of an unfavorable kind shall be formed with respect to the dealers in coal."

Washington State Mines Yield Three Million Tons in 1923

Fifty-seven operators in Cowlitz, King, Kittitas, Lewis, Pierce, Thurston and Whatcom counties, Washington, produced 2,946,007 tons of coal in 1923, according to William P. Reese, chief state mine inspector. Of this, 19,937 tons was from a sludge washery of the Renton Coal Co. The largest producer was the Northwestern Improvement Co., which has six mines comprising four district operations. Its output was 1,119,102 tons. The next largest producing company was the Pacific Coast Coal Co., with an output of 618,024 tons. The output per man varied from 0.30 ton per day in one of the smaller mines to 5.07 tons in one of the mines of the Roslyn-Cascade Coal Co. The average production was 3.18 tons per man-shift.

COAL PRODUCED IN WASHINGTON IN 1923

County	Coal Shipped	Total Output	Tons per Man
Cowlitz.....	.....	114	2.37
King.....	634,679	663,061	2.65
Kittitas.....	1,295,030	1,358,359	3.87
Lewis.....	95,544	113,114	3.42
Pierce.....	281,715	355,715	1.79
Thurston.....	256,582	268,202	6.06
Whatcom.....	172,680	187,442	3.83
	2,736,232	2,946,007	3.18

Missouri Retailers Charged With Unfair Methods

The Missouri State Retail Coal Merchants' Association is charged with unfair methods of competition in a complaint issued last week by the Federal Trade Commission. The organization, which is also known as the Mid-West Retail Coal Association, is composed of retail dealers in coal in Missouri, Arkansas and Illinois.

J. B. Sanborn & Co., of Chicago, Ill., a coal-trade directory publisher, and the following officers and directors of the coal association also are named as respondents in the case: R. D. Kelly, W. A. Storrs, H. R. Oglesby, P. L. Rupp, F. W. Schramm, F. A. Parker, F. W. Autenrieth, E. J. Wallace, Arthur M. Hull, S. P. Guthrie, W. R. Creasey, J. B. Hallquist, V. C. Elmore, W. F. Sprague, G. V. Montague, Frank Wilmes, H. F. Shrankler, William Farrell and J. E. Cowling.

According to the commission's complaint, the respondents co-operated in preventing the distribution of coal in the territory served by the association's members, except through the so-called "regular" channels and prevented "irregular" dealers, co-operative purchasing associations and other consumers from obtaining coal at wholesale prices, or from any other source than the so-called "regular" dealers.

Indiana Feels a Pick-Up

The opening recently of the Ventura mine, formerly the Riverside mine, by the Coal Bluff Mining Co., Terre Haute, and of Miami No. 10 mine is indicative of the general increase in activity felt by the industry in the western Indiana district. Twenty-one mines are now operating near Clinton and many mines that had been idle for long periods of time are now working steadily.

The Ventura mine, which had been idle for some, has been remade into practically a new mine. A steel tippie has been erected with the latest type of picking tables and loading booms for the sizing and preparation of the coal. The tippie is built to handle four tracks.

Some time ago the opening of the Dixie Vein mine, the Miami mines 6, 8 and 10, and the Oak Hill mine gave impetus to the business and furnished employment for hundreds of miners.

Statistics from the Indiana Coal Trade Bureau compiled for the week ending Jan. 26 show that the mines in operation worked over 51 per cent of the time. One hundred and seventy-seven mines reported in operation to the bureau, although many Indiana mines are not included in that number.

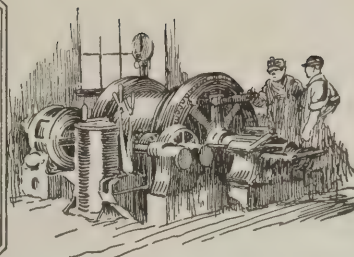
Causes for the sudden spurt in the coal-mining business are said to be the "getting ready for April 1" policy. Some of the railroads are storing coal and many manufacturers fear a coal miners' strike, it is said.

William L. Allen Dead

William L. Allen, of Scranton, well-known coal operator, died Feb. 18. He was president of the Scranton Coal Co., the Price-Pancoast Coal Co. and the West End Coal Co.



Practical Pointers For Electrical And Mechanical Men



Some Reasons Why Chemical Specifications Of Cast Iron Are Undesirable

IN RECENT years, as the consumer of iron castings is becoming familiar with the methods of foundry operation, there has come a marked tendency to include chemical requirements in the specifications for cast-iron products, evidently because of the success of such a procedure in the case of steel. The movement has gone so far that the new tentative specifications for chilled iron car wheels, as first reported, actually demanded the given analysis in full.

Cast iron, in contradistinction to steel, is an extremely non-homogeneous material, highly useful for its fine resistance to compression, ease in machining, cheapness and adaptability to simple melting and molding processes. Yet, while steel may be perfectly homogeneous throughout the piece, the surface and interior of a casting are widely different in their physical properties, as brought about by carbon condition changes due to the rate of heat abstraction during setting. Further, the subsequent heat treatment to which steel is amenable finds almost no counterpart in cast iron.

On the other hand, while it will be shown in what follows that the full chemical composition when specified in purchasing iron castings serves no useful purpose, it is eminently proper, and on occasion extremely important, that one or more injurious elements always present in cast iron be limited to given maxima. The experience of the foundryman and the consumers of his product would go for naught if this limitation could not be made part of the specifications governing their transactions.

The first reason why the introduction of chemical requirements into the usual specifications for iron castings is undesirable is that wherever this has been tried in a general way it has failed of its purpose. One prominent engineering society, which went into the subject very thoroughly, found that to include all the compositions of castings coming under each separate line of work for which special specifications were to be prepared would mean that the limits for the several elements in cast iron would have to be held so wide that no useful purpose would be served. The project was therefore abandoned.

Another engineering society, through its specification committee and in conjunction with a similar committee of the foundrymen interested, has just come to the same conclusion, after studying an elaborate series of tests

for which chemical data were available to check up with the physical results. They would not fit, though showing general parallel tendencies. Perhaps the reason for this in part lies in the variations in practice at the several foundries. Procedure in founding iron is cruder and hence more widely fluctuating than in the finer and more exact process of steel making.

The second reason why chemical compositions at given figures should not be required of foundrymen in specifications they are to work under is that the history of the development in foundry practice has shown that present-day compositions of castings are considerably different from what was considered necessary some years back. Silicon is a good instance of this.

With more knowledge on the bad effects of dissolved iron oxide in cast iron, and definite information on the progression of cupola melting, the same grades of soft iron castings are now produced with much lower silicons than formerly. Much of the trouble formerly attributed to sulphur is now known to have been caused by oxidation phenomena. Even phosphorus has come in for greater attention than formerly, though in the direction of limiting it more closely, for with the better irons that can now be made, the phenomena of segregation have become more acute, as the metal remains fluid longer.

The general use of steel scrap in cupola mixtures, for cutting down the total carbon and thus strengthening the iron, has upset many notions on compositions as going with physical properties, and with this new variable introduced into the problem, already complicated with many others, it is very nearly hopeless to formulate a series of constants such as could be used to build up a set of compositions that could be called standard.

None the less, the purchaser of castings, in the course of his experience with the product of the foundries he deals with, may develop a line of compositions which will give good results, and naturally he will want to apply this information for his own benefit. There is no reason why such compositions should not be given in the specifications issued as "recommended practice," but not as essential requirements. The foundryman who works under such specifications will do his best to comply with them and get the physical prop-

erties demanded. But should he find himself unable to do this, he will be free to use his own experience in getting the physical properties required by using compositions of his own, without having his product rejected.

The cases where maxima for certain elements may be specified are somewhat different. Where it is known definitely that when a given maximum percentage of an element is exceeded failure may result, it is the part of wisdom to apply this limit. The case of sulphur in cast-iron water pipe is an example. High sulphur here may cause breaking when the shock of water-hammer is applied. It is perfectly justifiable, therefore, to state in the specifications that sulphur shall not exceed a given percentage. Phosphorus, similarly, is known to give serious segregation troubles when sections exceed 2 to 3 in. in thickness. Hence a limit is proper where the work will exceed these sections.

The conclusion derived from the above discussion is that it is unwise to add to the troubles of the foundryman by imposing chemical requirements upon him in addition to physical ones. Either one or the other should be imposed, but not both. If the consumer wants a given composition, the foundryman furnishes it, but then the consumer is responsible for the physical characteristics of the work. But if the consumer wants the castings for his service requirements, the foundryman should be unhindered in working out the problem, so long as the service requirement tests are met.

RICHARD MOLDENKE.

Allowing for Expansion and Contraction of Copper

For the same temperature a piece of copper will expand more than a similar piece of iron or steel. Further, it is usually found that in a motor, the copper becomes hotter than the other materials of which the motor is made. Therefore, it is necessary to provide means for the copper to expand and contract to take care of the relative motion between the different materials for the changes in temperature. A common error in this respect is to anchor the wiring around frame connections to the frame proper when it should have been securely bound to the windings, so that it would be free to move with the windings. It is obvious that this is more important with solid-strap conductors than with flexible cables.

Replacing Broken Gear Teeth

The building up of cast-iron gears offers possibility for wide use of the acetylene torch—for instance, in replacing a drum gear on a room hoist.

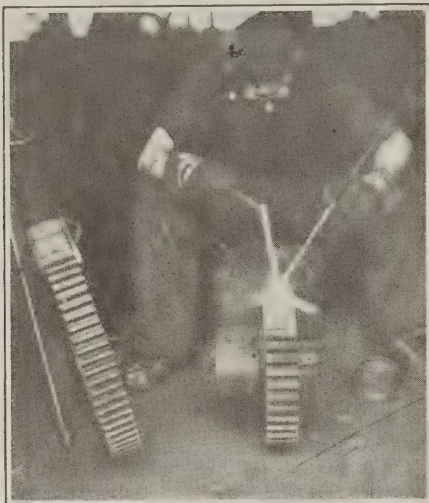


Fig. 1—Building Up Metal for New Gear Tooth

Here the operator fills in the section of the gear where a tooth has been broken.

By placing a strip of $\frac{1}{4}$ -in. steel plate on either side of a gear section where teeth are broken off and clamping these with a $\frac{3}{4}$ -in. round of soft iron, bent to a U so as to press the plates against the sides of the gear, a pocket may be formed. This pocket then should be built up with cast-iron welding rods by means of an acetylene torch. The gear is then placed on a boring mill and the built-up section faced off. Then it is placed in a shaper and teeth are cut from the solid metal.

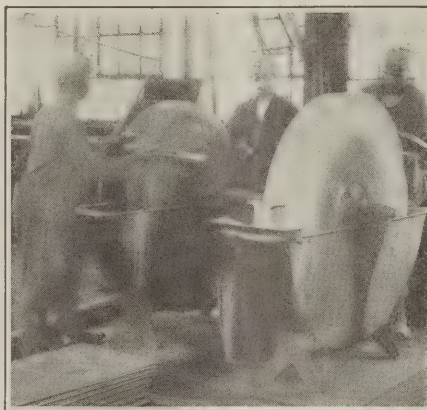
The machine work is laid out as follows: The side of the built-up section is chalked, a templet is placed over the chalked area and the teeth marked out. A round-nosed tool is prepared by grinding to cut the exact tooth shape with only a downward feed of the

shaper, the templet aiding in obtaining the correct shape of each tooth to be cut. The templet is cut in the rough from a piece of thin sheet iron and then filed to shape by clamping the sheet iron against a new gear which is a counterpart of the one to be repaired.

This job is a great money saver when many gears of the same size and shape are repaired. It also is economical to go through the entire process described for only one gear. The cost of making three new teeth, including materials and labor, is about \$1. Steel gears may be repaired in a similar manner, of course, using steel instead of cast-iron welding rods.

Grindstone for Sharpening Axes, Hatchets and Picks

One or two old-fashioned grindstones, depending upon the size of the plant, are as important a part of the equipment in a mine shop as they are a necessity on a farm. From the point of safety they are highly desirable, as they can be used by inexperienced men for many sharpening jobs which too



Mine-Shop Grindstones

Slow-moving stones like these may be used with relative safety by any workman around the mines.

commonly are done on the high-speed emery wheel.

Approximately, for every 1,000 tons of coal mined, 100 loaders are employed, each of whom should be provided with a sharp ax, because it is needed for efficient work in placing safety props in the chambers and along the mine roads. Members of timber crews also must have these implements; mine electricians and brattice men cannot work without good one-hand axes, nor can a carpenter do much without a sharp hatchet. A slow motor-driven grindstone of fine sandstone will give a keen edge to all these tools. And loaders can grind their own picks on them too.

At the Lynch Mines of the U. S. Coal & Coke Co. coal loaders and others fought for the use of emery wheels to sharpen their tools. The practice was both dangerous and bothersome, so the company installed two grindstones. On them, as the illustration shows, four men can work at one time. All danger

of injury is removed and interference with shop operations is eliminated.

Ignorant practices in the use of an emery wheel might cause it to burst or the tool being sharpened might be thrust back because of the great speed of the wheel, and thus a man might be severely injured by it. Worst of all, flying particles of emery are likely to cause blindness if the eyes are not properly protected with goggles. At best it is a difficult undertaking to teach these men to use goggles or to keep a supply of such glasses at the emery wheels when they are used promiscuously.

Nicking of Copper

The nicking of copper is an abusive practice to be avoided. It is very easy to nick copper with the sharp edge of a metal drift or other tools such as are used in connection with the winding of armatures. It is preferable to use a hard-fiber drift and drive leads down into commutator neck slots by using a copper filling piece placed on the lead to receive the blow from the hammer. Another source of trouble due to nicking of copper is found in field-coil cable leads breaking at the point where the insulation has been cut off with a knife, the break having been started by the knife nicking the strands of the cable. Such nicks are the starting point of breaks, as surely as are those which the glazier cuts in glass when he is cutting it for the window pane. Extreme care should be used in removing insulation on all cables and wires of small cross-sections.

Circumference of Western Red Cedar Poles in Inches

Length of Pole	Class AAA		Class AA		Class A		Class B		Class C	
	Top	6 ft. from Butt	Top	6 ft. from Butt	Top	6 ft. from Butt	Top	6 ft. from Butt	Top	6 ft. from Butt
30	28	40	26	38	24	36	22	34	20	32
35	28	42	26	40	24	38	22	36	20	34
40	28	44	26	42	24	40	22	38	20	36
45	28	47	26	44	24	42	22	40	20	38
50	28	49	26	47	24	44	22	42	20	40
55	28	52	26	49	24	47	22	44	20	42
60	28	54	26	52	24	49	22	47	20	44
65	28	56	26	54	24	52	22	49	20	46

One kilogram meter equals:

7.233 ft.-lb.

0.000003653 hp.-hr.

0.000002724 kw.-hr.

0.009302 heat unit.

One hp.-hr. equals:

0.7457 kw.-hr.

1,980,000 ft.-lb.

2,546.5 heat units.

273,740 kilogram meters.

0.174 lb. carbon oxidized with perfect efficiency.

2.62 lb. water evaporated from and at 212 deg. F.

17.0 lb. water raised from 62 deg. F. to 212 deg. F.

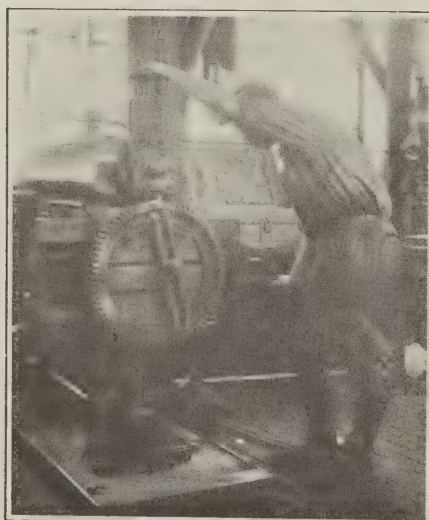


Fig. 2—Milling Out the New Tooth

By working with a tool specially designed the new tooth is shaped in the metal which was built up with an acetylene torch.



Problems In Underground Management



Shall We Protect Mines from Gob Fires by Stowing, Ventilation or Stoppings?

Most Gob Fires Occur in Thick Coal Because in That Case Many Pillars Are Left—Mine in Edmonton, Alta., Being Worked by Tunnels Cut in Solid Rock with Small Panels

DISCUSSING, in the *Monthly Bulletin* of the Canadian Institute of Mining and Metallurgical Engineers, the avoidance of gob fires in coal mines, J. B. De Hart, mining engineer, Cadomin Coal Co., Cadomin, Alta., a company that has experienced two of these fires, says that of the six fires mentioned by J. A. H. Church in a recent article, five are in thick pitching beds. These fires occurred in the following mines during the years shown: At Frank, in 1910; at Lovett, in 1916; at Cadomin, in 1920; at Yellowhead, in 1922, and at Cadomin, in 1923.

Every one of these occurred, as Mr. Church pointed out, in a seam having a thickness exceeding 12 ft.; none of them has been extinguished though in every case large sums of money have been expended and considerable risks taken in fire fighting.

SEALING AND VENTILATION CURES

Mr. De Hart says that spontaneous combustion undoubtedly arises from the oxygenation of the coal faces, with the consequent heating of the coal. If the air is excluded oxygenation is prevented; if a ventilating current is provided the heat is removed as generated. Consequently fires will be avoided if air is excluded from gob or if the gob is so well ventilated that any heat generated will be removed by the current.

He continues that in his belief thick seams do not heat because they are thick but because, being thick, the extraction is imperfect and much coal is left to become oxygenated. Thinness of seam offers no special immunity. If imperfectly mined it still would be subject to gob fires. Stowing would enable the coal to be completely removed, but, unfortunately, due to the lack of material for such stowing, the cost of filling the working with sand or other fine material would be prohibitive. However, broken rock could be fed in by chutes. With present methods only about 50 per cent of the coal is recovered, and, taking into account barrier pillars and fire losses, perhaps not more than 40 per cent.

Ventilation of the gobs, he says, would require an uncertain quantity of air at a water gage not determinable except by experiment. He is disposed

to think the cost would not be prohibitive; in any event much less expensive than a fire.

SURFACE CAVES FURNISH AIR

Coal piles sometimes will heat dangerously in six weeks from the time the coal pile is formed. Consequently heating of coal always is imminent. When drawing pillars, the roof caves, driving air to the surface if the fan is forcing air into the mine or drawing air from the surface if the fan is exhausting. Consequently the gob receives air and may heat before all the pillars are drawn. Earth might be hydraulicked with a monitor into the caves, but this could be done in the coal fields of Alberta only during the warm months.

If heating did not occur till the pillars were drawn the gob could be sealed off in the mine. If, however, the gob had heated, a current would be established between the surface and the gob, the heat furnishing the means by which the gob would be ventilated sufficiently to permit of further heating, but in insufficient volume to cool off the heated area.

It would seem well, says Mr. De Hart, to leave the pillars near the crop and to seal openings leading to the surface so that the ground will not cave to the surface, at least not till the pillars have been withdrawn and the place has been sealed. Along the crop, pillars should be left for a sufficient depth from the surface to prevent caves. Probably 75 ft. would suffice, much of which would be wash and worthless coal. With this provision the air circulation would be kept from the gob and concentrated at the working faces. The gob might then fill with methane, as in the Reaver method of North Staffordshire, when the gob is kept free of fire by drowning it with an accumulation of firedamp. The mine should be ventilated by an exhaust fan so that the gas in the interstices of the gob would be put under increased pressure should the fan stop. This method, Mr. De Hart thinks, would be safer than running the risk of a mine fire.

He advocates also drawing pillars up the pitch, thus making it possible to put

stoppings at the lower end of the room. This would give better extraction and less ventilation of the coal faces. Working downward, triangular pieces of coal are left projecting into the gob. These corners naturally squeeze and form dust, ideal starting points for fires.

Another method he considers is using small panels—so small that they can be completely worked out and sealed before a fire appears—but, he concludes, this would give a panel life too short for economical methods of working with a large output. As the pillars would be drawn in a confined area the percentage of extraction would be low and more coal would be left in the gob. The retreating method would, of course, be the ideal system, but it is too expensive to be considered.

Experiments are being made southwest of Edmonton in developing a mine by means of rock tunnels. This is good practice because it cuts the cost of upkeep of the main haulage road and gives some assurance that if, in spite of all precautions, a fire should occur, it can be sealed off in the rock and the seam opened beyond the fired area. Further, the size of the panels is being limited so as to supply about one and one-half or two years' coal.

Short Fuses Are Suicidal

BY W. J. GERMAN
Technical Representative
E. I. du Pont de Nemours & Co.

Few mine officials know how a miner uses short fuse. When he is ready to charge his shothole he cuts 7 in. or less of fuse, attaches a blasting cap to it and places the cap in the cartridge of dynamite, probably lacing the fuse through the cartridge as shown in Fig. 1.

If he intends to use three sticks for



Fig. 1—Badly Laced and Too Short to Reach Mouth of Hole

Fuse is laced through cartridge and is so short that it must be lit before the cartridge is inserted and before the tamping is wedged behind it.

the charge, he places two sticks at the back of the hole, then puts the primer stick in the mouth of the bore and lights the fuse. Next he rams the primer as far as it will go in the hole, puts in a 6- or 8-in. dummy of tamping material and tamps it reasonably tight. He then makes—or tries to make—his escape to the nearest cross-cut.

Frequently as the dummy is rammed back into the hole it curls up the fuse and this causes a misfire or delayed

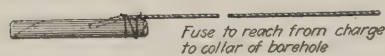


Fig. 2—Cartridge Properly Primed

The fuse is pushed into the side of the cartridge in a hole made for that purpose. It is then tied in place. The fuse is cut off so long that it will reach to the mouth of the bore hole.

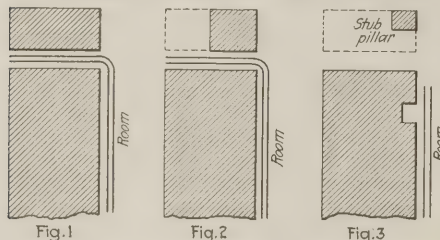
shot. Then there are times when the miner gets in a hurry and fails to clean out the holes, in which case the charge with the lighted fuse gets hung up a part of the way back in the hole. He misjudges the time it will take for the fuse to burn, and through his efforts to force the charge back he stays too long and is injured by the shot.

The use of short fuse has been responsible for many serious accidents and it necessitates loading about a third more explosive than really is necessary to bring down the coal satisfactorily. In some states the use of short fuse is against the law, and it is contrary to good practice and common sense everywhere.

Safety in Extracting Coal and Salvaging Timber

Some people maintain that in mining coal the posts should be sacrificed and no risk should be taken to salvage them. In some mines, however, the reclaiming of timber is considered important not alone for the value of the timber but to control the fall of the roof.

Wherever timber is reclaimed the



Draw Pillars Right and Save Timber

The stages in withdrawal of timber. Fig. 1 shows the crosscut completed so as to provide a small pillar adjacent to the goaf. Fig. 2 exhibits the small pillar still further reduced at the far end. Fig. 3 shows the small stub pillar which protects the man who pulls the timber. This is finally shot out and lost.

work should be supervised intelligently and with care. If the miner were allowed to use his own judgment he probably would adopt such a dangerous system of robbing pillars that he at any time might be obliged to run out of the place, occasionally losing his tools and the mine car also. Under proper directions he might obtain the same quantity of coal at less risk and yet save practically all the timber.

A safe way in which this may be done is to drive a crosscut through the rib near its end and then remove the small pillar thus formed, starting near the gob and leaving nothing but a small stump near the main roadway of the room.

After removing the track in what was the crosscut take an axe and chip one of the remoter props at one side immediately under the cap piece, so that with a long chain and post puller the post can be pulled with safety. Continue this process until the forty or fifty posts are all out. Then a hole drilled into the stump which was left

standing should be filled with a small charge of powder and shot by an electric shotfiring battery. By this method it is possible to save all the posts and yet obtain 95 per cent or more of the coal. Thus the posts will be removed without destroying one of them and without a waste of powder.

ROBERT W. LIGHTBURN.

Gans, Pa.

Why Did the Shots Explode Prematurely?

Recently we have had some peculiar accidents in the firing of shots when coal was being blasted. We are anxious to obtain suggestions as to the cause of these dangers. We use only permissible explosives for blasting the coal and No. 6 caps and fuse for igniting the shots.

On two separate occasions the miner had tamped his dummies on the charge, lit the fuse and retired to safety when an explosion followed that sounded as if only the cap had fired and not the cartridges. On returning to the face, however, it was found that the blast had blown out the tamping. The fuse was seen still burning but the cap had not fired; it went off a little later. There is no gas here and we are at a loss to understand just what occurred.

Some years ago I recall that the same thing happened to me when sinking a well, and it seems probable that others have had the same experience at times and may be able to explain the true cause.

J. H. SMITH.

East Lynn, W. Va.

This question being submitted to three of the principal powder companies manufacturing blasting powder for mines, brought the following replies:

"What seems like a premature explosion of a cap can be caused by a tight pinching of the fuse. If a small piece of fuse is held and squeezed as tightly as possible between the jaws of rather broad-mouthed pliers and, while so held, the end of the fuse is lighted, when the fire strikes the compressed part there will be an explosion of considerable force.

"Now, it is conceivable that fuse in a borehole might be so pinched between pieces of rock that a sufficiently strong explosion would blow out some of the tamping. It might blow the fuse with the cap attached out of the hole; but it is difficult to believe that such an explosion would blow the main charge out from the hole, if that is what occurred."

A second letter reads as follows: "This occurrence as described appears to have been caused by an extensive 'side spit' of the fuse, due probably to breaks caused by unrolling it and straightening it out too roughly, the fuse being either cold or somewhat dry from age. In the case mentioned it is possible that the 'side spit' ignited some fine dry 'bug dust' or coal drillings used as tamping and that sufficient gas was formed in this way to blow out the remainder of the tamping and carry the fuse with the detonator attached,

drawing it from the explosive charge.

"If the primer was not the last cartridge loaded, the explosion could have been caused by ignition of explosives from 'side spit' of fuse, this ignition resulting in a partial explosion of the charge from high temperature and pressure.

"It seems most likely, however, that what did occur was the ignition of a small feeder of mine gas by 'side spit' of the fuse. This would have resulted in the slight explosion that the miner asserts that he heard. Such a partial explosion could easily have drawn the burning fuse and detonator from the primer. The similar occurrence, in sinking a well, was in all probability due to ignition or partial explosion of the charge from a 'side spit' of the fuse. It is quite likely that the primer was not the last cartridge loaded in this case. Assuming that dry coal dust was not used for tamping, there could have been no mine gas present and we are then unable to explain the occurrence, either in the shot in the mine or that in the well."

A third letter read as follows: "From the description given of this incident it appears that the fuse probably was laced through the cartridge or in close contact with it and that the burning fuse ignited the explosive at such points. The hole being well tamped, the gases produced by the burning of the fuse and explosive might develop sufficient pressure to blow out the charge with the tamping. This would not produce a loud report, and this would agree with the reported conditions, it being stated that the noise was not as loud as would have been expected from an explosion of the entire charge. The fuse, of course, would continue burning until the fire reached the cap, which would then explode. This is the best and most plausible explanation of such occurrences, which have come to our attention on previous occasions."

In the opinion of *Coal Age*, the most plausible explanation of this occurrence is that one of the explosive cartridges was ripped or torn by a sharp jutting piece of rock or coal in the side of the hole as the cartridge was being pushed home. The injury to the cartridge may have caused a trail of powder to be left from that point to where the injured cartridge finally rested.

Now, assuming that the primer, containing the cap attached to the fuse, was the last cartridge inserted in the hole and the injured cartridge was next below this, it is quite possible, and indeed probable, that the burning fuse ignited the trail of powder and this carried the fire quickly past the primer and ignited the cartridge below it. In that case the resulting explosion would blow out the primer, the tamping and the unburned portion of fuse with the cap attached. The primer itself may or may not have been ignited by the flame of the exploding cartridge, the latter being most probable. Such an explosion would most naturally cause a blownout shot, owing to the full force of the charge being developed slowly.

Discussion

Why Peat Grew Rapidly When Coal Was Formed

With Two per Cent of Carbon Dioxide in Air Tissue Was and Is Rapidly Developed, but for Seed Development Certain Rare Elements Are Needed

FOR some years I have been operating a greenhouse with an atmosphere in which the percentage of carbon dioxide is artificially increased. This has increased the rate of growth of any plant I have used—celery, pansies, etc. Unfortunately, another influence is to make the plants woody, without seed and with warty fruit.

It is well known that in the ages when coal was deposited, approximately 2 per cent of carbon existed in the air, whereas the present atmosphere contains only 0.03 per cent. In the interval since that time a large quantity of this gas was absorbed by the action of plants and certain small organisms, and, as a result, we have limestone, oil and coal deposits, etc. The carbon dioxide that the vegetables of that period absorbed is now locked up in Nature's safe-deposit vaults; an impoverished atmosphere is left for the plant, which assumes a commensurate feebleness.

Biochemically we find that, other things being equal, the percentage of carbon dioxide on the leaves determines the quantity of starch formed and the growth of the plant. In short, double the carbon dioxide in the air and you double the plant's growth. Quadruple it and you quadruple the starch formation. Multiply the percentage of the gas by sixteen and the plant grows sixteen times as fast as in the air of today. It is important that the gas come in contact with the stomata or the breathing cells.

Now, as was stated, it is unfortunate that this growth is uncontrollable and woody, for every power house pours out the equivalent of tons of fresh vegetables and fruit. We have obtained luxuriant rose bushes but without roses, cucumbers that were warty and seedless, celery that could be a caveman's war-club, with, of course, a lot of good fruit accidentally produced in isolated tests.

After years of research I have found out the scientific key to the matter. We have disturbed Nature's balance brutally, tried for production without regard for quality. We must find how to use tact with Dame Nature.

A companion research has developed certain facts and rules as to the effect of rare minerals and elements on the growth of organisms. For instance, I find in all the glands called "ductless" and made notorious by the "monkey-gland" operation certain rare elements

as lithia, zinc, vanadium, molybdenum, nickel, iodine, arsenic, manganese, tin, copper, and so forth, and that these play a dominating biochemical rôle even if present in such small proportions as one-hundredth of a grain in an organic form. For instance, as little as two or three milligrams of nickel, chrome, tungsten and other elements in an organic form in bread will enable the ductless pancreatic gland to make for a diabetic the insulin for sugar oxidation. This has been tested out in several clinical cases. Even trees and other plants have their own endocrine glands. They are merely storehouses for the rare minerals and factories for

working them up into products useful to the organism.

It remains to learn the application of this principle. Referring to "Principles of Biology" by Herbert Spencer, edition of 1898, Vol. 1, pages 272 et seq., we find the fact that there are in life two principles of growth, called by him "gamogenesis" and "agamogenesis." In short, the latter is the tissue-producing force; the former the seed-producing force.

Therefore, when we increase the percentage of carbon dioxide, we increase the tissue-producing force and produce a distortion of nature. Accordingly, we must increase it in proportion with the seed-producing force. Then, the plant gets an arrangement pleasing to its nature and we have speeded up the growth normally.

This can be done in a greenhouse by a soil rich in ordinary manure with which is incorporated certain organic compounds of lithia, manganese, nickel, chromium, tungsten, etc., to give life to the tissue.

The matter is now in shape for small-scale tests and I would be pleased to give any interested experimenter an adequate quantity of the gamogenetic fertilizer.

W. McA. JOHNSON.

Argus, Pa.

Ignition of Gas by Sparks Struck by Falling Rock

Because of my former association with and employment in the Bellevue mine, of the West Canadian Collieries Co., Alberta, Canada, mentioned in the reply to the inquiry regarding the possibility of gas being ignited by sparks struck by falling rocks in mines (*Coal Age*, Nov. 8, p. 711), the remarks of the editor on that subject greatly interested me.

As he has already stated, a series of mysterious explosions took place at that mine, and the cause was generally believed to be the ignition of gas by sparks emitted by falling rocks. When the second of this series of explosions occurred I had been in charge of the mine only nine days.

Unfortunately, the verdict of the jury at the inquest seeking to ascertain the cause of the accident was based on an assumed theory of percussion advanced by James Ashworth, a mining engineer, who was called as an expert. The verdict read as follows: "We do upon oath say that thirty men came to their death by carbon monoxide poisoning and fractured skulls, as the result of a concussion of air caused by a fall of rock in chutes Nos. 76 and 78."

Realizing that the responsibility of reopening and operating the mine devolved upon me as superintendent, and not feeling satisfied that the verdict of the jury was in line with the facts, I proceeded in company with the mine foreman to make a careful and thorough inspection of the mine. The investigation satisfied me that beyond a doubt the explosion had originated in the neighborhood of No. 65 chute.

In that chute we found that a fall had occurred at the surface pillar above the fourth cross-pitch. According to the evidence of two witnesses, gas had been found at this point two days previous to the explosion, and in making my examination of the place I also detected an explosive body of gas.

Later, my conclusion was substantiated by the report made on this explosion by J. T. Stirling, provincial inspector of mines, and Professor John Cadman, of the University of Birmingham, England. In this connection, the detailed account of my investigation, which was published in *Coal Age*, Vol. 3, p. 985, under the title "A Gas Ignition Controversy," will be of interest.

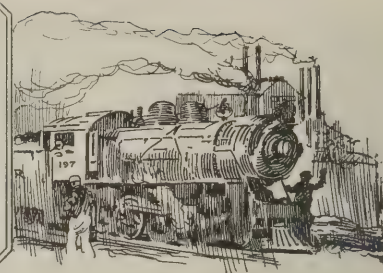
Personally, I am of the opinion that there is much danger of an accumulation of gas being ignited in any mine where the roof is of such a nature as to emit sparks when subjected to the grinding action that occurs immediately before a fall. On certain occasions I have heard the roof rock crack with a sound like the report of a large gun. Bright sparks also are emitted when such rocks strike each other when pieces of the roof fall.

In my opinion, it is of great importance for the management of mines where explosive gas is generated, that samples of the roof rock be subjected to a practical test to determine their ability to emit sparks when weighting or falling. The results of such tests should afford valuable information that would guide the management in the selection of a method of working and a system of ventilation that would reduce this hazard to a minimum.

Welch, W. Va. J. W. POWELL,
Contracting Engineer.



Production And the Market



Gradual Increase in Buying of Soft Coal Noted; Quiet Spot Selling; Contracts Move Steadily

Without any considerable change in the situation that has ruled for several weeks, there has been a gradual but noticeable increase in buying of soft coal. Numerous large consumers have bought quietly of the free coals, while contract holders have taken steadily of their quota. Of course, the topic of conversation in the market has been the Jacksonville conference, and while the outcome is evident consumers hesitate to act for the future until the agreement is signed. Meantime contract making is practically at a standstill. In some quarters predictions are made of a lifeless market if a long-term agreement results.

Some markets are encouraged by the greater activity in steel operations, but these expectations may be offset by curtailments in the textile and other industries.

Coal Age Index as of Feb. 18 is at 186, a decline of two points from the previous week, the average price being \$2.25, also a recession of 2c. from Feb. 11.

Consumers' Eyes on Jacksonville

The accumulation of lump and middle sizes of coal in Illinois and Indiana and the difficulty in selling has caused numerous "no bills." Salesmen are experiencing difficulty in moving eastern Kentucky coals while central Illinois domestic sizes, due to warmer weather, have become sluggish. Cancellations of orders for the larger sizes have caused a cut in production and an upward movement in screenings, and as a result buyers have been looking to other fields for lower-priced coals. Consumers are watching the outcome of the Jacksonville conference.

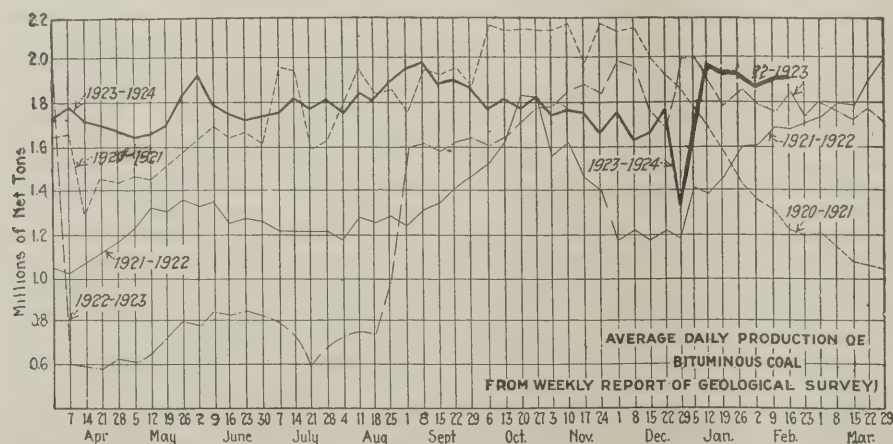
Retail dealers in St. Louis report a good trade for the middle grades and cheaper coals, with a slow movement for the higher grade coals, but scarcely any activity in smokeless, anthracite or coke. The southern

Illinois field was the scene of more trouble at Herrin, with the mines in the district generally working about four days a week. "No bills" are prominent in the Standard fields with the mines averaging two or three days a week. If car supply was adequate the mines in eastern Kentucky could work six days a week, according to some operators. As it is, supply is cut down to around 55 per cent. There is a good demand for coal as a result of winter weather and reduced stocks. The Northwestern markets are active.

The domestic trade in Ohio is brisk, but the contrary is reported of the steam-coal market. Consumers of steam coals are showing no disposition to increase their stockpiles and buy only for current requirements. Screenings are off because of the larger production of lump, while railroad buying has slowed down due to the favorable outlook at Jacksonville. Numerous local strikes are reported in the Hocking Valley district. Better market conditions are indicated at Pittsburgh. There are a few visible signs of betterment in New England, accompanied by an increase in the number of inquiries for small lots. Along the Atlantic seaboard everything is quiet and uninteresting. Tidewater business is quiet but more activity is reported from the line.

Production of soft coal during the week ended Feb. 9 jumped to 11,531,000 net tons, as compared with 11,337,000 tons the previous week, an increase of 194,000 tons, according to the Geological Survey, while the output of hard coal reached a total of 1,906,000 net tons, an increase of 13,000 tons when compared with the previous week. At present anthracite is being produced in smaller quantities than during the corresponding periods of 1923 and 1921, but is slightly above the figure for 1922.

A fair demand continues from foreign buyers and



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Jan. 26	10,985,000	11,569,000
Feb. 2 (b)	10,686,000	11,337,000
Feb. 9 (a)	10,725,000	11,531,000
Daily average	1,788,000	1,922,000
Coal year	353,987,000	471,286,000
Daily av. coal year	1,339,000	1,791,000

ANTHRACITE

	1922-1923	1923-1924
Jan. 26	2,119,000	1,782,000
Feb. 2	2,056,000	1,893,000
Feb. 9	2,023,000	1,906,000
Coal year	42,472,000	80,070,000

COKE

	1922-1923	1923-1924
Feb. 2 (b)	348,000	264,000
Feb. 9 (a)	359,000	287,000
Calendar year	1,959,000	1,528,000

(a) Subject to revision. (b) Revised from last report.

while not much actual business is reported the prospects seem good. Inquiries come mostly from France and Italy. The South American market is reported as quiet. Baltimore reports a disappointment in the export situation for the first ten days of February. Dumpings for all accounts at Hampton Roads during the week ended Feb. 14 were 395,464 net tons as compared with 369,171 tons in the previous week, an increase of 26,293 tons.

Middle West Has Too Much Lump

No-bills on the middle sizes and even on big lump are accumulating at most Illinois and Indiana mines and are hard to sell in Chicago and the Midwest markets. Eastern Kentucky lump coming into this region has a hard time moving at \$3.25, the average being close to \$3. Central Illinois domestic sizes are sluggish at the same price and the best southern Illinois runs from \$3.50 to \$3.75 with evidences of softening under a spell of warmer weather. Cancellations have not grown numerous yet, but they are expected.

St. Louis Keeps Busy

Seasonable weather continues and the St. Louis retailer finds his business good on the middle grade and cheaper coals. There is some movement of higher grade coals, such as Franklin County, but nothing to speak of in anthracite, smokeless or coke. Country domestic is fairly good, but calls are for cheaper coal as a rule. Dealers seem to keep a pretty fair supply ahead in their bins. Local wagon-load steam continues good, while carload shows an easing up and the production is greater than the demand. Country carload is easy.

Railroad tonnage shows up fairly good out of southern

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern	Market Quoted	Feb. 19 1923	Feb. 4 1924	Feb. 11 1924	Feb. 18 1924†
Smokeless lump.....	Columbus....	\$7.00	\$3.35	\$3.60	\$3.25@ \$4.00
Smokeless mine run.....	Columbus....	4.35	2.10	2.10	2.00@ 2.25
Smokeless screenings.....	Columbus....	4.35	1.50	1.50	1.45@ 1.70
Smokeless lump.....	Chicago.....	7.00	3.60	3.60	3.50@ 3.75
Smokeless mine run.....	Chicago.....	4.75	2.50	2.50	2.50
Smokeless lump.....	Cincinnati.....	7.25	3.75	3.60	3.50@ 4.00
Smokeless mine run.....	Cincinnati.....	4.75	2.75	2.60	2.50@ 2.75
Smokeless screenings.....	Cincinnati.....	5.00	1.80	2.10	1.75@ 2.00
*Smokeless mine run.....	Boston.....	6.70	5.05	4.80	4.65@ 4.85
Clearfield mine run.....	Boston.....	3.85	2.05	2.05	1.65@ 2.25
Cambria mine run.....	Boston.....	4.50	2.60	2.50	2.25@ 2.75
Somerset mine run.....	Boston.....	4.10	2.15	2.25	2.00@ 2.50
Pool 1 (Navy Standard).....	New York.....	4.80	3.00	3.00	2.75@ 3.25
Pool 1 (Navy Standard).....	Philadelphia.....	4.80	3.00	3.00	2.75@ 3.25
Pool 1 (Navy Standard).....	Baltimore.....	4.80	3.00	3.00	2.75@ 3.25
Pool 9 (Super. Low Vol.).....	New York.....	4.00	2.25	2.25	2.00@ 2.50
Pool 9 (Super. Low Vol.).....	Philadelphia.....	4.35	2.30	2.30	2.10@ 2.50
Pool 9 (Super. Low Vol.).....	Baltimore.....	3.60	1.85	1.90	1.70@ 2.00
Pool 10 (H.Gr. Low Vol.).....	New York.....	3.70	1.95	1.95	1.75@ 2.10
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	3.70	1.85	1.85	1.70@ 2.00
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	3.25	1.80	1.80	1.65@ 1.75
Pool 11 (Low Vol.).....	New York.....	2.90	1.60	1.60	1.50@ 1.75
Pool 11 (Low Vol.).....	Philadelphia.....	3.15	1.65	1.65	1.55@ 1.75
Pool 11 (Low Vol.).....	Baltimore.....	2.65	1.65	1.60	1.50@ 1.60

High-Volatile, Eastern	Market Quoted	Feb. 19 1923	Feb. 4 1924	Feb. 11 1924	Feb. 18 1924†
Pool 54-64 (Gas and St.).....	New York.....	2.60	1.60	1.60	1.50@ 1.75
Pool 54-64 (Gas and St.).....	Philadelphia.....	2.75	1.70	1.70	1.60@ 1.80
Pool 54-64 (Gas and St.).....	Baltimore.....	2.45	1.50	1.50	1.45@ 1.55
Pittsburgh s.e.d gas.....	Pittsburgh.....	4.10	2.55	2.55	2.50@ 2.65
Pittsburgh gas mine run.....	Pittsburgh.....	2.75	2.30	2.30	2.25@ 2.50
Pittsburgh mine run (St.).....	Pittsburgh.....	2.85	2.00	2.00	2.00@ 2.25
Pittsburgh slack (Gas).....	Pittsburgh.....	2.85	1.60	1.55	1.50@ 1.65
Kanawha lump.....	Columbus.....	4.30	2.60	2.60	2.50@ 2.85
Kanawha mine run.....	Columbus.....	2.60	1.60	1.60	1.50@ 1.75
Kanawha screenings.....	Columbus.....	4.25	1.25	1.05	1.10@ 1.25
W. Va. lump.....	Cincinnati.....	4.35	2.85	3.10	3.00@ 3.25
W. Va. gas mine run.....	Cincinnati.....	4.35	1.70	2.10	1.65@ 1.85
W. Va. steam mine run.....	Cincinnati.....	3.35	1.70	2.10	1.65@ 1.85
W. Va. screenings.....	Cincinnati.....	2.35	1.30	1.25	1.25
Hooking lump.....	Columbus.....	4.25	2.75	2.75	2.50@ 3.00
Hooking mine run.....	Columbus.....	2.50	1.85	1.85	1.75@ 2.00
Hooking screenings.....	Columbus.....	2.10	1.15	1.05	1.10@ 1.20
Pitts. No. 8 lump.....	Cleveland.....	4.25	2.40	2.40	2.00@ 2.85
Pitts. No. 8 mine run.....	Cleveland.....	3.20	2.05	1.80	1.80@ 1.85
Pitts. No. 8 screenings.....	Cleveland.....	3.10	1.60	1.45	1.40@ 1.50

Midwest	Market Quoted	Feb. 19 1923	Feb. 4 1924	Feb. 11 1924	Feb. 18 1924†
Franklin, Ill. lump.....	Chicago.....	\$4.60	\$3.50	\$3.50	\$3.25@ \$3.75
Franklin, Ill. mine run.....	Chicago.....	3.35	2.35	2.35	2.25@ 2.50
Franklin, Ill. screenings.....	Chicago.....	2.55	1.80	1.80	1.70@ 2.00
Central, Ill. lump.....	Chicago.....	3.35	3.10	3.10	3.00@ 3.25
Central, Ill. mine run.....	Chicago.....	2.60	2.10	2.10	2.00@ 2.25
Central, Ill. screenings.....	Chicago.....	1.60	1.35	1.35	1.40@ 1.60
Ind. 4th Vein lump.....	Chicago.....	4.35	3.10	3.10	3.00@ 3.25
Ind. 4th Vein mine run.....	Chicago.....	3.10	2.60	2.60	2.50@ 2.75
Ind. 4th Vein screenings.....	Chicago.....	2.10	1.70	1.70	1.65@ 1.80
Ind. 5th Vein lump.....	Chicago.....	3.60	2.60	2.60	2.50@ 2.75
Ind. 5th Vein mine run.....	Chicago.....	2.60	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings.....	Chicago.....	1.80	1.45	1.45	1.40@ 1.50
Mt. Olive lump.....	St. Louis.....	3.10	3.10	3.10	3.00@ 3.25
Mt. Olive mine run.....	St. Louis.....	2.50	2.50	2.50	2.50
Mt. Olive screenings.....	St. Louis.....	1.10	1.50	1.50	1.25@ 1.50
Standard lump.....	St. Louis.....	3.10	2.75	2.75	2.65@ 2.90
Standard mine run.....	St. Louis.....	2.25	1.95	1.95	1.90@ 2.00
Standard screenings.....	St. Louis.....	1.45	1.10	1.75	.75@ .90
West Ky. lump.....	Louisville.....	3.35	2.85	2.85	2.75@ 3.00
West Ky. mine run.....	Louisville.....	2.05	1.70	1.70	1.50@ 1.90
West Ky. screenings.....	Louisville.....	1.85	1.05	1.05	1.10@ 1.30
West Ky. lump.....	Chicago.....	3.60	2.85	2.85	2.75@ 3.00
West Ky. mine run.....	Chicago.....	1.95	1.60	1.60	1.50@ 1.75

South and Southwest

South and Southwest	Market Quoted	Feb. 19 1923	Feb. 4 1924	Feb. 11 1924	Feb. 18 1924†
Big Seam lump.....	Birmingham.....	3.85	3.85	3.85	3.75@ 4.00
Big Seam mine run.....	Birmingham.....	2.10	1.85	1.75	1.75@ 1.85
Big Seam (washed).....	Birmingham.....	2.60	2.10	2.10	2.00@ 2.25
S. E. Ky. lump.....	Chicago.....	4.60	3.25	3.38	3.00@ 3.25
S. E. Ky. mine run.....	Chicago.....	2.85	1.85	2.00	1.75@ 2.00
S. E. Ky. lump.....	Louisville.....	4.75	3.25	3.25	3.00@ 3.50
S. E. Ky. mine run.....	Louisville.....	2.60	1.80	1.80	1.65@ 2.00
S. E. Ky. screenings.....	Louisville.....	2.35	1.15	1.35	1.25@ 1.60
S. E. Ky. lump.....	Cincinnati.....	4.00	2.75	3.15	2.85@ 3.25
S. E. Ky. mine run.....	Cincinnati.....	2.60	1.80	2.05	1.65@ 1.85
S. E. Ky. screenings.....	Cincinnati.....	2.35	1.30	1.25	1.25
Kansas lump.....	Kansas City.....	5.00	5.00	5.00	5.00
Kansas mine run.....	Kansas City.....	3.50	3.50	3.50	3.50
Kansas screenings.....	Kansas City.....	2.50	2.25	2.25	2.25

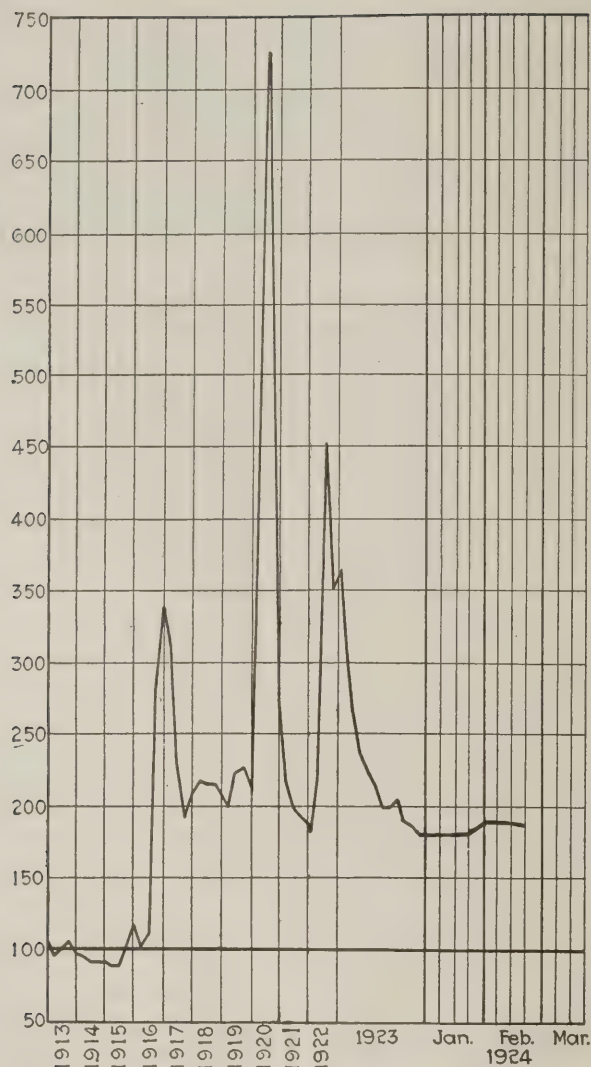
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Feb. 19, 1923	Feb. 11, 1924	Feb. 18, 1924†
Broken.....	New York.....	\$2.34	Independent	Company	Independent
Broken.....	Philadelphia.....	2.39	\$9.00	\$7.75@ \$8.25	\$8.00@ \$8.50
Egg.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	8.25@ 9.00
Egg.....	Philadelphia.....	2.39	9.25@ 11.00	8.10@ 8.35	8.75@ 9.25
Egg.....	Chicago.....	5.06	12.00@ 12.50	7.20@ 8.25	8.00@ 8.35
Stove.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.50@ 10.25
Stove.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 11.00
Stove.....	Chicago.....	5.06	12.00@ 12.50	7.35@ 8.25	8.00@ 8.35
Chestnut.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.50@ 10.25
Chestnut.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 11.00
Chestnut.....	Chicago.....	5.06	12.00@ 12.50	7.35@ 8.35	8.00@ 8.35
Range.....	New York.....	2.34	8.25	8.25	9.00
Pea.....	New York.....	2.22	7.50@ 11.00	6.15@ 6.30	4.75@ 6.25
Pea.....	Philadelphia.....	2.14	7.00@ 9.00	6.15@ 6.20	6.35@ 6.60
Pea.....	Chicago.....	4.79	7.00@ 8.00	5.49@ 6.03	5.40@ 6.05
Buckwheat No. 1.....	New York.....	2.22	4.50@ 5.50	4.00@ 4.10	2.25@ 3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	5.00@ 5.50	4.00	2.00@ 3.50
Rice.....	New York.....	2.22	2.25@ 3.00	2.75@ 3.00	2.00@ 2.50
Rice.....	Philadelphia.....	2.14	2.75@ 3.00	2.75@ 3.00	1.50@ 2.50
Barley.....	New York.....	2.22	1.50@ 2.00	1.50@ 2.00	1.50@ 1.75
Barley.....	Philadelphia.....	2.14	1.50@ 2.00	2.00	1.25@ 1.50
Birdseye.....	New York.....	2.22	2.00	2.10	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1924			1923
	Feb. 18	Feb. 11	Feb. 4	Feb. 19
Index	186	188	187	288
Weighted average price.....	\$2.25	\$2.27	\$2.26	\$3.49

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Illinois the past week, although the movement of cars is slow. Several mines around Herrin, in the Carterville field, have been idle on account of the trouble between the law-enforcement element and the bootlegging element. At the present time there are 1,700 soldiers in the field and this has had some effect on the foreign miners who are refusing to work with the American miners who belong to the law-enforcement organization, which is affiliated with the K. K. K.

The mines in all southern fields are getting from three to four days per week work, which is good and is accounted for by the cold weather. The Mt. Olive district is doing remarkably well, with good demand for domestic, and screenings seem to keep moving. The railroads are taking the egg and nut. In the Standard field there is an overproduction of all sizes and nearly all mines have no-bills, excepting on a cold day when they may clean up. Working time averages only two or three days.

Kentucky Finds Trade Good

It is asserted by the eastern Kentucky trade that a good many mines would be operating six full days a week if the car supply was adequate, but, due to increased general

buying and the fact that a good many cars are on long haul, supply is now down to around 50 or 60 per cent in eastern Kentucky. Practically all large mines are operating. General demand has been good, as utilities, gas and by-product plants, industrial plants and railroads are all needing more coal as a result of a hard winter and the fact that stockpiles are low.

Favored by a steady car supply the western Kentucky operators are managing to get out a good tonnage and there isn't much trouble experienced in getting orders. The South is buying an abnormally large amount of coal this winter, having experienced more bad weather than for years past. Western Kentucky screenings have been advancing, due in part to alleged buying on the part of Chicago brokers for the Commonwealth Edison interests. At any rate screenings, which had been selling at 80@90c., suddenly have advanced to \$1@1.10 to the trade on pea and slack, and \$1.20@1.35 on nut and slack. Prepared sizes show no change. With a range of from \$1 on screenings to \$3 on best block coal, the field could be in much worse shape.

Business at Duluth was good last week, with orders plentiful, and coal men taking the attitude that a large amount of the coal on the docks will be sold by the time navigation opens. The general opinion is that a strike will not occur, but even at that few can see any definite loss, as the way coal is going shows that a large surplus will not have to be held over. It is estimated that 4,200,000 tons remain. Exactly how much of this is free is uncertain, but the major portion is already contracted for. The prices of soft coal are firmer. Screenings as a whole are showing strength. The fall-off in prices reported last week has done much to stimulate trade. The failure of water power in the iron ranges also has taken much coal.

There is a brisk demand at Milwaukee for coal both for local and country delivery. The dock yards are well supplied with all grades of coal, but jobbers of rail coal say prepared Pocahontas and western screenings are a little hard to get at present. One cargo of soft coal which was held afloat was unloaded this week. Prices of coal and coke remain unchanged.

A slight decline was noted in the sales of Colorado coals during the past week. "No market" reports show that 20 per cent of the working time lost was attributed to this cause. Prices remain unchanged and the present supply of labor seems plentiful. The transportation and car-shortage situation has been favorable throughout the state except in Routt County, where more than 85 per cent of the full working time was lost for this reason.

A slight surplus of all grades of coal has begun to accumulate at Kansas mines, which, after six weeks of almost full-time operation, again are cut down to approximately two-thirds time. The present slump marks the end of one of the most profitable periods since the war for the Southwest.

Slight shading of prices again has developed in Kansas City, though it is encountered little throughout the rest of the Southwestern district.

Published quotations remain unchanged. Kansas lump is quoted at \$5; nut at \$4.25; mine-run at \$3.50 and screenings at \$2.25.

The domestic market at Salt Lake City is absorbing the greater part of the output of Utah mines. Consumption has fallen off as a result of the sudden break in the weather. Mines are now working about three days a week. Stocks in Salt Lake City coal yards have increased during the past ten days, due to pressure from operators who desired to keep mines open. The situation in regard to intermediate sizes, which threatened to close several mines, is a little better.

Stock at the mine is stated to be \$1.75 for screened and \$1.25 for straight. Other grades are: Lump, \$4.50; domestic lump, \$3.75; stone, \$3.75; nut, \$3.50. Retail prices are: \$9.50, \$9, \$8.50 and \$8 respectively.

Ohio Steam-Coal Market Slow

Large consumers of steam coals in the Columbus market are buying only for current needs and are showing little indication of increasing surplus stocks. The market, however, is absorbing all steam sizes although there is little special demand and prices continue low. The larger production of lump, rather than a reduction in demand, has forced lower prices for screenings. The railroads have eased up in buying because of the belief that there will be a satis-

factory agreement on the wage scale. Domestic trade is rather brisk. Users of these coals are buying in small lots, but retail dealers are generally busy. Pocahontas is showing considerable strength.

Production in the Ohio fields is better, with an output of about 30 per cent in the southern Ohio field. There have been several small strikes in the Hocking Valley district, resulting in a curtailed production.

Contracting for steam sizes is slow. Utilities are buying but not as heavily as earlier in the year, while several of the larger utilities in central Ohio are reported out of the market because of storage-pile fires.

The Cleveland market is sluggish with demand dull. Prices show no change from the previous week. Production in the eastern Ohio district for the week ended Feb. 9 was about 393,000 tons.

All attention at Cincinnati has been centered on the conference in Florida and buyers have been rather timid about placing orders. As a result of this condition there is some unsteadiness in the domestic market, both for smokeless and high-volatile. In the low-volatile market there has been less demand for "car numbers" from the West. On the other hand, the steady business in the Pocahontas and New River fields put the local sales agents in a position where they are selling now on a March delivery basis. Special coals are quoted as follows: Egg, \$3.25@3.50, and lump, \$3.75@4.

Pittsburgh coal operators are watching the Jacksonville conference carefully and the prediction in the trade is that if the present scale is continued the union coal mines, as a body, will have rather little business during the period, except as railroads may be unable to serve fully the non-union mines.

Altoona reports considerable correspondence and conferring on contracts, but not many being signed. A slight increase in production in central Pennsylvania was reported during the week ended Feb. 9, the loadings amounting to 16,597 cars as compared with 15,266 cars the previous week.

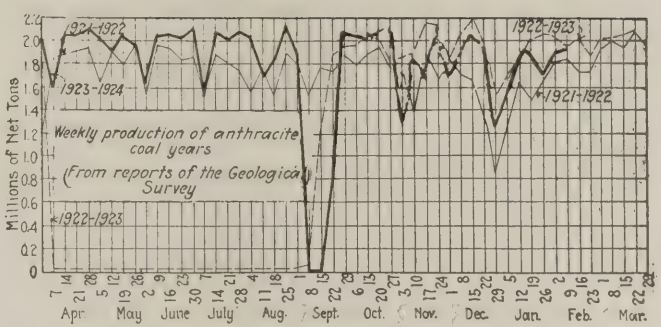
But little soft-coal buying is being done at Buffalo and there is little optimism.

New England Shows Slight Improvement

In New England there are few visible signs of improvement. There is scattering inquiry for small lots, but a close canvass of buyers in this territory discloses no prospect of comprehensive business for weeks to come. Several factors are offering No. 1 Navy standard grades from the Southern field at \$6.25@6.75 per gross ton on cars, but the larger consumers know that any quantity, however small, can be had at not over \$6. There is therefore little confidence in present quotations, and not even the possibility of labor troubles in April will induce more than hand-to-mouth purchases.

At Hampton Roads there is a steady increase in receipts from the mines, a condition that is reflected in an occasional price of less than \$4.75 per gross ton f.o.b. vessel. The agencies are combing over the market with great care in the effort to place spot coal, but aside from deliveries on contract there is little doing coastwise. Almost nothing is heard of contract engagements for the year beginning April 1, but doubtless many of the arrangements now in force will be renewed through the same channels from month to month, if not for the twelve-month period.

All-rail from central Pennsylvania the market is in the same quiet state that has obtained since last summer. Poca-



hontas and New River via Hampton Roads are still low enough in price at rehandling points here to exclude all-rail deliveries from the largest part of this territory. Medium grades in the Clearfield district can still be had at less than \$2 per net ton at the mines, and not even quality coals from Cambria County command more than \$2.75@2.90. Now and then there is an occasional call for screened coal to take the place of anthracite, the retail dealer being in position to offer high grade fuel at from \$3 to \$4 less than the present retail price of hard coal.

Inland Demand for Soft Coal Better

The topic of comment along the Atlantic seaboard is the Jacksonville conference. There has been no change in conditions. Buying at tidewater is slow, but demand from the inland is better. Some contracts have been reported as closed but a number of consumers are holding back awaiting developments. Increased inquiries have resulted in more orders and there has been some extra buying. Some of the railroads are considering new contracts to take the place of those that will expire soon. While the cotton and woolen textiles are quiet there is a better feeling in some of the other industries and the trade is encouraged to some extent. There has been no distinct line of improvement shown in the Baltimore market with the exception of more inquiries.

Anthracite Market Quiet

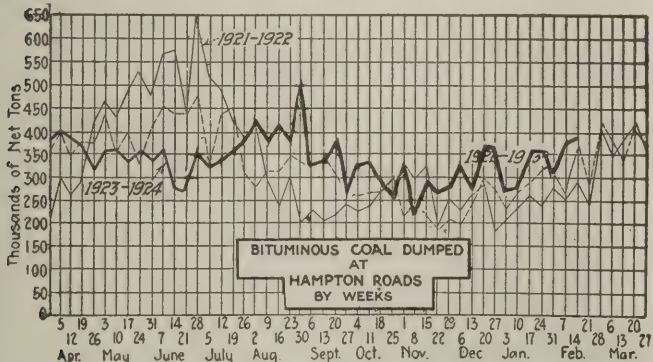
There is no real activity in the anthracite market. Domestic coals are plentiful and, contrary to past years, there has been no rush to replenish stocks. Mild weather conditions have not caused heavy consumption and producers of independent coals find it difficult in some instances to keep their product moving. The demand centers around stove coal, but there is a good demand for chestnut. Egg and pea are moving slowly and it is reported that some pea is being stored by the producers. The steam coals are easier but in good demand. Barley is the strongest of the three sizes and the better grades are being quoted at more than company circular. Some Welsh anthracite is being received at Baltimore, but the tonnage is not large.

Spot Furnace Coke Stiffens

Production of beehive coke during the week ended Feb. 9 was 287,000 net tons, as compared with 264,000 tons in the previous week and 359,000 tons during the corresponding week of last year. Spot furnace coke is stiffer in the Connellsville district and second-quarter contracting is reported easier. Recent buying of spot furnace coke cleaned up floating supplies very well and there were some prompt lots sold, which absorbed the extra production beyond regular contract requirements. As a result offerings in the spot market are very light. Heating coke has stiffened lately, some production being cut off on account of low prices.

Car Loadings, Surplusages and Shortages

	Cars Loaded		
	All Cars	Coal Cars	
Week ended Feb. 2, 1924.....	929,936	198,955	
Previous week.....	891,326	204,396	
Same week in 1923.....	865,414	190,425	
	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
Jan. 31, 1924.....	169,036	67,578	4,598
Same date in 1923.....	26,588	7,208	
Jan. 22, 1924.....	236,174	100,781	2,484



Foreign Market
And Export News

Strike of Dock Workers Likely to Affect
British Mines; Output Increases

While not yet affected by the dock workers' strike, which became effective at noon Feb. 16, it is expected that unless work is resumed soon the South Wales coal mines will be compelled to suspend operations, due principally to the scarcity of props and other mine timber.

Congestion at the docks is reported as steadily growing and many vessels are reported waiting for cargoes. Rail service has been retarded, but this did not prevent the mines from producing 5,245,000 tons of coal during the week ended Feb. 2, according to a cable to *Coal Age*. This was 528,000 tons more than was produced during the previous week but a decrease of 603,000 tons when compared with the output of 5,848,000 tons during the week ended Jan. 19.

There is no indication at present of a resumption of the third working shift in the mines. There is a good foreign demand for coal and prices are stiffer. Best Admiralty grades are being quoted at 30s. 6d. @ 31s. 6d.; bunker smalls at 21s. @ 23s.; cargo smalls at 18s. @ 20s.; mixed bunker throughs at 23s. @ 28s., and coke for export at 47s. 6d. @ 57s. 6d.

The settlement of the recent railway dispute came too late to enable the Welsh market to show any material improvement. At that time about 70 per cent of the collieries were operating and others were already closing down. The railway companies, however, got into their stride quickly and other mines were saved from suspending operations. As a result the market is very uncertain but operators are asking slightly increased prices for forward business.

Similar conditions exist in the Newcastle market, though there is considerable pressure for prompt delivery. The output has been well maintained and not many pits have had to close down. Stocks accumulated during the

strike are now being cleared at firm prices.

Various public corporations on the Continent are placing contracts for quantities ranging up to 10,000 tons.

Export Permits to Insure French Coal
for Home Needs

Permits regulating the export of French coal have been re-established in order to save the largest portion for home consumption and to avoid the necessity for buying foreign fuel. These permits will be effective throughout the country and also will apply to foreign steamers entering French ports for replenishing their supply of fuel.

The prices of all kinds of coal were reduced 3 fr. effective Feb. 1, as a result of the request of the French authorities; this despite the higher cost of labor and raw materials of all kinds. To the railway strike in Great Britain occasioned considerable uneasiness in regard to prices and arrivals fell off to a marked degree for a while. Transportation difficulties are interfering with the arrival of Belgian coals, but in France both land and water traffic have greatly improved but are still below normal.

An improvement in the supply of metallurgical coke is reported but the receipts from Great Britain and Belgium are slightly smaller because of the railway and dock troubles. The French authorities have fixed a price of 143.5 fr. for German coke delivered at the frontier.

Hampton Roads Market Dull

Business at Hampton Roads was generally dull last week, with an occasional good order reported. Foreign movements were fairly brisk, but mostly on old contracts. Inquiries for

foreign business were not numerous.

Bunker trade held its own, with a substantial increase in general shipping. Coastwise business showed little increase, though movement was fairly active chiefly on old orders. The spot trade was generally fair.

Prices about held their own, although various price levels were being maintained by shippers who desired to get coal off of demurrage. The tone of the market was dull.

Export Clearances, Week Ended
Feb. 16, 1924

FROM HAMPTON ROADS		Tons
For Africa		
Ital. SS. Valtellina, for Dakkar	8,071	
For Brazil		
Br. SS. Holms Light, for Puerto la Plata	5,254	
For Canada		
Br. SS. Wabang, for Halifax	6,839	
Br. SS. Lingan, for St. John	6,871	
For Cuba		
Br. SS. Berwindmoor, for Havana	9,631	
Amer. Sehr. Theoline, for Santiago	830	
For France		
Br. SS. Picton, for Marseilles	7,390	
For Hawaii		
Amer. Sehr. Orleans, for Pearl Harbor	9,129	
For Porto Rico		
Du. SS. Banka, for Sabang	1,391	
For West Indies		
Nor. SS. Wascana, for St. Thomas	7,558	
FROM BALTIMORE		
For Italy		
Ital. SS. Aster	9,048	

Hampton Roads Pier Situation

	Feb. 7	Feb. 14
N. & W. piers, Lamberts Pt.:		
Cars on hand	1,628	1,018
Tons on hand	113,135	65,824
Tons dumped for week	125,431	181,046
Tonnage waiting	15,000	12,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand	1,133	1,276
Tons on hand	75,100	85,450
Tons dumped for week	91,474	98,132
Tonnage waiting	3,580	21,260
C. & O. piers, Newport News:		
Cars on hand	1,291	1,274
Tons on hand	64,330	63,290
Tons dumped for week	112,712	73,915
Tonnage waiting	5,550	

Pier and Bunker Prices, Gross Tons

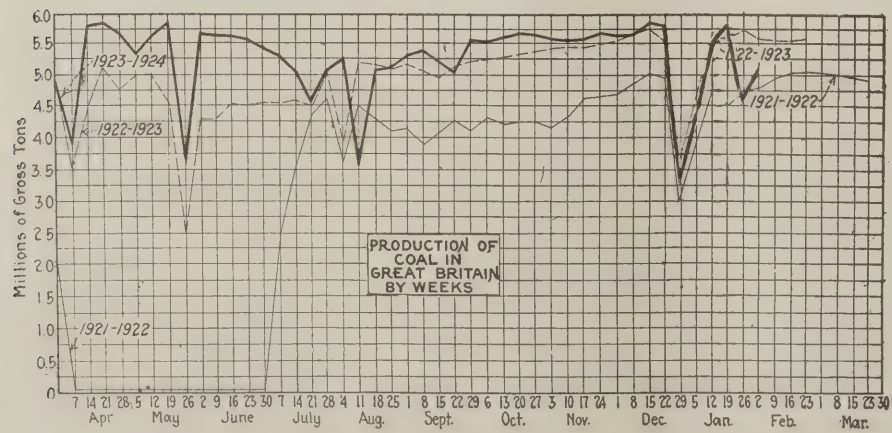
PIERS		Feb. 9	Feb. 16†
Pool 9, New York	\$4.90 @ \$5.25	\$4.90 @ \$5.25	
Pool 10, New York	4.65 @ 5.00	4.75 @ 5.00	
Pool 11, New York	4.50 @ 4.75	4.50 @ 4.75	
Pool 9, Philadelphia	4.90 @ 5.20	4.90 @ 5.20	
Pool 10, Philadelphia	4.50 @ 4.90	4.50 @ 4.90	
Pool 11, Philadelphia	4.25 @ 4.60	4.25 @ 4.60	
Pool 1, Hamp. Roads	4.90 @ 5.00	4.80 @ 4.90	
Pools 5-6-7 Hamp. Rds.	4.25 @ 4.35	4.35	
Pool 2, Hamp. Roads	4.65	4.60 @ 4.70	

BUNKERS		Feb. 9	Feb. 16†
Pool 9, New York	5.20 @ 5.55	5.20 @ 5.55	
Pool 10, New York	4.95 @ 5.30	5.05 @ 5.30	
Pool 11, New York	4.80 @ 5.05	4.80 @ 5.05	
Pool 9, Philadelphia	5.15 @ 5.55	5.15 @ 5.55	
Pool 10, Philadelphia	4.90 @ 5.20	4.90 @ 5.20	
Pool 11, Philadelphia	4.65 @ 4.90	4.65 @ 4.90	
Pool 1, Hamp. Roads	5.00	4.90	
Pool 2, Hamp. Roads	4.75	4.70	

Current Quotations British Coal f.o.b.
Port, Gross Tons

Quotations, by Cable to <i>Coal Age</i>		Feb. 9	Feb. 16†
Admiralty, large	30s. @ 31s.	30s. 6d. @ 31s. 6d.	
Steam smalls	23s.	22s. @ 23s.	
Newcastle:			
Best steams	26s.	25s. 6d. @ 26s.	
Best gas	25s.	25s.	
Best bunkers	25s. @ 26s.	25s. @ 26s.	

† Advances over previous week shown in heavy type, declines in *italics*.



Traffic News

West Virginia Intervenes in Lake Rate Hearing

The State of West Virginia, through its Public Service Commission, has taken a hand in protecting coal cargo rates to the lakes by asking to be permitted to intervene in the petition of the Pittsburgh Coal Producers Association and the Pittsburgh Vein Operators Association against the Ashland Coal & Iron Ry. for a change in lake rates. The West Virginia Public Service Commission was represented at the hearings in Washington during the second week of February by B. S. Stathers, a member of the commission, and F. Livezy, general counsel for the commission.

In its petition filed with the Interstate Commerce Commission, the West Virginia Public Service Commission sets forth that "for many years the rates of rail carriers have had an established relationship as between the coal-mining districts of the State of West Virginia and other districts shipping lake cargo coal, including the districts represented by complainants, and petitioner believes complainants seek by this proceeding to change such relationship and to have established rates which will give complainants or the operators represented by complainants an advantage over operators in the State of West Virginia, in the sale of lake cargo coal, and thus prevent the operators of the State of West Virginia from competing in the sale and marketing of such coal."

N. & W. Buys 4,000 Coal Cars

Among the largest equipment orders since the beginning of the year was that of 4,000 seventy-ton hopper cars placed Feb. 13 by the Norfolk & Western R.R. While no statement was given as to the total amount involved, it was estimated that the order would equal about \$12,000,000. One-half of the order went to the Ralston Car Co. The Pressed Steel Car Company received an order for 1,000 cars, and the remaining 1,000 cars will be constructed by the Virginia Bridge & Iron Co.

Would Extend Coal Road In Pennsylvania

The Conemaugh & Black Lick Railroad Co. has applied to the Interstate Commerce Commission for authority to acquire and operate an existing line of railroad in Cambria County, Pennsylvania and to construct and operate a 16-mile extension of that line so as to form a direct connection between the main line of the Pennsylvania and the line of the Baltimore & Ohio at Johnstown. In addition to facilitating the handling and interchange of freight, it is stated that the extension will "open up new territory for manufacturing sites and for the mining of coal, fireclay and other minerals."

Asks Exemption from Rate Order

The Central Railroad of New Jersey has petitioned the Interstate Commerce Commission that it be exempted from the provisions of the so-called "New England rate" order, handed down in 1922 and upheld in a decision of the U. S. Supreme Court a year ago.

By the terms of the New England rate decision the terminal New England railroads were granted an increase in their proportionate share of through rates on shipments from other sections of the country, the cost of the extra apportionment being pro-rated among the carriers contributing to such freight movement. The plea of the Jersey Central is based on the contention that it is more properly a terminal railroad than a through freight line and that, moreover, its earnings are not on a level sufficiently high to enable it to bear its share of the burden.

Hearings on the petition are expected to be held within the next few weeks, and it is understood that other roads are considering taking action similar to that of the Jersey Central.

New Freight Record in 1923

A record amount of freight traffic was carried by the railroads of the country in 1923, according to complete reports filed with the Bureau of Railway Economics. Traffic handled during 1923 amounted to 457,589,846,000 net ton miles, which exceeded by 2.3 per cent the 1920 total, the previous high record. Compared with 1922, this was an increase of 21.7 per cent. For the month of December, however, there was a decrease of 7.9 per cent, in comparison with the same month in 1922. The average load per freight car in 1923 amounted to 27.9 tons, or one ton above the average for 1922, but a decrease of 1.4 tons compared with the record average established in 1920.

Revised Rates in Effect March 1

The Louisville & Nashville R.R. has notified the Alabama Public Service Commission that it will put into effect March 1 the revised interstate coal and coke rates prescribed in the commission's recent order.

Industrial Notes

The J. B. Engineering Sales Co., Connecticut sales representatives of the Conveyors Corporation of America, Chicago, have moved their office from Hartford to Chamber of Commerce Building, New Haven, Conn. This firm handles the sales of American steam-jet, ash conveyors and other power-plant and engineering specialties.

The St. Louis Steel Casting Co., will open a new foundry for the production of commercial steel castings March 15, at 100 Malt St., St. Louis, Mo. The officers of the new company are Joseph Teipel, president; W. F. Heinecke, vice-president; W. F. Exner, secretary, and F. G. Langbein, treasurer.

Recent Patents

Mine-Car Coupler. George H. Norris and Edward A. Ernest, Milwaukee, Wis., 1,472,988. Nov. 6, 1923. Filed April 7, 1922; serial No. 550,450.

Retort for the Distillation of Shale, Bituminous Coal and Other Materials. Claude M. Garland, Chicago, Ill.; 1,473,616. Nov. 13, 1923. Filed Feb. 11, 1921; serial No. 444,090.

Mining Machine Anchoring Device. Nils D. Levin, Columbus, Ohio, assignor to the Jeffrey Mfg. Co., Columbus, Ohio; 1,473,729. Nov. 13, 1923. Filed Sept. 11, 1918; serial No. 253,633.

Explosive for Use in Blasting Caps. John Marshall, Swarthmore, Pa., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.; 1,473,825. Nov. 13, 1923. Filed Oct. 5, 1921; serial No. 505,599.

Mining Machine. Edmund C. Morgan, Chicago, Ill.; Olive E. Morgan, executrix of E. C. Morgan, deceased; 1,474,000. Nov. 13, 1923. Filed May 22, 1916; serial No. 99,015.

Mining Apparatus. Charles W. Wyman, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago, Ill.; 1,474,311. Nov. 13, 1923. Filed July 25, 1919; serial No. 313,206.

Miner's Ticket Box. Samuel T. Pratt, Nanticoke, Pa., assignor of one-fourth to M. J. McDonald and one-fourth to A. V. McDonald, both of Nanticoke, Pa.; 1,474,553. Nov. 20, 1923. Filed May 16, 1923; serial No. 639,351.

Skip Hoist. W. E. Hale, Fort Washington, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa.; 1,474,902. Nov. 20, 1923. Filed Dec. 29, 1922; serial No. 609,618.

Cutter Chain and Bars for Mining Machines. Frank Cartledge, Terre Haute, Ind.; 1,475,364. Nov. 27, 1923. Filed May 13, 1920; serial No. 380,955.

Process of Preparing Coal for Coking. Henry Dannettell, Evansville, Ind., assignor of one-half to Burtis U. Cain, Evansville, Ind.; 1,475,543. Nov. 27, 1923. Filed Sept. 20, 1919; serial No. 325,236.

Weighing and Loading Apparatus for Hoist Skips. Daniel F. Lepley, Connellsville, Pa.; 1,475,637. Nov. 27, 1923. Filed Aug. 31, 1922; serial No. 585,542.

Pit-Cage Arrester. Morgan Williams, Ogmores Vale, near Bridgend, Wales; 1,475,668. Nov. 27, 1923. Filed Nov. 20, 1922; serial No. 602,182.

Obituary

Robert Fleming, president of the Fleming Coal Co. and of the Banner Coal Co., both located at Bannervane, Va., died of Bright's disease at Norton, Va., Feb. 12, at the age of 68. Born in Scotland he came to this country with his parents when 15 years old, the family settling in Pennsylvania. In his early youth he worked in the coal fields of Pennsylvania, later removing to Iowa, where he spent several years trying to develop a mine in the coal district of that state. In the early nineties he went to Norton, Va., and became a pioneer in the development of the Clinch Valley, opening the first coal mine in the valley, the Virginia Gas Coal Co., in Tazewell County.

S. M. Cawood, former sheriff of Harlan County, Kentucky, coal operator, and prominent business man, died suddenly on Jan. 31, at his winter home in Asheville, N. C., where he had gone for his health. A wife and five children survive. Death was due to a sudden attack of heart trouble.

Coming Meetings

Upper Potomac Coal Association. Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

Northwestern Pennsylvania Coal Operators' Association. Annual meeting March 4. Butler, Pa. Secretary, T. F. Diefenderfer, Butler, Pa.

Canadian Institute of Mining and Metallurgy. Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

News Items From Field and Trade

ALABAMA

The Southern Ry. is making extensive improvements at its Finley Yards, Birmingham, and it is understood will add car-building and repair shops at a cost of \$5,000,000, though no official confirmation has been given of the extent and nature of the work now under way.

Investigation by the Shelby County Grand Jury into the recent mutiny of convicts in the Montevallo Mines, operated under lease with convict labor by Messrs. Thomas and Weller, absolved the officials and warden of blame in the matter and recommended the restoration of the lash as a last resort in the punishment of unruly prisoners. Equipment in the mine was damaged to the extent of more than \$25,000 by dynamite in the hands of the convicts.

The large frame commissary building and contents at the Mary Lee Coal Mine of the Alabama Company, was destroyed by fire Feb. 2 with a heavy loss. The origin of the fire is unknown. The building will be replaced.

The Youngstown Mining Co., of Blount County, has increased its capital stock from \$2,000 to \$300,000 in accordance with papers filed with the Secretary of State at Montgomery. The incorporators are W. H. Young, H. M. Norwood and J. A. Simpson, of Birmingham.

It is reported that the Brilliant Coal Co. will make another opening at Calumet, Walker County, and will construct a number of tenant houses in connection with the new development. The offices of the company are in Birmingham.

Charles H. Nesbitt, for the past twelve years chief mine inspector for Alabama, serving under the appointment of the three previous governors, has been reappointed for a term of four years by Governor Brandon. Through an increased appropriation by the last Legislature Mr. Nesbitt expects to extend and perfect the work of his department so as to render the service much more valuable to the mining industry during the next four years.

The Birmingham office of the Sullivan Machinery Co., of Chicago, has been removed to 2108 5th Avenue North, where ample ground floor space provides more adequate accommodation for the company's business. G. P. Small is local manager for Alabama.

William Goodwin, of Birmingham, W. P. Smith, Rock Castle, and George Kuffner, Kellerman, have been named associate mine inspectors for a term of four years by Governor Brandon.

ILLINOIS

The Peabody Coal Co. operating and engineering department heads from all over the country assembled in the annual operating conference at Chicago Feb. 4 and 5. Various problems of management and production were discussed.

Federal stamps placed on the deed of the transfer of the Bickett Coal & Coke Co. mining property in Franklin County, to the Franklin County Coal Co., formerly the Taylor Coal Co., represented \$1,200, indicating a value of the total properties at \$1,200,000. The papers were recently drawn up by Marion Hart, attorney at Benton, the land being located near Royalton, in that county.

Fred Truebger, assistant engineer for the Union Colliery Co. at its Kathleen mine, at Dowell, has been made civil engineer, succeeding Arthur S. White, of Chicago, who held the position for the past three years.

Julius F. Yarp, for some time assistant to the commissioner of the Chicago Coal Merchants' Association, has been appointed commissioner, succeeding Colonel A. C. Earnshaw, who has resigned.

The Lumaghi Coal Co. has reopened its No. 3 mine, at Collinsville, after a six weeks shutdown.

C. E. Campbell, of the Consumers Company of Chicago, joins the Globe Coal Co., wholesalers, of Chicago, April 1.

New electrical equipment now being installed in Old Ben mine No. 16, at Sesser, is almost completed and will be in use in a short time.

INDIANA

The Consolidated Collieries Co., of Indianapolis, has been incorporated to deal in coal and other fuels and to operate mines. The company has a capital of \$25,000. Roy C. Bain, Warren F. Smith, and James E. Bingham are directors of the company.

Judge John E. Cox, of the Superior court, Terre Haute, has named Clem Richards receiver for the Burnett Coal Co. (the Devonald mines), and fixed his bond at \$25,000. The receiver was named on the application of the Mid-American Mutual Casualty Co., which carries the mine compensation. The mines were recently operated by a group of miners as a co-operative project.

The Dixie Vein Coal Mining Co., Indianapolis, with a capital of \$50,000, has been incorporated. Jacob S. White, Burrell Wright and Paul Kirk are the directors of the company. The Dixie Vein mine near Terre Haute, closed for 18 months, will soon be reopened.

IOWA

The Shuler Coal Co., while drilling on the W. A. Snyder farm, two miles east of Alpha, where their mine is located, struck a vein 5 ft. 4 in. thick.

The property of the Consolidated Coal Co. at Buxton, has been disposed of in a trade to Gavrousky & Goldstein, of Centerville, for a 323-acre farm in the northern part of Appanoose County, and other considerations. The Buxton property consists of a tract of farm land, the large company store and several other buildings. Coal mining has been abandoned on the property and it will now be used for other purposes.

Joe Pestotnik, one of the veterans in the coal mines of Boone, recently received a wage check for \$205.98 for eleven and one-half days work. This is the record wage check received at Boone.

KENTUCKY

Senator Bannie Tabor's scrip bill, passed in 1922 and lost before it was enrolled, has been passed again by the Kentucky Senate, and will undoubtedly become a law. The bill provides that persons, firms and corporations which issue scrip must redeem it at face value for any person presenting it. The bill is to prohibit speculation in scrip, and to prevent mine-operating companies from being able to buy it up at a percentage of its value.

The Dawson Daylight Coal Co. of Dawson Springs, controlled by the K. U. Meguire interests, Louisville, plans to start loading coal from its new stripper operation within about thirty days.

MISSOURI

John A. Sargent was made a vice-president in charge of the coal department of the Central Coal & Coke Co., Kansas City, by the directors at a meeting Feb. 6. Since July 20 Mr. Sargent has been general manager of the coal department of the Central, and had been acting manager of the department since the resignation, Feb. 1, 1923, of Harry N. Taylor, vice-president in charge of the coal department, to become president of the United States Distributing Corporation. Before Mr. Taylor's resignation Mr. Sargent was sales and traffic manager of the Central.

The sale of the Blackfoot coal mine, at Prathersville, by the receiver, S. F. Conley, to W. R. Prather, who for several years has been manager of the mine and a large stockholder, has been approved by Judge David H. Harris of the Circuit Court. The mine is one of the largest in the county and the coal is mined with the aid of electrical machines.

John Mammen has purchased a steam shovel and will use it in mining coal on his farm, northeast of Golden City. Mammen has a large acreage of surface coal and his new equipment will enable him to do a much larger business.

NEW YORK

Lieutenant Eugene C. Roberts, of Buffalo, who has been second in command of Troop A, state police, has resigned his position and will go into the coal trade, in which he was formerly engaged. He and his two brothers, Paul and Clark T., have formed the Roberts Coal Co., which will have headquarters in Detroit, Mich. They will handle both coal and coke at wholesale and also represent the "Electric Furnace-man." The three young men are sons of Eugene C. Roberts, a member of the Hedstrom coal concern, Buffalo.

OHIO

The work of organizing the Columbus-Pocahontas Coal Co., of Columbus, incorporated three months ago with a capital of \$300,000 is progressing satisfactorily, according to F. A. Garen, and the work of developing a large property in the smokeless field will be started. Chicago capitalists are interested in the new company.

The Fuel Sales Co., Canton, has been chartered with an authorized capital of 5,000 shares, no par value designated, to produce, buy, sell and deal in coal and other minerals for fuel. Incorporators are E. L. Hang, Edward Reiser, H. S. Roose, J. R. Beiter and E. A. McCuskey.

The Whitesburg Coal Co.'s branch office in Cincinnati has been closed after a year's participation in the trade there. The Old Dominion Coal Corporation has reopened its Cincinnati office with N. K. Howard in charge. The Riddle Coal Co. has opened a branch office in Cleveland.

Harry Young, head of the Utilities Coal Co., of Huntington, Ind., was in Cincinnati recently and has arranged to take over the output of the Harlan Coal Co., at Ages, Ky., and the J. L. Smith Coal Co., at Draper, Ky., by the Kearns Coal Co. Both produce about ten cars a day each. Mr. Young will become a member of the Kearns concern and will retain his Indiana headquarters.

The Ogle Coal Co. has taken offices in the new Frederick H. Schmidt Building, Cincinnati. Several changes have been made on the eighth floor of the Dixie Terminal. The Creech Fuel Co. and the Wallins Creek Coal Co. have changed their locations.

After being idle for several months, work was resumed at the Palos mine, near Glouster, but a fire destroyed the power house, throwing 100 men out of work again. The loss was about \$30,000. Steps will be taken to repair the damage at once.

OKLAHOMA

The Grace B. Mining Co. has been organized at Picher to develop raw coal lands owned by this company in that immediate vicinity. The company is capitalized at \$300,000 and incorporators are D. O. MacKaller, E. L. Morris and A. C. Wallace, all of Picher. The company has under lease and owns in fee considerable coal lands in the vicinity of Picher and it is planned to develop these lands at an early date.

The John T. Cole Mines Co. has been organized at Schuler for the purpose of developing extensive coal lands. The company is capitalized at \$50,000 and the incorporators are John T. Cole, A. M. Cole and I. W. McAllister.

PENNSYLVANIA

There were 506 fatalities in the anthracite mines of Pennsylvania in 1923, according to a preliminary report of Joseph J. Walsh, Secretary of Mines. This total is said to be smaller in proportion to the number of miners employed and the number of days the mines operated than during any period in the past fifty years. The actual number of fatal accidents was larger, however, than in some of the recent years. Secretary Walsh said, but when the number killed was smaller the number of workers employed and the number of working days were smaller. The fatalities occurred in fifty-six of the 137 companies operating in Pennsylvania last year. Seventy per cent of the accidents occurred before noon, Mr. Walsh pointing out that the morning period of work is that of the greatest activity. The preliminary report classifies the causes of accidents as follows: Falls of roof and rock, 221; crushed or killed by cars, 63; gas explosions, 43; premature blasts, 46; crushed or killed by machinery, 12; miscellaneous, 121. Of those killed 245 were miners; 83, miners' laborers, and the others were employed in various other capacities. Approximately 160,000 miners in the anthracite region worked an average of 273 days last year.

City Purchasing Agent Lafferty, of Philadelphia, has awarded contracts aggregating more than \$1,016,282 for furnishing coal to the various municipal bureaus for the current year. The amount of the award made to each of the successful bidders was: Philadelphia & Reading Coal Co., \$750,000; Bell Coal Co., \$71,500; Jenkins & McCall Coal Co., \$64,000; George B. Newton Coal Co., \$62,250; Mason-Scholes Coal Co., \$60,750; E. O. Kelly, \$4,500, and John C. Hancock Co., \$3,282.

The H. C. Frick Coke Co. fired 1,000 additional beehive coke ovens last month and is firing 1,000 more this month, and a number of other companies in the Connells-ville district also are increasing their output or are preparing to do so. The Hillman Coal & Coke Co. has fired the balance of its idle ovens at the Isabella plant and all the ovens at the Tower Hill No. 2 plant which had been idle since last autumn. There are 254 rectangular ovens at this plant. The Etna-Connellsville Coke Co. is getting ready to start its plant at Simpson with 119 beehive ovens; W. J. Parshall is doing the same at his 100 beehive oven plant near Uniontown. Both these plants have been idle since autumn.

The state tax collected on anthracite this year on last year's business, based upon reports so far filed with the Auditor General's department, will reach \$6,000,000 to \$7,000,000, fiscal officers of the state contend. Approximately 250 anthracite producing companies will file reports. Several of the large producers who have filed reports sold more coal despite strike conditions last year than in 1922. The period for filing the reports ended with the close of January, but owing to details connected with the making up of the reports Auditor General Samuel S. Lewis has granted extensions of fifteen days in most cases.

A state charter has been issued to the **Jordan Coal Co., of Scranton**, with a capital of \$50,000, the purpose of which is to buy, own, sell and operate coal lands. William R. Willis, Pershing, is treasurer, and the three incorporators are William Mack, Scranton; Albert Zenke, Scranton, and F. R. Jordan, Hazleton.

The **Pittsburgh Coal Co. Employees' Association** reports that the total of employees' savings and investments through the association during the year 1923 was \$492,099.46, of which \$361,359.13 was by mine employees in the Pittsburgh district. During the year 1923 1,901 employees contracted to purchase 11,906 shares of stock; 5,027 shares of stock were delivered to 598 employees on completed contracts; 2,384 employees received \$1 per share additional to the dividends for the year, authorized by the directors of the company to be paid to employees and or their dependents holding stock of the company purchased through the Employees' Association. Since this association was organized 26,872 shares of stock have been delivered to employees on completed contracts.

John Barnes, Barnesboro (Cambria County) coal operator has become the owner of the **Tobias Mishler farm** of 263 acres near Red Bridge, now Kring's Station, in Conemaugh township, Somerset County. The tract is underlaid with valuable coal deposits and has been the object of attention of coal operators for many years. Acquisition of the tract is taken to mean that a huge coal operation will soon be started with a town on the level lands bordering on the river.

State charters have been issued at Harrisburg to the following coal companies: **Pennsalt Coal Co., Natrona**, mining and preparing coal for the market. Capital \$25,000. Incorporators: Warner T. Over, 1435 Cayuga Street, Philadelphia, treasurer; Charles M. Butterworth and L. A. Smith, Philadelphia. **Tyrone Coal Co., Uniontown**, \$30,000, mining and preparing coal for the market. Incorporators: George H. Bortz, Uniontown, treasurer; Anton Luxner, Dawson, and Charles E. Bortz, Uniontown. **Stevens-Chapin Coal Co., Wilkes-Barre**, which will mine and prepare coal for the market. The company's capital stock is \$25,000. Nat D. Stevens, 800 East Main Street, Nanticoke, is treasurer and one of the incorporators, the others being Ernest M. Chapin, Brookline, Mass., and James R. Scouton, Wilkes-Barre.

The **H. H. Robertson Co.**, manufacturers of Robertson process asbestos protected metal, skylights, ventilators, mineral rubber and special asphalts, has announced the appointment of James S. Ervin, formerly in charge of the sale of mineral rubber and special asphalts, as manager of sales, with headquarters at Pittsburgh, to succeed C. D. Mercer, resigned.

WASHINGTON

Announcement has been made at Longview by the **American By-Products Co.** of the incorporation of a \$2,000,000 corporation which plans to develop the byproducts of the Cowlitz County coal fields, the building of a 250-ton commercial plant on the Cowlitz River two miles north of Longview and Kelso, and the ultimate intention to serve this district with gas. Purchase of the coal deposit, estimated as containing 20,000,000 tons, will involve the expenditure of \$1,000,000.

Clarence L. Wickstrom, mining engineer of Spokane, and associates recently bought an interest in the **Beacon Coal Co.** of Allentown, of which he has been made manager. In discussing the deal Mr. Wickstrom said: "The company has three seams of coal of workable width, 10,000,000 tons blocked out above the tunnel level, a property valuation in excess of \$1,275,000 and nothing to sell but its products. But besides coal and coal residuum these products include benzol, gasoline, gas ammonium sulphate, tar, creosote oil, lubricating oil and pitch, all produced from the coal with the Green-Lacks process, equipment for the use of which the property is supplied."

WEST VIRGINIA

The **R. S. Lumber & Coal Co.**, of Martinsburg, has just been organized, with a capital stock of \$25,000. Interested in the new concern are J. P. Rensburg, of Capon Bridge; R. A. Snyder, of Markleton, Pa.; I. D. Van Meter, of Kearneysville, Pa.; G. J. Shaffer and G. P. Morrison of Martinsburg.

That it is unlawful to employ a boy under 16 years of age in the mines or elsewhere in West Virginia is the substance of a decision of the West Virginia Supreme Court in connection with the damage suit of Ray Jackson against the **Monitor Coal & Coke Co.**, originally tried in the Logan Circuit Court, the plaintiff asking damages of \$25,000. The court held among other things that "such employment is not rendered lawful by the fact that at the time of his employment the boy misrepresented his age; nor by the employer requesting and receiving from the county superintendent of schools and keeping on file, a certificate showing that such child is over 16 years of age."

A tippie at Wilmoth, in the Barbour County field, was destroyed by fire late in January. The large coal bin, being full of coal, also burned and continued to burn for several days. Only a few men were at work when the fire occurred, but preparations were being made to operate on a larger scale.

There were 36 deaths incidental to the mining of coal in and around West Virginia mines during the month of December, 26 being due to fall of roof and coal and 5 being due to mine-car accidents. McDowell County mines had 9 fatalities; Fayette had 6 and there were 3 each in Logan, Mingo, Monongalia and Raleigh; 2 each in Brooke and Kanawha, and 1 in Boone, Marion, Mercer, Nicholas and Wyoming.

Frank L. Bowman, at the head of several companies operating in the Monongalia field and with headquarters at Morgantown, has announced his candidacy for the Republican nomination for Congress in the Second West Virginia district.

A three-year old fire in the mine of the **A. L. Black Coal Co.** near Maidsville not only threatens to destroy all the coal in a 14-acre tract of Pittsburgh coal owned by the company but also is menacing adjoining mines in the same region. Unless it is possible, according to W. B. Rigglesman, State Mine Inspector, to confine the fire to the 14-acre tract, it may spread into the adjoining operation of the **Warner Collieries Co.** In order to prevent the spread of the fire, fourteen brick walls are being rushed to completion by a force of twenty-five men, through the construction of which it is hoped to cut off the supply of oxygen from the Black mine and thus cause the fire to extinguish itself. The fire broke through the outcrop on Feb. 6, great sheets of flame ascending from the outcrop and dense clouds of smoke enveloping the community in which the fire has been raging. As showing that it has sought in every way possible to protect its own interests as well as the interests of other mines, the **A. L. Black Coal Co.** states that it has spent between \$50,000 and \$60,000 in endeavors to control the fire and has done everything that expert advice seemed to direct in an effort to control and extinguish the flames.

WYOMING

J. H. Slate, a mining engineer from Pittsburgh, has been making a thorough inspection of the **Conroy coal mine**, situated about nine miles north of Kemmerer, it is reported on good authority, to reopening the mine at an early date. Slate was shown the interior workings of the mine by Joe McDonald, who has been in charge of the property since it was shut down several years ago, and he is convinced that coal can be mined and marketed profitably. If this meets with the approval of the Pittsburgh owners of the mine it is practically certain that operations will be resumed during the coming summer.

WASHINGTON, D. C.

The United Mine Workers, it is announced, are preparing to fight Governor Pinchot's coal bill as introduced in Congress by Senator Borah. It is declared the measure aims at anti-strikes and for that reason organized labor is against it. An official of the miners in Washington is quoted as opposing the bill because it would tie up the funds of the organization and threatens to jail the officers. The bill provides that in the event of an emergency growing out of a strike threat the president may exercise through a proposed coal division of the Interstate Commerce Commission all the powers conferred by the Lever act in effect during the war. The courts have interpreted this act as giving the authorities power to enjoin the calling of a strike in any industry affecting the nation's fuel and food supply.

CANADA

The **Coalmont Colliery, in the Princeton coal field of British Columbia**, has opened a new 14-ft. seam of high-grade bituminous coal, and, as a consequence, is increasing its working force. The coal from this mine is in demand in the city of Vancouver, which is capable of absorbing the whole of the output of the mine.

The **Crows Nest Pass Coal Mining Co.** has found it necessary to close down "B" North and No. 1 North mines, owing to the slackness of trade. This is unusual at this time of the year and is attributed to the competition of fuel oil and the Fordney tariff.

Coke-oven gas from the new \$2,500,000 plant of the By-Products Coke Oven Co., Hamilton, Ont., was turned into the mains recently. The city's supply has thus been increased 1,500,000 ft. a day. Some 200 men are at work in the plant. An effort will be made to use Nova Scotia coal.

Edward T. Devine, a member of the U. S. Coal Commission, in a public address in Toronto recently said that instead of the United States putting an embargo on coal shipments to Canada, it should be encouraging exports to the Dominion and extending its market there. He stated that the United States still had large coal reserves and, if mining could be carried on steadily, could produce half as much coal again with the same number of miners. Exports to Canada are comparatively small.

Following the announcement of the reorganization of the **Western Fuel Corporation of Canada, Ltd.**, which has large coal mine holdings on the east coast of Vancouver Island, mainly centered in and around the Nanaimo, B. C., a group of financiers of San Francisco and Los Angeles, Calif., have been visiting and inspecting these mines and properties. At the head of the party was Guy H. Kinsley, of Peirce, Fair & Co. The corporation now has a capitalization of \$5,000,000 divided into 1,000,000 8-per cent cumulative preferred shares of \$1 each and 4,000,000 common shares of \$1 each. The new company is assuming the present bond issue of the old company of \$3,000,000, which is secured by trust deeds held by the Montreal Trust Co.

The **City of Nanaimo is facing what may prove a serious problem.** It is built on old coalmine workings and a short time ago a cave-in occurred in a residential section and water began to seep through to the surface. An effort was made to drain it but it continued to rise until there was danger that a firehall would be flooded. The city council then closed the block affected to traffic and, in the meantime, an effort is to be made to locate the workings, of which no reliable maps are available, with a view to filling them in and taking whatever other measures may be found necessary to protect city property.

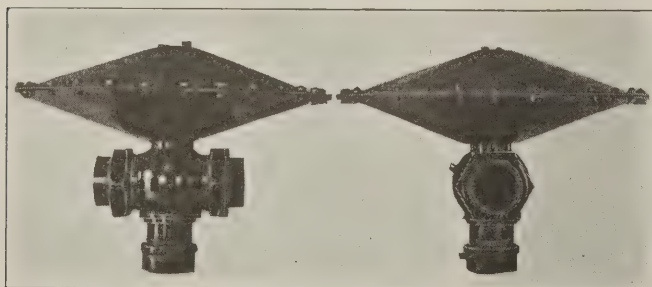
New Equipment

Automatic Suction Valve for Mine Gathering Pumps

This valve is to control automatically the suction inlet of a plurality of suction connections on mine pumps, and eliminate the necessity and expense of valve operators. The elimination of the hand-operated system of suction control makes it practical to pump from a number of places at the same time, which permits a considerable reduction in the size of branched suction pipes without sacrificing economy. From an efficiency standpoint automatic suction control approximates the equivalent of reaching all the water through a single suction connection for each pump because of the fact that all the pumps have access to all their water at any and all times through these automatic valves.

These valves are designed to work anywhere in a branch suction between the point of branch and the water to be pumped. They are simple and rugged in construction, having no levers or floats. Each valve is a complete unit within itself and is not dependent on any mechanism whatever at the source of water. The valves are of the diaphragm type and are automatically opened by the pump suction against a spring by a vacuum of about $\frac{1}{4}$ lb. per square inch when the suction inlet is submerged. They are closed by the spring when the water is lowered sufficiently to allow the system to begin to receive air.

The entrance of air into the valve weakens the vacuum in the vacuum chamber, causing the opening of a vent valve to the atmosphere, which immediately destroys the vacuum under the diaphragm, allowing the spring to close the valve without hesitation. The opening again of the main valve is dependent on the sealing of the suction inlet with water and the return of the vent valve to its seat, the latter being controlled by a mechanical time-limiting device which can readily be adjusted to suit conditions in the place to be pumped.



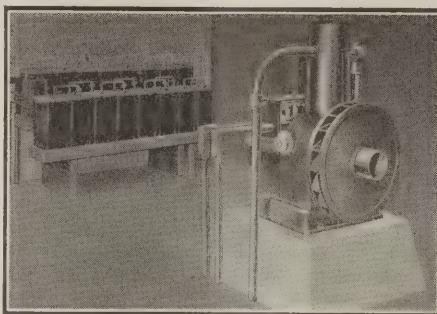
Automatic Suction Valve

Each valve on the system operates to cut off its suction as soon as the water has been pumped down in its sump. When the water fills up again the valve automatically reopens.

This valve has been developed by C. E. Rogers, electrical engineer for the Logan Mining Co., Logan, W. Va., and is being manufactured by Dravo Doyle Co. of Pittsburgh, Pa., and marketed by the Rogers Manufacturing Co., Logan, W. Va.

110-Volt Light and Power Plant

A new 110-volt direct-current light and power plant, manufactured by the Westinghouse Electric & Mfg. Co., has been developed to solve the problem of supplying current for light and power in locations where central-station service is not available. The plant consists of a gasoline engine, electric generator, and electric starter and control all built into a single, compact unit. It



Small Light and Power Station

This engine develops 3 hp. and is suitable for direct-lighting service or for charging the batteries so as to provide for heavy lighting or power drafts.

also includes a battery in which to store the electricity from the generator. The fact that the engine is air cooled makes possible its installation in an unheated outhouse.

This light and power plant supplies ample energy for the operation of electric lights, small motors for various needs, water-pressure pumps, buzz saws and similar mechanical appliances. It is economical in fuel and oil consumption, and its slow operating speed and rugged construction provide for long life and dependable service under

the most rigorous conditions.

The plant operates on either gasoline, kerosene or natural gas and is particularly suitable for mine service in regions remote from electric-lighting lines and also for emergency service.

Either of two batteries may be had with the unit. One has a

capacity of 7,850 watt-hours at 8-hour rate and the other has a capacity of 15,750 watt-hours at 8-hour rate.

The single-cylinder four-cycle engine has a bore and stroke of $3\frac{3}{8} \times 5$ in. A fan in the flywheel draws air into the cylinder dome and over the cylinder fins, assuring cool operation under all conditions. The engine is lubricated by a splash feed system which supplies an equal amount of oil to the moving parts at all times, regardless of the depth in the crankcase.

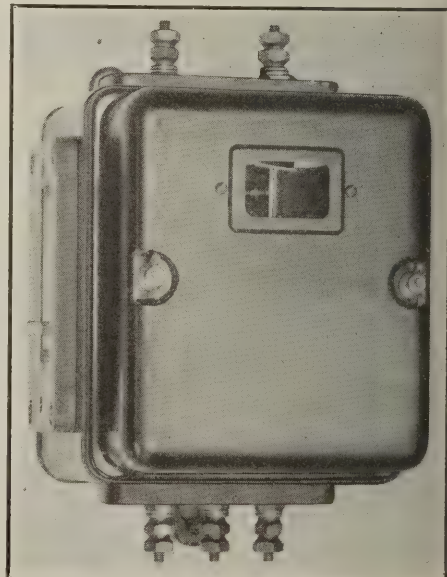
The 1,500-watt four-pole generator, which is bolted to the engine frame, is of the sleeve type on the engine shaft. It has a shunt winding and a series field to start the engine.

Low-Rate Battery Charger

The Magnar battery charger, a device marketed by the General Electric Co. for the "trickle" or "floating" charging of railway signal batteries, is being applied to new fields, such as time clocks, bell systems, burglar alarms and tripping batteries in power plants and substations. It has been found that on such installations the batteries may be discharged continuously at a very low rate or intermittently at a higher rate, the average discharge rate being low in either case.

By the "trickle" or "floating" charge method the charging equipment operates continuously. The average rate at which the battery discharges being first determined, the equipment is regulated to supply the battery just enough current to compensate for the discharge plus a small additional quantity to allow for internal leakage. Among the advantages claimed for this method of charging are the continuous maintenance of a fully charged battery, a constant voltage, longer life and the necessity of a minimum amount of attention.

For hoisting signal service on the many shaft and slope hoists of the coal mines this device no doubt will meet with favor because it eliminates the necessity for dangerous high-voltage signal systems and obviates the need for continual attention and renewal of batteries of the primary or secondary type.



Charger for Small Batteries

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, *President*
E. J. Mehren, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. Dawson Hall
Engineering Editor

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Energy or Atrophy?

THREE years of peace in the bituminous-coal industry! Shall they be years of construction or deterioration? Shall the companies energize or atrophy? In these years of peace is a chance for notable constructive work. In fact it may be said that only those companies which confront the situation boldly now and bring their mines up to the best practice devised or projected will be able to sail through the three years of peace, weak market and competition. Only those who modernize their mines—who in 1924 do all they can to cheapen their ways of operation—will see 1927. If nothing is done, if their owners “wait and see,” the mines may endure but the properties will change hands.

Some will hope to win by heartening their sales force by cutting salaries and by discharging a man here and there at the office and the mine, but only by radical improvements at the mines can the true solution be found. Cheaper coal, obtained by better machinery and by a cutting down of risks, will alone work the reformation. What improvement is made must needs be fundamental. No half measures will serve. The result will be obtained not so much by removing needed officials, repair and maintenance men but by the broader policy of providing mechanical appliances that will actually make men superfluous.

It will be necessary to remember that the mine is the fighting front. The comforts of the rearguard must be renounced and the fight must be pressed where the victory alone can be won—at the face—not forgetting of course the necessity of providing the necessary finances for the needed mine equipment.

Hoodlumism

ONE day a cloud of dust swept aggressively up the road into a troublesome Colorado coal camp. A lean-jawed ranger on a motorcycle burst out of it and halted in front of a crowd of scowlers. “I hear somebody in this town said he was gonna get the first ranger that come in. Where’s that man?” he demanded. The scowlers swallowed and blinked. Some appeared to shrink back. “I don’t think nobody said that,” finally offered somebody. “All right then,” replied the ranger. The cycle roared, the dust cloud rose, and he was gone but not forgotten. That town remembered such occurrences.

What if the Kluxers and the Knights of the Flaming Circle and the rest of them down in Herrin, Ill., had some such remembrance? Would there be so many hot guns and so many fresh graves and such hell on earth for the decent citizens of Williamson County? But they have no state rangers in Illinois. One of the reasons why they haven’t is that organized labor killed the constabulary bill in the last session of the State Legislature.

Violence has come to be a habit in the solidly unionized coal field of “Bloody Williamson.” The spirit of

disregard for law has grown up there among a large number of men who have let powerful unionism go to their heads. There are good, sound, sane citizens among the union miners of that territory, just as there are in every other union field, but the isolation of the region from every interest but the unionized production of coal has given too many of those men the idea that the law of the union, which has made them dominant in their neighborhood, is the only law worth obeying. Some of them are getting wobbly about obeying even that.

Union propaganda blamed bolshevism for the 1922 outbreak of these men—the infamous Herrin massacre. Bolshevism can hardly be blamed for the moonshine war of this year. It is due to just plain lawlessness of mind—the same inflamed mental attitude which led to the butchery of twenty-two non-union men in Herrin two years ago. Only one thing will help to check it—outside control. Sending in troops periodically is clumsy. The only form of outside control worth a whoop is offered in the form of a state constabulary. Such a force is needed so badly that even the mine workers’ union could benefit by its suasion. Rangers, by inspiring more respect for statute law in the minds of Williamson County miners, might evoke more respect for union law. There were indications at the Indianapolis union convention and elsewhere that union law is suffering from lack of respect in Illinois. Hoodlumism is bad for any union. Mr. Lewis and Mr. Farrington might bear this in mind when the next constabulary bill comes up in Illinois.

The Union Will Learn

“WE ARE weak; we can’t fight now,” was the doctrine preached to the United Mine Worker delegates at the Indianapolis convention. So they sent their men to Jacksonville pacifically minded. The delegation was pacific enough in its attitude there. Unionism did not need to wave a bludgeon. Nobody stoutly demanded that miners take a cut in wages. Nearly everybody but the operators from Illinois were reasonably willing to give the miners what they asked—a four-year continuance of the present scale. And the trimming of that program to three years was made principally because Illinois gagged at the dose, feeling that the program is nearly suicidal. But is it?

Of course, many a coal company will have to retire from the field. But with them must go an army of union miners. This means further weakness of the union. The first thing to expect of those discolored miners is that they travel over into non-union fields and try to remain in the kind of labor they know and like.

They may be good union men but they must live and they will go where they can work even if it be into non-union territory, just as hundreds of them did during the 1922 strike. This gives the non-union operator a higher hand. Likewise, it gives the union operator more opportunity to select the men he wants to keep,

which means an increasing opportunity to run his own property instead of letting unionism run it as is generally the case in many union fields.

What does all this mean? Doesn't it mean that an already weakened union is going to be compelled to recognize the fact that union-field wages must be adjusted downward if union coal is to keep any of its markets and continue in production? That is exactly what it means. President Lewis could not propose it to his men now. The rank and file would strike. A strike would be ruinous to all unionism and all union fields. Therefore the rank and file must learn of its necessity through bitter experience.

The bitter experience is now starting. Every mine shutdown makes the bitterness more poignant. The natural result of it all is an appeal by the union for a change in the wage agreement. Some day such an appeal will be made by the union by the exercise of nothing but plain common sense—unless government intervention or some other extraneous influence can be dragged in by Mr. Lewis.

Much at Little Cost

SUCH a small concession to public need and private virtue is federal inspection! One is almost ashamed to suggest so little to those who have done so much. If we had argued that the anthracite region spend \$5,000 or \$6,000 per day for inspection of its own and had urged that coal that did not meet the needs of that inspection should go back to the breaker and be treated again till it met with specifications, that would have been asking a sacrifice indeed. We are sure that the anthracite region would have demurred. "Two millions a year! Preposterous!" would have been the cry.

If we had argued that the railroad coal companies should sell their coal under the market price, taking no advantage of the fact that other companies were selling for much more, we should have been regarded as hopeless idealists.

But these things have been done, are being done. The second is so unusual, so self-denying, that the public persistently doubts that it *is* being done and tries to suggest it is a trick of which some secret, subtle advantage is being taken.

Yet when we argue that the federal government should inspect cars here and there at its own expense and see if those that have no inspection and those that have are alike producing coal of the specification now demanded we are told by some that it is too much. This little dip into Jordan, this ceremonial washing is too great a concession, we are told, to be taken by men who made such magnanimous provisions as those for an elaborate self-inspection of every car and a regulation of prices on all the domestic sizes sold.

No one can explain the difference except that the distinction is a "Little thing but mine own." The anthracite companies made their own big concessions, but this one is suggested to them without ostentation by a federal bureau, and consequently they demur about it. We cannot see why.

But is this concession little—if concession it may be termed? Surely it gives the public such assurance of right dealing, such an advertisement of rectitude of purpose that though it cost nothing it will do more to establish the anthracite industry in the good will of the public than either or both the concessions already

made. It will earn the public good will; it will promote the public confidence. At a time when oil is getting into public reprobation, and for good reason, coal will come back as have the railroad and central-station industries. Why not make the venture, if venture it be?

All Soft-Coal Mines Are Powder Magazines

RECENTLY a soft-coal mine superintendent in asking a question said incidentally that his mine was a safe one. We have forgotten where the mine was. It was not, however, in the anthracite region, so we were confident that it was a powder magazine and liable, if he did not take precautions—unusual precautions—to explode. He has a dangerous mine and we did not fail to tell him so. If the public fools itself that any of the bituminous mines are safe from explosion it is deceived, unless indeed the mine has been made safe by diligent stone dusting.

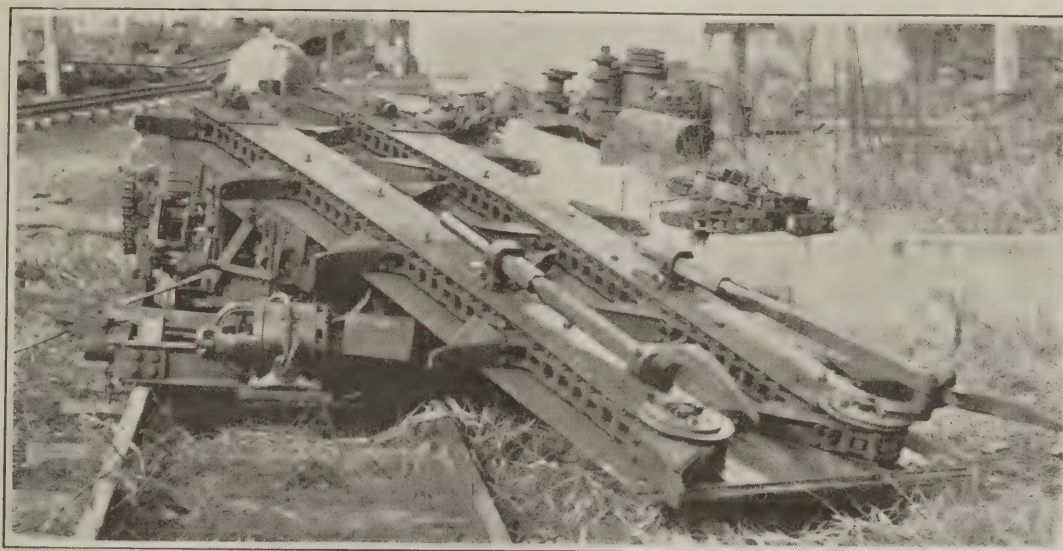
In the Ruhr the operators at last are beginning to see that humidification is at best only a palliative. It has done much to make the mines safer, but rock dusting is a greater security, and at that it must be thorough. Great Britain with its 50-per cent admixture of stone dust has altogether too many explosions; the Belgian and French rule of requiring 70 per cent of inert material seems preferable.

Unfortunately, in the United States the cars are built up with lumps, and the coal in consequence rolls off the cars whenever brakes are applied to either the locomotives or the cars. In this way the roads are strewn with material which soon is ground to an explosive dust. So long as the practice continues a road treated with rock dust inevitably will soon be rendered dangerous. Loading machines with or without conveyors will largely correct that condition because the best that can be done economically with a loading machine is to load the coal "baldy," or with only a rounded top. When the brakes are applied on such a car it will merely shake down, leaving the coal still in the bed. Furthermore, by concentrating operation proper treatment of the few roadways involved will be a job well within economical possibility.

At the mines of the Phelps Dodge Corporation in New Mexico all the cars are lightly loaded. In consequence the coal-dust evil is reduced to a minimum. This company also is going heavily into the practice of rock dusting. Shelves 2,000 ft. in length have been introduced to carry rock dust or adobe and the same material is being spread by the cement gun and other methods. The Old Ben Corporation also is using rock dust generously to protect its mines.

The movement is spreading. No one wants to have a mine bespread with a material that is and has been frequently used as constituent for the manufacture of a low-grade but extremely effective explosive, unless indeed that constituent is guarded by some inert material.

THERE IS CO-OPERATION IN COAL NOW, if there never was before. Those numerous bituminous-coal operators who have contended that the industry needed only a long period of low market to eliminate the unfit and thereby correct many coal evils have long had the co-operation of heavy storers, of smooth-running railroads, of plenitude of labor and even of the Great Operator himself, who has modified the winter thus far to a degree seldom exceeded.



One More Mechanical Loader Comes to Light

Wilson Chainloader for Low Coal Weighs 4,600 Lb.
and Has Maximum Height of 32 In.—It Has Loaded
69 Tons of Coal a Day and 120 Tons of Loose Gob

AROUND the corner of almost every gob pile in the American coal fields somebody is quietly developing an underground coal loader. It is no surprise, then, to learn that F. N. Wilson, of St. Louis, Mo., working under the paternal interest of the Southern Coal, Coke & Mining Co., of that city, now has what he calls the Wilson Chainloader fairly well developed after nearly two years of experimentation and back-breaking work. This machine, the appearance of which is suggestive of the Joy loader but which differs from it in many respects, is now working in one of the Bell Coal & Navigation Co.'s mines near Sturgis, Ky., under the inventor's eye and hand.

W. F. Davis, general superintendent for the Southern Coal, Coke & Mining Co., said early in January that the machine "is handling a clod and bastard lime, heavily shot, of course, to make it as small as possible, at the rate of 15 tons an hour." The machine has been loading coal also. On 12-ft. entry work, where, of course, it was handicapped by narrowness just as any loader would have been, it has loaded about 30 tons a day, but in 25-ft. rooms its best day was Aug. 29, 1923, when it loaded out 69 tons. This work was in coal not exceeding 40 in. in thickness.

The machine in its present form is designed especially for use in thin coal. It stands 32 in. high from the rail to the highest point on the machine—a sprocket on

the top of the upper end of a sloping conveyor. It is possible that this height can be further reduced to 28 in. The machine today therefore can load under a roof approximately 36 in. above the rail. It weighs about 4,600 lb.

The Chainloader is made up of two conveyors and the mechanism that drives them, all mounted on a four-wheel self-propelled truck, the wheelbase of which is 48 in. long. The main conveyor is 12 ft. long and slopes at an angle of about 18 deg. when the front end is lowered to the floor in operating position. It pivots at the back and can be swung through an arc with a front-end cord of 16 ft. Coal is gathered onto this swinging conveyor and delivered at the top of the machine to a non-adjustable conveyor which extends horizontally backward over the car to be loaded. The machine is driven by three motors—one of 7½ hp. actuating the gathering arms and main conveyor, one of 2 hp. affording traction and the third, of 2 hp., operating the rear conveyor.

The digging and gathering of the coal to the main conveyor is done by two kinds of arms—two heavy digger bars and a series of conveyor arms. The digger bars remind one of the flails which operate on the Joy machine, although there are important differences. Thus they are neither jointed nor flexible. One of these digger bars is mounted at each side of the front end of the conveyor pan or tread plate. It is about 6 ft. long and made from tool steel 2 in. square. The front end is curved in sickle shape and is pointed. Just back of this curve the bar is attached to a crank disk by

The headpiece shows the Wilson Chainloader, which is designed for thin coal. This machine has been working in a 40-in. seam and, without reducing its present maximum height of 32 in., could load coal in a 36-in. deposit. This picture gives some idea of the main conveyor with the two digger bars and the conveyor arms.

a substantial tool-steel pin. The crank disk moves the front end of the bar in an elliptical path, the plane of which is slightly above that of the conveyor.

Not only does this bar move with a gathering motion, dragging coal to the conveyor, but it also rotates through 90 deg. This is accomplished by reason of the fact that 28 in. of the bar's rear end is turned to 2 in. in diameter and provided with rifled grooves $\frac{3}{4}$ in. deep on opposite sides. These grooves, which engage heavy pins, run straight along the bar except at their forward ends, where they follow a helical course for a sufficient distance to impart a 90-deg. rotation to the bar.

This twisting motion of the digger bar turns the "sickle" up when it reaches a position directly over the conveyor. This permits lump coal of good size to pass under the bar and reduces the likelihood of its dragging coal off the conveyor.

Actual conveyance up the tread plate is accomplished by two endless chains fitted with arms which extend 14 in. across the 18-in. plate. These arms are attached to the links of each chain at 36-in. intervals and are so arranged as to alternate with each other. Thus the arms are 18 in. apart as they move up the tread plate pushing coal to its top. Roller chain of 3-in. pitch is used on this conveyor.

Each conveyor arm is built of a $\frac{1}{4}$ -in. steel strap 3 in. wide lying on edge. Two pieces of this flat steel are placed approximately on the two sides of a right-angle triangle of which the chain forms the third side. A link attachment secures the two corners of the arm to the conveyor chain, and a certain amount of flexibility in the arm itself allows it to negotiate the sharp turn which the chain makes in rounding the sprockets at the ends of the conveyor.

MACHINE WILL CLEAN A WIDE AREA

A "machinery plate" which in shape resembles a wide T that lies flat on top of the truck, with the cross of the T at the forward end, forms the base of the entire machine. The rear end of the main conveyor pivots directly above the base of this T-shaped plate. Most of its weight rests on the cross of the T, on which a curved track is mounted. The forward end of the conveyor is supported on deeply grooved wheels running on this track and swings through its 16-ft. arc, enabling the machine to clean up a fairly wide area.

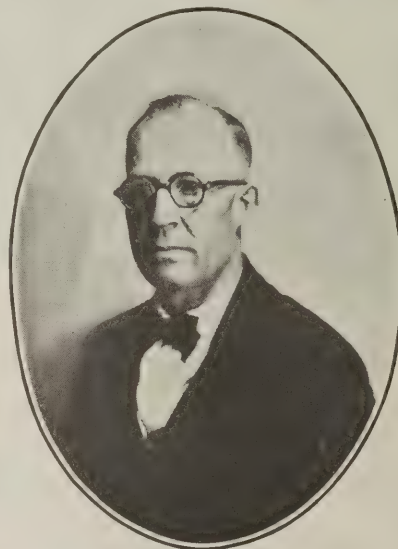
In practice the machine is moved up to the front of a fall of coal. One man with a crowbar easily swings the front end of the conveyor to the extreme left of its arc. The machine then begins work along the left rib. The traction motor crowds it into the pile of coal. As soon as the pile at that point is reduced so that the right-hand digger bar is doing the heaviest work the action of this bar tends to pull the end of the conveyor under the coal. By releasing a chain, a few inches at a time, the operator permits this swinging

motion to proceed until the loader has swung through its full arc. A man with a crowbar then swings it back to the left, the machine is crowded forward again, and cuts another swath through the pile. Thus the operation is repeated. The inventor asserts that this machine can clean up a place so neatly that little or no hand shoveling is necessary.

Originally the machine was built with one continuous conveyor which flattened down at the back. However, Mr. Wilson soon concluded that there were many advantages in breaking the long conveyor into two separate sections. Not the least of these was the advantage of always having the tail end of the machine lined up

with the car to be loaded. Consequently the present machine has a flat delivery conveyor 8 ft. 6 in. long suspended from the rear of the loader frame. This conveyor is built up in a peculiar manner. A belt 30 in. wide is riveted to thin iron cross slats which are attached at their ends to roller chains of $\frac{3}{4}$ -in. pitch. Both the main and delivery conveyors move at a speed of 300 ft. per minute.

During the two years of experimentation that have

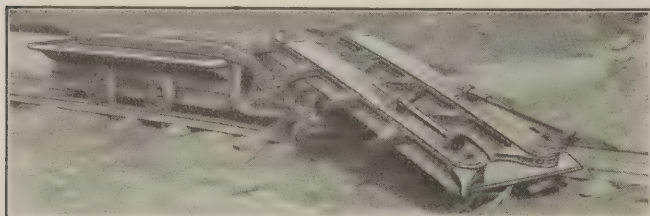


F. N. Wilson

Inventor of the Wilson chainloader

passed since W. K. Kavanaugh, president of the Southern Coal, Coke & Mining Co., first saw a model of this machine operating in Mr. Wilson's basement in St. Louis many a "bug" in this loader has been eliminated. When the long tread plate of the main conveyor buckled it was made rigid by a long angle iron riveted underneath. When the conveyor arms snapped under the strain of revolving around the sprockets their design was changed. Spur-gear drives were replaced by worm gears working in oil. The main motor of 25 hp. was replaced by one of $7\frac{1}{2}$ hp., which appears to be ample. Over-all height was reduced by changing from 4-pole motors to 2-pole.

Other improvements followed one upon another until today the machine is able to stand considerable rough-and-tumble work though it is not yet ready for extensive commercial production. As this was written there also appeared to be some likelihood of patent infringement difficulties although the main patents covering the machine all have been allowed by the Patent Office, and their holders are ready to rise in their defence.



The Machine is Merely Two Conveyors

The main conveyor can be swung through an arc of 16 ft. to clean up a considerable area. The rear belt with its riveted cross slats of iron always is in line with the car being loaded.

RENEWING THE SALT LOST IN PERSPIRATION.—In England, Professor Moss of the University of Birmingham, with the advice of Dr. Haldane, has made a study of the effects of chloride elimination during excessive sweating while working in high temperatures. He states that the addition of sodium and potassium chlorides to the drinking water materially lessens the muscular fatigue and prevents miners' cramps.

What Everyone in the Industry Should Know About Handling of Mining Machinery

Many Equipment Failures Due to Lack of Understanding of the Machines
—Devices Should Be Designed to Meet Mining Conditions— Proper
Performance Obtainable Only When Machinery Is Kept in Good Repair

By T. F. MCCARTHY

Electrical Engineer, Indiana, Pa.

IN THE evolution of mining methods which has been rapidly taking place our industry has seen a marked increase in the use of machinery. Much of the equipment now used has been developed for special application to mining service but a far greater proportion of the equipment now commonly used in or about the mine has been adopted from other industries.

The application of mechanical and electrical machinery has been so rapid that few except those who have an intimate contact with it have a proper appreciation of its important characteristics; in fact, many of those who have direct supervision of its operation have been unable to give it the care and attention ordinarily required. Another disadvantage most engineers have realized is the fact that machines introduced from other industries do not always withstand the hard mine service.

In spite of these adverse conditions the application of machinery is rapidly expanding, and it is therefore becoming increasingly necessary that mining men become more thoroughly familiar with mechanical and electrical machinery if the best results are to be obtained. It also is important that many manufacturers of equipment for mine service design their product or revise their designs to meet mining conditions.

Mine superintendents, foremen and assistant foreman usually have direct supervision of the operation, care and repair of mining machinery and it is therefore important that they be sufficiently familiar with the equipment to know its limitations and be able to ascertain whether or not it fits the conditions and is being given proper attention and repair. In this connection there are three important points to be considered, namely: The equipment must be designed for the particular operating conditions, it must be operated within its rating and must be properly cared for and repaired.

The question of design is a problem that requires special attention. Often mine equipment must operate in very damp and dirty locations and under widely different conditions, all of which must be taken into consideration. It is particularly important that motors and other electrical equipment be designed to keep out moisture and dirt. Haulage, cutting and hoisting equipment are subject to very heavy overloads, and due consideration must be given to the rating and capacity of the motors and the design must be such as to withstand severe mechanical stresses. It is therefore important that those responsible for the purchase of mine equipment remember that the operating conditions, rating and quality of the apparatus should govern its selection rather than first cost.

Many equipment failures are due to the operation of machinery under conditions different from those for

which it was designed. Motors often are operated on circuits where the voltage is too high or too low, and to avoid failures from this cause one should remember that the voltage of a circuit should never vary more than 10 per cent above or below that stamped on the name plate. Pumps often are operated on heads above their rating or the suction or discharge pipes are smaller than the openings on the pump, yet they are expected to deliver their rated capacity. These conditions apply to all classes of mine equipment and where a machine or motor is continually breaking down an investigation usually will reveal the fact that some condition is not right for its successful operation.

The largest percentage of equipment troubles are due to faulty lubrication and dirt. Every piece of apparatus requires certain grades of lubricating oils and greases for the different bearings. The manufacturers of equipment will gladly recommend the particular lubricant to use on their machines and these recommendations should be closely followed. With motors, an over-supply of oil frequently is the cause of electrical trouble. The excess oil gets into the windings and spreads itself over the insulation of the wiring, field coils, armature and commutator bars, causing the insulation to break down and resulting in a short-circuit. Oil mixed with dirt serves as a path for current to leak, thus causing burned insulation.

Repairmen should be thorough in the inspection and cleaning of equipment. If the machines are cleaned of excess oil and dirt at every inspection it will be possible to eliminate a large percentage of the most common troubles.

Haulage locomotives are one of the most abused classes of mine equipment. Those in charge do not know their limitations and as a consequence they are given very little attention. Locomotives usually are operated over poorly kept tracks and the supply voltage often is much lower than that necessary for successful operation. Some motormen believe a locomotive should haul any size trip that can be coupled to it.

A locomotive is guaranteed to deliver a given drawbar pull at a rated speed provided the track conditions and the voltage of the circuit are correct. A modern locomotive can be relied on to deliver a drawbar pull equal to 25 per cent of its weight provided the wheels can obtain sufficient adhesion to the rail. The tractive force therefore is governed by the size of rail and condition of the roadbed. If locomotives are to be expected to deliver their rated drawbar pull, heavy rails should be used and the track should be well kept. With chilled cast-iron wheels it is the usual practice to consider the drawbar pull equal to 20 per cent of the weight of the locomotive, while with steel tires the drawbar pull will be equal to 25 per cent of the weight

of the locomotive. It is necessary then, if we wish to obtain best results from our locomotives, that the load attached to the motor shall not cause it to exceed its rating and that the proper voltage be maintained on the trolley circuit.

Where plain-bearing mine cars are used it is common practice to consider 30 lb. per ton as the friction load and 20 lb. per ton as the grade resistance. For example, let us suppose it is required to determine the number of cars a 10-ton locomotive will haul on a 2-per cent adverse grade where the mine cars are equipped with plain bearings and the total average weight of the loaded car is two tons.

With a proper size rail—which should not be less than 40 lb. per yard—and the rated voltage on the trolley circuit, the correct number of cars for the trip will be determined as follows: The drawbar pull of a 10-ton locomotive with steel tired wheels is 5,000 lb. The friction load of the 2-ton car at 30 lb. per ton is 60 lb. per car. The grade resistance load at 20 lb. per ton is 40 lb. per car; the total drawbar pull per car is therefore 100 lb. As the drawbar pull of the locomotive is 5,000 lb. it is apparent that it can haul a load equal to fifty cars each weighing two tons. As the locomotive weighs ten tons and is therefore equal to five 2-ton cars, it is capable of hauling only forty-five cars of this given weight on the 2-per cent grade.

OPERATE LOCOMOTIVE MOTORS WITHIN RATING

The motors in a locomotive usually are guaranteed to deliver their rated drawbar pull at a given speed with a temperature rise not exceeding 75 deg. C. or 167 deg. F. over a period of one hour. If the load exceeds the capacity of the locomotive and the haul is long, the temperature may exceed the safe limit and the insulation of the armature and field coils become overheated. To keep within the rating of the motors it is necessary that the duty cycle of the locomotive

be such that during periods when the locomotive is lightly loaded, coasting or standing, it will have time to cool off.

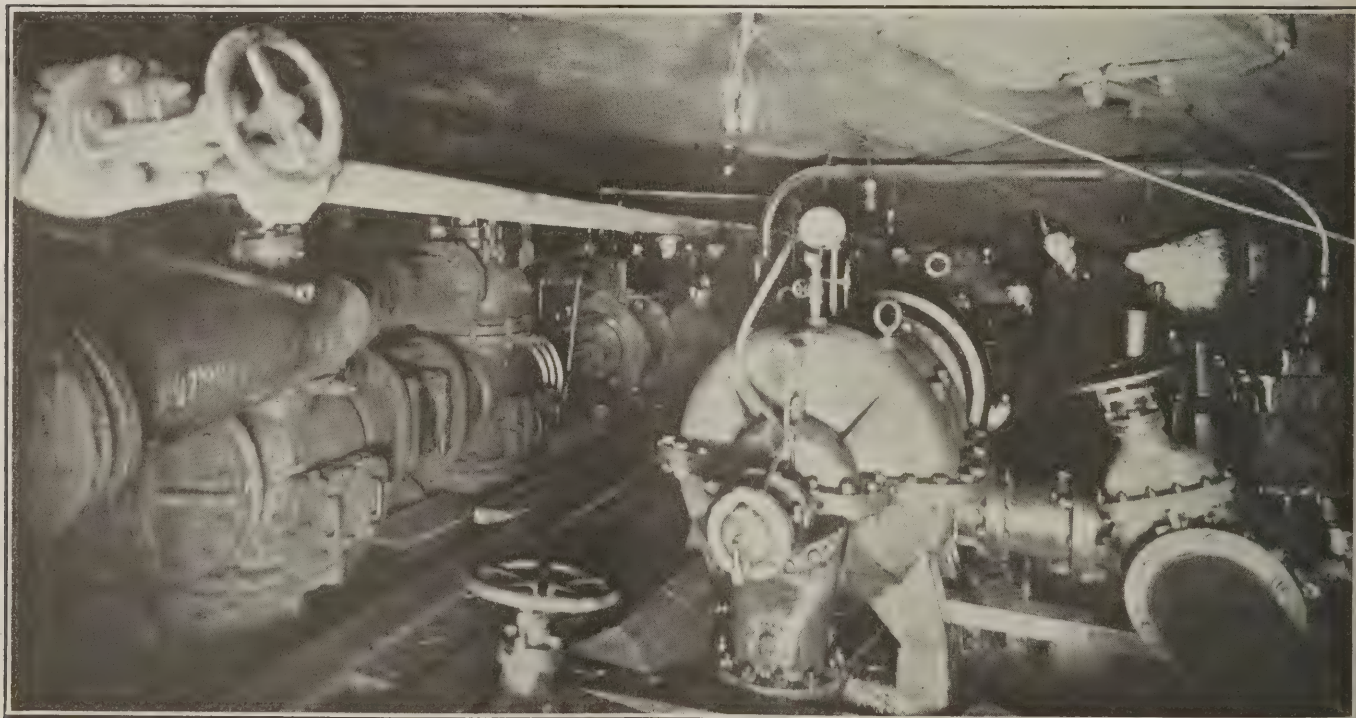
A 25-per cent overload on a motor will reduce the time the motor attains its maximum temperature from one hour to one-half hour and also cause a reduction in speed of approximately 10 per cent. If the haul is long and the locomotive overloaded and there is not sufficient time between trips for the motors to cool the result will be overheating and insulation failure.

Another cause of trouble from overheating is low voltage. A 10-per cent reduction in voltage will cause a reduction in speed of approximately 20 per cent, causing an increase in the time required to make a trip and resulting in overheated motors, increased power consumption and reduced output. Low voltage usually is found to be due to poor bonding and lack of sufficient copper in the trolley or feed lines.

Overloads increase the demand charge with a resulting increase in energy cost. Low voltage also increases the energy cost because when the speed of a locomotive has been reduced 50 per cent the power bill is doubled and the extra power has been wasted in overcoming the resistance of the track, poor bonds or overloaded feed lines.

The motors of modern locomotives are equipped with ball or roller bearings which require a special grade of grease. Great care should be given to see that the bearing housings are dustproof and that no dirt is working into them. Journals and axle linings also require a special grade of oil and the oil wells should be kept packed with a good grade of wool waste and the lids properly fitted to prevent sand and dirt working into them.

All driving-gear bearings should be kept reasonably tight so that the gears will mesh properly. Gear cases should always be installed and kept tight and the gears lubricated with a gear compound. Brake rigging and

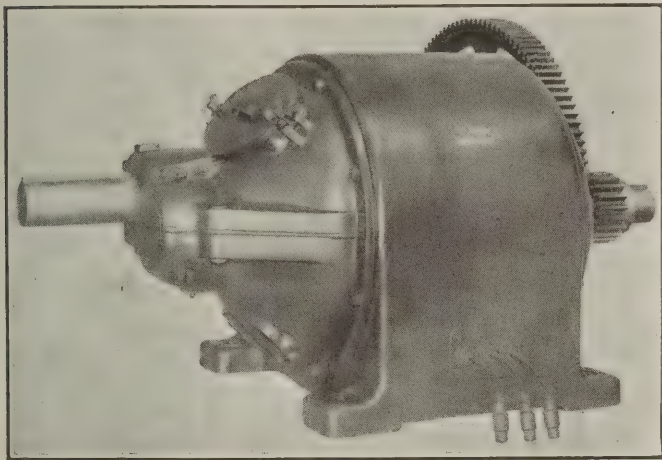


Underground Pumping

Some of the pumps used in the mines must be located in remote places, this is because the pump must be located where the water can be concentrated. Late developments in pumping machinery have resulted in odd looking pumping stations; motor-driven centrifugal pumps are sometimes seen with steam-driven reciprocating pumps.

shoes should be kept in perfect adjustment to prevent any possibility of accident.

Motor brushes require a certain amount of attention to see that they are seating properly and not sticking in the holders. Controllers should be inspected regularly and all fingers and segments that are burned or pitted should be promptly repaired and kept lubricated with a light coating of vaseline. The air gap between the motor armature and pole pieces should be regularly checked with a gage to make certain that the clearance is correct. Where compressed air is available it should be the practice to blow off all accumulations of sand and dirt at frequent intervals. This method of



Enclosed Type Motor

If manufacturers selling equipment to the mining industry would study the conditions under which their equipment must operate, far better success would be obtained. Enclosed motors will usually be much larger and more expensive than the open types but in many cases they would quickly prove more satisfactory.

cleaning is especially effective on the rheostat because it will clean off the grids and reduce the probability of short-circuits and grounds.

TWO TYPES OF PUMPING EQUIPMENT

Mine pumps may be divided into two types, reciprocating and centrifugal. When driven by means of an electric motor they are either direct-connected, belt driven or gear driven. The reciprocating type pump, either piston or plunger, generally is used for gathering purposes.

Whenever a pump is inspected the motor also should be inspected so as to be certain that the brushes are seating properly, are free in the holders and the winding and commutator are free from oil and dirt. If excessive sparking occurs at the motor it probably is caused by a dirty commutator, sticky brushes, open or short-circuited armature coils, partly short-circuited field coils or grounds. If any such defect is noted it should be given instant attention so that the source of trouble may be located.

The hand-operated or automatic starter also should be examined to see that it is functioning correctly and that all connections are tight. These starters have a definite purpose in the circuit, being used to accelerate the machine slowly, prevent excessive mechanical strains and also to prevent excessive starting current when the motor is connected to the line. Where hand starters are used the pumpmen or workmen often will tie the arm of the starter in the running position so that in the case of power failure they will not have to

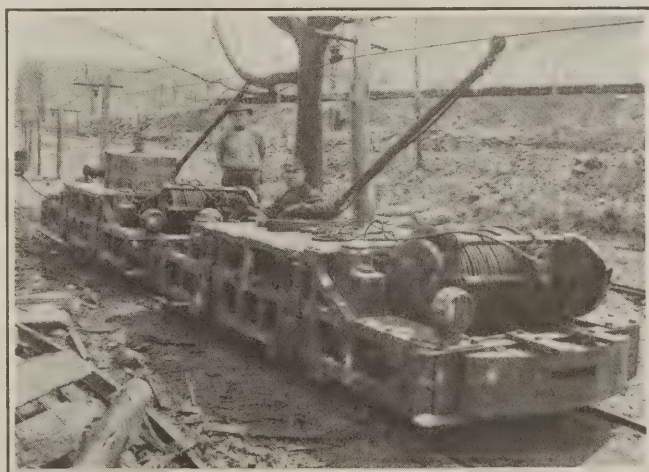
return to the starter to put the motor in operation when power is again on the line. Men should be reprimanded or discharged for doing this, as they are defeating the purpose of the starter and frequently cause serious material damage or injury to other workmen. All motors should be properly protected by fuses of a carrying capacity low enough to protect the motor in case of trouble; ordinarily the fuses should not be more than 50 per cent in excess of the full load current of the motor.

The packing on the pump rods, plungers and pistons should be regularly examined and tightened or replaced when required. When a packing gland is tightened the handiest nut to get at is often turned down and the other one left loose. This causes the packing to bind and the rod to be cut or scored.

When the pump fails to pick up its water the valves should be examined to see that they are seating properly and that all bolted connections and suction lines are free from air leaks. Efficient strainers on the suction pipe will reduce the possibility of particles of coal or rock being carried into the pump and preventing the valves from seating properly. The connecting-rod bearings should be tightened before a knock develops. Where mine water is especially bad the water ends of the pumps should be made of an anti-acid composition or lined with wood or cement; ordinary cast iron will not successfully resist the action of an acid water.

Centrifugal pumps should be used only on heads very close to that for which they are designed, for ordinarily they have the peculiar characteristic of overloading when the head is too low and of not delivering their full capacity when the head is excessive. They also require that the suction line be absolutely airtight and the pump and suction line be primed before being started.

In the inspection of a centrifugal pump care should be taken to be certain that all bolted connections and packing glands are free from air leaks. Bearings should be examined to see that the oil reservoirs are properly filled and that the oil rings revolve freely. The inside of the pump should be examined occasionally to see that the wearing rings on the rotor and casing have a minimum clearance, because excessive clearance will permit too much water slippage and the pump will not deliver its rated capacity. The openings in the rotor may become plugged up with coal or wood, and



Cable Reel Locomotive

A locomotive which may be repaired easily is always better than one which the repairmen must tear down to make adjustments or changes.

therefore should be cleaned. The thrust bearing should be closely inspected and adjusted.

Cutting machines are required to operate under very adverse conditions of voltage and load, and as the dust conditions usually are abnormal they will prove very expensive to maintain unless carefully operated and repaired. Lack of proper lubrication is a prolific source of trouble. Very often the machine runner neglects to oil the machine when required and puts in an over-supply at long intervals of time instead of using a small amount of oil at frequent intervals. These machines require special grades of lubricants for the different bearings and drives and require particular care to prevent dirt from entering the bearings.

The hardness of the coal being cut determines the speed of the feed on the machine, and if the load on the motor is to be kept within its rating and the mechanical stresses within safe limits, the cutting speed must be correctly proportioned to the load. Manufacturers of cutting machines furnish different ratio gearing for the different feeds required, which makes it possible to make the rate or speed of the feed such that the load is within the capacity of the machine at all times. The machine runner always should be supplied with a sufficient number of sharp bits so that the used bits may be replaced when dull. Many overloads and burned-out armatures are caused by machine runners attempting to cut with dull bits.

ENCLOSED MOTORS BEST FOR HOISTS

Room-hoist motors require the same careful inspection and adjustment needed by other electrical equipment and should be specially protected from dampness because they operate very intermittently. The most suitable motor for this class of work is the totally enclosed crane type. When hoists are operated by unskilled labor it is necessary to see that the controllers or starters are in good and safe condition and that the motors are not overloaded by the men attempting to haul too many cars or replace heavily loaded derailed cars on the track.

Mine cars represent one of the largest investments in equipment about the mine and as a rule are expected to remain in operation without attention until worn out or put out of service due to a wreck. As the condition of the cars largely governs the output of the mine they should be regularly inspected and repaired so that the trucks will always be in perfect alignment and the friction reduced to a minimum. Ball and roller bearings have considerable merit and undoubtedly reduce car friction and are worthy of careful consideration in buying new equipment.

PROTECT WIRE ROPE AGAINST CORROSION

Other items used about the mines, such as wire rope, electric cables, drills and other accessories to mine equipment represent a considerable investment and their correct use is an important consideration in the successful operation of the mine. All wire rope used on cutting machines and hoists should be protected from corrosion by the application of a rope preservative or compound.

Trailing electric cable on cutting machines, cable-reel locomotives and other machines should have an insulation constructed so as to resist abrasion and moisture. Cables with molded rubber covering have proved quite successful for this service.

The Miner's Torch

Seeing Things

MAGAZINE and newspaper editors have an idea, I am told, that technical men are not competent to write descriptions dealing with plants or processes with which they are well acquainted, the argument being, of course, that they might leave out several important links in the narrative without realizing that the average layman cannot jump the gaps that are left. Since I class myself a "technical man," I might be accused of violating the proprieties if I questioned the editors' judgment in the matter, but by way of countering the accusation, I want to go on record as saying that the average layman or laywoman attempting a description of a plant or industry with which he or she is not familiar generally spoils the picture by saying too much. They do not leave any gaps to jump largely because they fill in all of the gaps with their own imaginings.

The January issue of *Success* magazine has an article which illustrates the point I am attempting to make. The article gives the impressions of a woman investigator who was sent to Alabama to investigate the operations of the Steel Corporation around Birmingham.

She describes what she saw and does it well, then she proceeds to tell about conditions as they were in the past, not as she saw them, of course, never having been in Alabama before, but as they were described to her by others. And you are left with the impression that all of the changes for the better date back only to the year 1907 when the Steel Corporation took charge of the properties.

I am sure that no one connected with the Steel Corporation consciously intimated that the mines in Alabama in 1907 were veritable hell holes and then overnight as they changed ownership or even in 16 years were transformed to their present state. Also I feel sure that the author of the article did not bring in these contrasts as overnight transformations just to make the article interesting but the result nevertheless is to make you doubt the accuracy of the entire description, and some might even wonder if the article was not inspired by the Corporation.

The conditions which she refers to as conditions of the past are not greatly exaggerated, and had the author only realized and made her readers realize that by past was meant thirty-five or fifty years ago, when the mines were first opened and that in a state where mining had never been carried on before, the impression made by her narrative would have been quite different.

The mining industry is in need of all of the publicity it can get; many of the editors and the politicians who take such delight in saying hard things about our mines and miners do not know that our country is filled with mining camps where the men and their families are well housed and otherwise treated as human beings—just as in the mining camp described in the article under discussion. What a pity then that the crude conditions of thirty-five years ago had to creep into the narrative to take hold of the reader's imagination.

I am reminded of the old saying that runs something like this: "It takes four very live men to carry out one dead man."

Valley Coals of Virginia Present Unusually Difficult Operating Conditions

Beds Are Located in Pocono Measures—Seams in Places Pitch so That Floor of Seam Is Higher Than Roof—As a Result of Pressure and Faulting Coal Often Is Badly Crushed

GEOLOGICAL conditions make the operation of the seams in Montgomery, Pulaski and Wythe counties, in Virginia, known as the Valley coal field, difficult to work and hard to clean. It also has crushed the coal. The seams are in measures below those of even the Pocahontas field, which lies a short distance to the north and west of the Valley region.

The coal beds of the region occur in the Price formation, the basal measures of the Carboniferous system, and they are therefore much older than the coal beds that lie farther northwest. The Price formation is of about the same age as the Pocono sandstone. Beds of this age carry coal in many parts of the northern Appalachian region, but, so far as known, they do not contain it in commercial quantities north of the Potomac River. Most of the beds that can be operated are limited to the counties of Virginia just named.

Montgomery County—In this county the coal lies in two distinct fields, as shown in Fig. 2, the Brushy Mountain field (A) on the north and the Price Mountain field (B) on the south. In the Brushy Mountain field only one bed (the Merrimac or "Big Bed") is generally of workable thickness. This bed extends entirely across the county on the south slope of Brushy Mountain. It dips to the southeast from 20 to 40 deg.

This coal, though locally much crushed, is generally workable from the New River eastward to a place about a mile beyond the Blacksburg-Newport road, but east of this place it has been crushed by movements within the crust of the earth, and in some places has been crowded into thick pockets and in other places almost squeezed out. Where the Merrimac bed is workable its thickness ranges from 5 to 9 ft., but it is broken by many bony partings, which are difficult to separate from the coal and which, if not removed, help to swell its already large percentage of ash.

COAL BEDS ARCH UPWARD TOWARD PRICE MOUNTAIN

The mine of the Superior Anthracite Coal Co. (5), which is a mile back from the river, at the station of McCoy, on the Virginian Ry., is the only one in the Brushy Mountain field that has direct railroad connection. In the autumn of 1923 four other mines—the mine of Linkous & Kipp (4), the College mine (3), the mine of the Diamond Coal Co. (2a), and the mine of the M. J. Shusser Coal Co. (3)—were working in a small way and trucking their output to Blacksburg for local consumption or for shipment on the railroad. Recently the A. Dunphy Coal Co. has begun operations on the property just south of that operated by the College mine (3).

The Price Mountain coal field (B) lies west of the road between Blacksburg and Christiansburg and com-

prises an isolated area of the Price formation that is entirely surrounded by the Valley limestone. Price Mountain, a small ridge about three miles long, has been formed by the arching up of the Price formation, so that the coal beds dip away from the axis of the arch in all directions and, in general, the accompanying beds of limestone dip correspondingly away from the mountain.

The dip of the coal beds on the south side ranges from 20 to 35 deg. and on the north from 30 to 50 deg. At some places on the north side the coal bed stands nearly vertical, and in some of the old mines it is reported to have been overturned so as to dip steeply toward the south.

As the beds of limestone and the coal bed have about the same degree and direction of dip, the coal bed obviously passes beneath the limestone in most directions, but the extent of the coal bed beneath the limestone is not known. As the coal bed in Price Mountain dips to the north and the same bed in Brushy Mountain dips to the south the logical conclusion is that the coal is continuous under the limestone from one outcrop to the other, but this assumed continuity can be proved only by drilling.

In general the limits of the coal fields of Montgomery County are determined on one side by the outcrop of the coal bed and on the other by the depth to which mining can be profitably carried. If 2,500 ft. is assumed to be the vertical depth to which mining can be made profitable, and if the dips range from 20 to 30 deg., then a strip of country ranging in width from three-quarters of a mile to 1½ miles may be regarded as containing minable coal. If the dip flattens with increase of depth the width of the belt of available coal will be increased.

This belt of available coal along Brushy Mountain is continuous across the county except in areas where the coal is crushed, but the coal in Price Mountain is limited mainly to its north and south sides, for at its ends the coal bed has been greatly crushed and faulted.

MERRIMAC MINE CONNECTS WITH TWO RAILROADS

Much coal has been mined in Price Mountain, but most of the mines have been small, and they have not extended any considerable distance beyond the drainage level. Only three mines are now in operation. The Merrimac mine of the Merrimac Anthracite Coal Corporation (6) is the largest and is the only one in the field that has direct railroad connection. It is favorably located for transportation, for it is on the south side of the mountain and has connections with both the Norfolk & Western and the Virginian railroads. The coal bed in this mine is from 5½ to 7 ft. thick and this thickness is typical of the bed on the Price Mountain field. The mine of the Brunfield Coal Co. (7) also is on the south side of the mountain, but it is small and its output is trucked to the railroad,

NOTE—This article is written from facts supplied by the U. S. Geological Survey. Wherever not declared to be based on report, the measurements given are those actually obtained by the geologists in charge of the Survey. A prior article, entitled "Can the Valley Coal Fields of Virginia Compete with Those of the Anthracite Region," appeared in the issue of Feb. 21 on pages 269-271.

half a mile distant. On the north side of the mountain a small wagon mine of the Eureka Coal Co. (8) supplies fuel for local consumption.

Pulaski County.—The coal fields of Pulaski County, as shown on the map (Fig. 2), consist of the Little Walker Mountain and the Pulaski fields.

The Little Walker Mountain field (c) is the south-westward continuation of the Brushy Mountain field of Montgomery County. The coal beds naturally extend from one field into the other, but the Merrimac bed appears to thicken to the west. The increase in thickness is generally believed to be due in large part to the greater number and increased thickness of the partings. The Langhorne bed ("Little Bed"), which normally lies 20 to 70 ft. below the Merrimac bed, also increases in thickness to the west and becomes 3 to 5 ft. thick in the western half of the Little Walker Mountain field. As this bed contains no bony partings its increase to workable thickness makes it very valuable, especially as its coal is somewhat harder than the average coal in the Merrimac bed.

The structural conditions in Pulaski County are much the same as those in Montgomery County except that

the coal beds dip more steeply, the dip ranging from 35 to 50 deg. Because of this increase of dip the width of the belt of available coal is narrow, only slightly exceeding 2,500 ft. in horizontal distance, which also is the limit of depth.

Two mines with railroad connections are operating in the Little Walker Mountain field—the Parrott mine of the Pulaski Anthracite Coal Co. (9), on the Norfolk & Western Ry. and the New River, and the mine of the Empire Anthracite Coal Co. (10), at the foot of Brushy Mountain, which connects with the same road at Pulaski, seven miles distant. The coal from the Empire mine (10) is hauled by tram to the breaker at Pulaski over part of an old railroad built many years ago by the Bertha Mineral Co. to their Altoona coal mine (11), about two miles west of the Empire mine. The Parrott mine (9) is operating in the Merrimac bed and the Empire mine (10) in the Langhorne bed.

COAL OUTCROP BENDS SHARPLY TO SOUTH

A short distance west of the old Altoona mine the outcrop of the coal bed leaves the slope of Brushy Mountain and turns sharply toward the east on the north

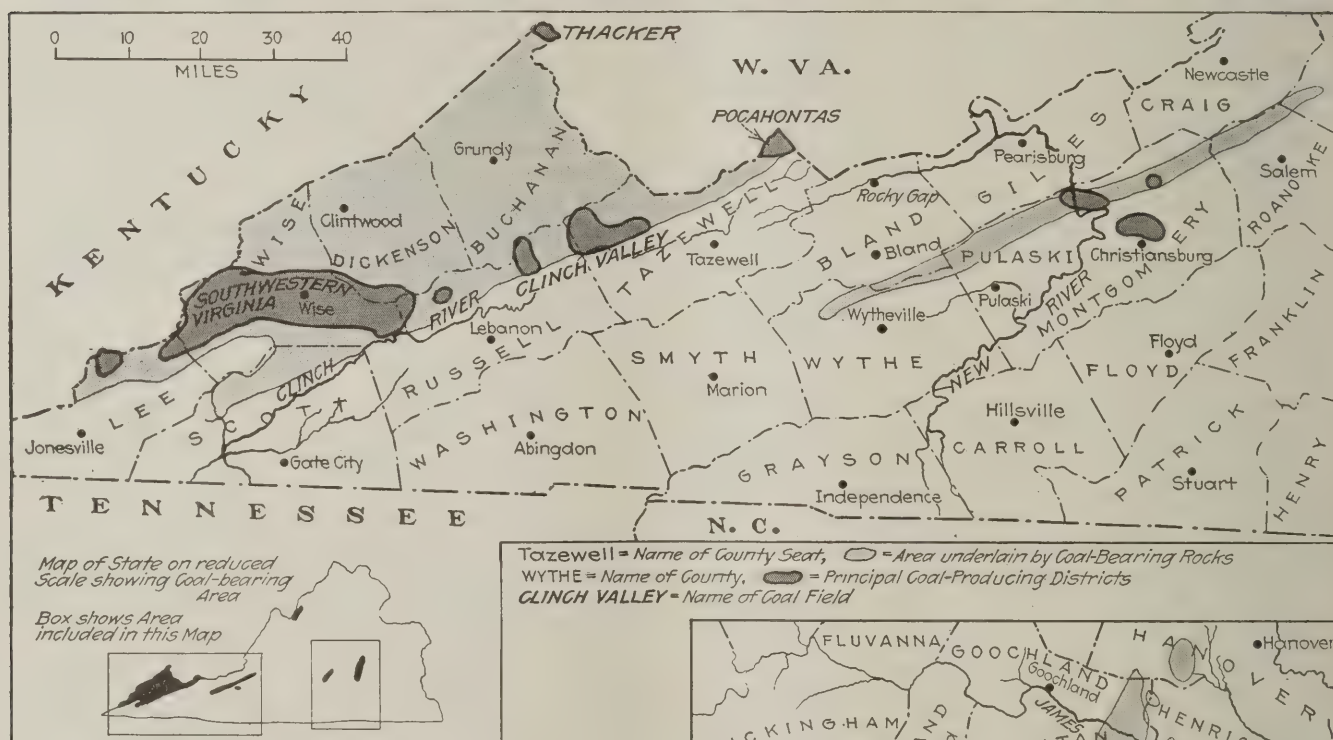
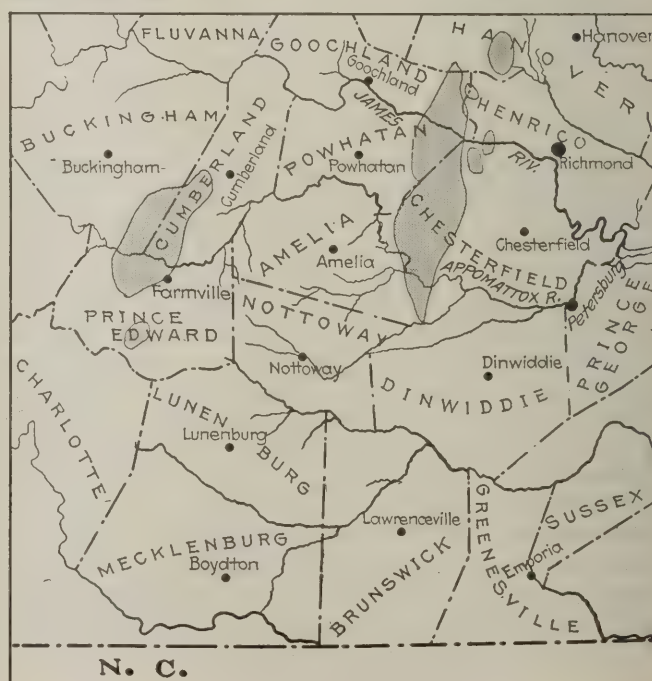


Fig. 1—Maps of Two Coal Fields of Virginia, the Eastern and the Central

The map of the Eastern area prepared some years ago by the U. S. Geological Survey, before the Valley coal beds had been given a close examination shows in a generalized way the areas they occupy. As will be seen in Figs. 2 and 3, greater detail is now at hand. The maps with the key sketch above this title exhibit somewhat completely the coal-bearing areas of the State of Virginia. In 1922 Wise County produced 5,022,866 tons; Russell County, 2,070,574 tons; Tazewell County, 1,563,847 tons; Dickenson County, 870,234 tons; Lee County, 762,305 tons; Montgomery, 42,194 tons. All the rest together—there are no separate returns available—totaled 106,281 tons. The price of the Montgomery coal, \$4.34 per net ton, led that of all other listed counties. Wise County coal sold for \$2.43; Russell coal, for \$2.51; Dickenson, for \$2.59; Lee, for \$2.68, and Tazewell for \$2.90. The price in the other counties averaged \$4.09 and the whole state railroad product \$2.57. This is evidence that certain at least of the Valley coals have a high market value.



face of Tract Mountain. The point at which the outcrop makes this sharp bend is arbitrarily taken as the western end of the Brushy Mountain field, and the area that lies east of this point is here called the Pulaski field, because the outcrop at its other extremity passes through the town of Pulaski.

Little mining has been done in the Pulaski field and few prospects can be found. The Merrimac bed is reported to be 12 or 15 ft. thick in an old mine two miles north of Pulaski, but the report could not be verified. Only one small mine is now operating in this field on the Merrimac coal bed. This mine is just south of Pulaski and is operated by the High Carbon Coal Co. The coal bed in this mine has a thickness of 7 ft., including the customary bony partings.

Wythe County.—There are two separate and distinct coal fields in Wythe County—one in the vicinity of Max Meadows, which will be called the Max Meadows coal field, and the other along the south slope of Brushy or Little Walker Mountain (C), on the headwaters of Reed Creek, which will be called the Reed Creek coal field (F).

The Max Meadows field is different from any of the fields so far described, as it consists of a rather flat synclinal trough six miles in length, extending from Gunton Park or Clark Summit on the east to the west fork of Miller Creek, about 2½ miles northwest of Max Meadows. A sketch map of this field is given in Fig. 2.

Only a little mining or prospecting has been done in this field, and consequently but little is known of the

coal beds except those in the vicinity of Gunton Park, where a mine recently was opened about a mile west of the railroad by the Pulaski Smokeless Coal Co. (12). The coal bed in which mining is now carried on apparently is the highest workable bed in the formation and is therefore called locally bed No. 1. This bed, where sampled by the geologists, is 5½ to 6½ ft. thick and has several partings. It dips only about 25 deg. to the south, but this dip is not uniform, as several rolls and irregularities of dip are shown in the mine slope.

COAL BADLY CRUSHED AND PROBABLY BUNCHED

Recently a tunnel was driven through the rock floor a distance of 12 ft. to a large but considerably crushed and distorted coal bed, which apparently is more than 20 ft. thick and carries 15 or 16 ft. of coal. The measurements given here, however, are not reliable, as the entry cut the coal bed in a roll and the coal as well as the partings in the bed are much disturbed and possibly bunched, so that probably the bed appears to be thicker than it really is. This bed is called No. 2. In addition to beds Nos. 1 and 2, there is another bed which, according to apparently reliable witnesses, lies not more than 20 ft. below bed No. 2 and contains at least 4 ft. of clean coal. This bed is known as No. 3.

A bed that seems to be bed No. 1 was prospected several years ago near the railroad, and beds of this group also were prospected about 1½ miles west of the mine of the Smokeless Coal Co. Probably the most satisfactory prospecting on these beds has been done

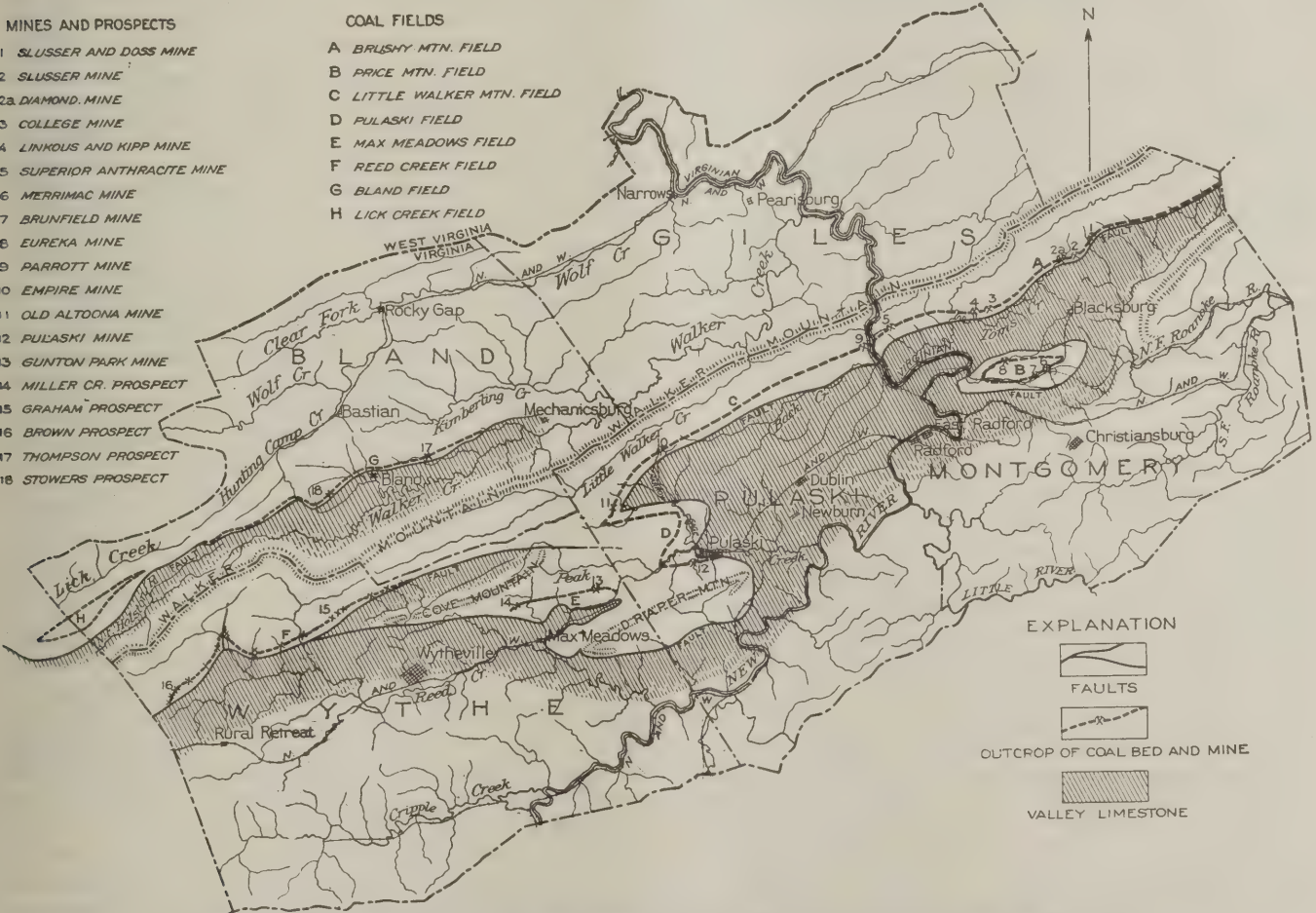


Fig. 2—Valley Coal Fields in Montgomery, Pulaski, Wythe and Bland Counties, Virginia

From the west corner of Bland County, near Lick Creek, to the most easterly corner of Montgomery County is 7½ miles. The area of the fields probably is large but the steepness of the dip soon carries the coal

to such profound depths as to make the coal unworkable, and its badly crushed condition makes the operation of some of it of questionable advantage. Other areas are extremely high in ash, and in fact in

all areas excessive ash is found. However, each operating area must be considered in detail and as yet none too much is known of the possibility of removing ash by washing, flotation and tabling.



Fig. 3—Max Meadows Coal Field with Section Showing Form of Syncline

This area is noteworthy for its overturned measures, which will make mining difficult. The depth of the coal at the deepest point probably is not greatly in excess of 1,000 ft. and it is doubtless nearly flat over a large area at the bottom of the basin. Apparently there is no coal under the Valley limestone, which, as in Fig. 1, is hatched to delimit its area.

on the west fork of Miller Creek northwest of Max Meadows.

At this place a 40-ft. shaft shows that bed No. 3 ranges in thickness from 3 to 10 ft., the greater thickness probably being due to movement within the coal. Bed No. 2 is exposed 20 ft. above bed No. 3, but could not be measured because the timbers in the shaft concealed it. Good coal 5 ft. thick is found in a near-by opening, and the bed in the shaft appears to be at least 7 ft. thick. Bed No. 1 lies 15 or 20 ft. above No. 2. On the outcrop bed No. 1 ranges in thickness from 6 to 5 ft., but it contains many bony partings.

COAL BEDS APPEAR TO END NEAR MAX MEADOWS

The westward extent of these coal beds is not definitely known by prospectors. The opinion is commonly held that the beds continue westward as far as Cove Creek, where they are overlapped and concealed by the Valley limestone, but this is improbable, for a few hundred feet west of the prospect shaft the outcrop of a sandstone can be traced underlying the coal until it assumes a position almost at right angles to the general strike of the coal beds.

This feature shows clearly that the coal beds end here in a synclinal point, and their outcrop, if it could be traced, would turn back to the east in the overturned south limb of the syncline and connect with the prospect on Miller Creek, half a mile below the forks of the creek.

The geologic structure of the northern part of the syncline is simple, as is shown by the regularity of the outcrop of the coal beds from one end of the basin to the other and by the regularity of the band of red shale (Maccrady formation) that occupies the middle of the trough. A rough measurement of the thickness of the

rocks that lie between the uppermost coal bed and the Maccrady shale south of the mine of the Smokeless Coal Co. is about 1,000 ft. The belt of red shale can be clearly seen from the forks of Miller Creek downstream for a distance of about 1,500 ft. and on the direct road leading from Gunton Park station to the coal mine.

As the Maccrady shale is the highest formation in this trough, its outcrop must mark approximately the middle of the trough, and hence the deepest part. If the coal lies 1,000 ft. below this red shale, it probably is at about that depth below the surface, and as the red shale here dips only about 10 deg., the coal bed directly beneath must lie nearly flat. These features afford a means of making an estimate of the area of available coal, for the trough is about six miles long, and the coal probably is workable for about a mile back of the outcrop.

BEDS VERTICAL AND PERHAPS OVERTURNED

From the southernmost boundary of the red shale southward the rocks are much disturbed, and where they are well exposed they dip steeply to the south or stand in a vertical position. This relation indicates clearly that the south limb of the trough is either sharply upturned or completely overturned, as can be seen on Miller Creek. If this condition prevails it does not look promising for the mining of coal in the south limb of the syncline.

The cross-section on Fig. 3 shows that the coal-bearing rocks on Miller Creek lie in a syncline whose southern limb is sharply overturned. Devonian rocks are exposed beneath the Price formation in Brushy Mountain, on the north edge of the field, and the same rocks, though much crushed and distorted, are exposed

also at the entrance of the gorge of Miller Creek, about a mile north of the railroad at Max Meadows. At both places these rocks dip to the south, but in the outcrop nearer the town they are overturned, as shown on Fig. 3.

Reed Creek Field.—The Reed Creek field (F) includes a rather narrow belt of outcrop of the Price sandstone along the south slope of a ridge known as Little Walker Mountain or Brushy Mountain. Because this field lies on the flank of the same ridge that carries coal in Montgomery and Pulaski counties many think that it is the westward extension of the Little Walker Mountain field (C).

The Little Walker Mountain field of Pulaski County ends in a synclinal point near the old Altoona coal mine, and the conglomerate that forms the lowermost bed of the Price formation has been traced definitely to an end on Little Walker Mountain, near the head of Crockett Cove. The Price formation comes in again near the Wytheville-Bland road, probably by the westward plunge of the synclinal axis, and there is a distinct interval in Crockett Cove, on Little Walker Mountain, in which there are no Carboniferous rocks.

Although the Price formation is exposed in Crockett Cove east of the Bland road, no signs of coal appear nearer than a point about a mile west of this road. Here the coal has been opened on the head of Goose Creek within 100 ft. of the edge of the limestone, which, as shown in Fig. 2, is faulted against and upon it.

BED 13 FT. THICK AND PITCHING 45 DEG.

From the prospect noted above the outcrop can be followed westward by means of old prospects in almost every ravine, but the coal is exposed at only a few places. Recent work done on a prospect belonging to Dr. John P. Graham, northwest of Queens Knob, where the coal bed dips 45 deg. south, has produced a considerable stockpile, and an analysis of a selected sample of this coal is given in the article entitled "Can the Valley Coal Fields of Virginia Compete with Those of the Anthracite Region?" which appeared in last week's issue of *Coal Age*, but the percentage of ash in this analysis probably is much less than it would be in a sample representing the entire bed. Doctor Graham reports that at the lowest point attained in the prospect the coal bed has a thickness of 13 ft., between well-defined walls. Unfortunately the prospect is caved, and the coal bed can no longer be seen.

West of Reed Creek the old prospects are in bad condition, and at only one locality, near the western extremity of the outcrop, was it possible to see the coal in place. At the C. C. Brown prospect, near the head of Mudlick Creek, a measurement shows that the coal bed becomes thinner toward the west, and a sample of coal obtained at this place indicates that it is of poorer quality than that to the east.

At the head of Mudlick Creek the outcrop of the coal bed swings to the south and is cut off or concealed by the fault. No coal is reported from places west of this locality, though the lower part of the Price formation outcrops nearly as far west as Bear Branch, 5 miles east of Marion.

In this field the movement thus produced within the coal bed has ground much of the coal nearly to powder and crowded some of it into great masses or squeezed it out altogether.

Bland County Field.—The coal beds of Bland County crop out in a narrow belt on the south slope of Brushy

Mountain. The coal beds continue southwestward into Smyth County.

In the Bland field the coal crops out at many places, but the coal beds seem to be thin and to have many partings. Two samples that were analyzed contained nearly 50 per cent of ash, and therefore they cannot be considered a source of fuel either now or for a long time to come.

Other Fields.—Coal beds of the same geologic age as those just described are found in other counties of Virginia, but most of them are so thin and so poor in quality that they are at present valueless.

Carnegie Institute Will Investigate Coal-Mining Problems

Studies of certain practical details of coal-mining practice will be conducted by six fellows to be appointed by the Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa. They are part of the co-operative mining courses of that institution in which the Pittsburgh Experiment Station of the U. S. Bureau of Mines and an advisory board of mine operators and engineers collaborate. The fellowships, which carry an emolument of \$750 a year of ten months' duration, are open to the graduates of colleges, universities and technical schools who are properly qualified to undertake research investigations.

Four of the fellowships are financed by the Carnegie Institute of Technology and two by coal-mining companies of western Pennsylvania. The following subjects have been suggested for investigation:

(1) GEOLOGY—(a) Correlation of coal seams by microscopic characteristics; (b) Colloid chemistry and the constitution of coal; (c) Microscopic study of the coking constituents of coal.

(2) ACID MINE WATERS—(a) Selection and performance of equipment for handling such water; (b) Action of such water on concrete and protective linings; (c) Analytic test for corrosion.

(3) COAL MINING—(a) Efficiency on blasting coal; (b) Possible substitutes for wood in mine timbering; (c) Friction losses and efficiency in mine ventilation.

(4) COAL WASHING—(a) Wet and dry methods; (b) Utilization and disposal of washery waste.

(5) UTILIZATION OF COAL—(a) Smelting qualities of coal; (b) Determination of comparative rate of carbonization of gas coals; (c) Combustion of low-volatile bituminous coal in house-heating furnaces.

(6) SAFETY AND EFFICIENCY—(a) Electric trailing cables used on portable motors and reel locomotives; (b) Carbon-monoxide indicators and their adaptability for mining and metallurgical uses; (c) Efficiency of dust-collecting instruments; (d) Rock dusting; (e) Humidification of mine air.

(7) COAL STORAGE—(a) Laboratory tests of relative tendency of coals to fire spontaneously; (b) Effects of size on deterioration in storage; (c) Maximum safe storage temperature.

(8) MINE EXPLOSIONS—(a) Modification of Stoke's law for settling of coal dust; (b) Time-pressure relations in dust explosions; (c) Conductivity and specific heat of coal; (d) Static charges in coal mines; (e) Effect of electric field in propagation of explosions.

The fellowships will begin Aug. 18, and applications must be made prior to May 15.

Is Your Tax Bill Too Heavy?

Your Taxes May Be Much Reduced if Higher Than Those of Companies Having Like Earnings

A Heavy Tax on Low Production May Put a Coal Operator at Great Disadvantage—The Unfair Impost May Be Due to Excessively Large Loans, Low Valuation of Property or Other Abnormal Conditions

BY GEORGE C. WILLIAMS*
Tax Consultant, New York City

MANY coal-mining companies have greatly overpaid their federal profits taxes in 1917 and subsequent years through lack of knowledge of the special relief provisions of the various revenue acts. As a result these companies are placed at a serious disadvantage in competing with representative concerns.

In support of the contention that such undue payments have been made tax data on a few coal companies have been listed in Table I, the figures being drawn from the 1917 statistics on coal-mining companies as prepared by the Bureau of Internal Revenue and found in Senate Document No. 259, Corporate Earnings and Government Revenues, Pages 130-133, inclusive. This table not only indicates the gross disproportion between the profits taxes paid by representative coal companies but also the fact that unless the concerns paying the higher rates of profits tax are granted relief under the special relief provisions exceptional hardships will be imposed.

Where a company was organized many years ago and bought its coal at a low price it will find the tax as ordinarily calculated far higher than would be paid by a company which bought its lands at a later date, because its valuation will be far less. Only the special relief provisions can rectify that abnormal taxation.

Company No. 17? (3) Is there any way under the tax laws that Companies No. 2 and No. 18 can obtain relief from their excessive taxes?

Some of the reasons why Companies No. 2 and No. 18 pay excessive taxes and the means by which they can obtain relief from this exceptional hardship will be discussed in detail in the following paragraphs.

Briefly, a domestic concern, in order to be entitled to relief under these special provisions, must prove either: (1) That its invested capital cannot be determined; or, (2) That its profits tax, if determined without the benefit of the relief sections, would, owing to "abnormal conditions" affecting its capital or income, work upon it an exceptional hardship by reason of having to pay a profits tax that is in excess of the average profits

tax paid by normal representative concerns.

The average profits tax is determined by comparison with representative concerns. The following example outlines in a general way the method of arriving at the average tax.

Assume Company A has a net income of \$100,000 and pays a profits tax under Section 326 of \$65,000. Abnormal conditions have been proved under Section 327. Companies B, C, D, E and F each have an average net income of \$100,000 and an average tax of \$40,000—ratio 40 per cent. The tax of Company A under Section 328 would be 40 per cent of its net income, which is \$40,000.

Special relief may be obtained for the taxable year 1917 under the provisions of Section 210 of the Revenue Act of Oct. 3, 1917, and for the taxable years 1918-1921, inclusive, under the provisions of Sections 327 and 328 of the Revenue Acts of 1918 and 1921. The special relief provisions are alike in the different revenue acts except for slight differences which are not material in the coal-mining industry. Sections 327 and 328 of the Revenue Act of 1921 read as follows:

Sec. 327. That in the following cases the tax shall be determined as provided in Sec. 328: (a) Where the Commissioner is unable to determine the invested capital in Sec. 326; (b) In the case of a foreign corporation or of a corporation entitled to the benefits of Sec. 262; (c) Where a mixed aggregate of tangible property and intangible property has been paid in for stock or for stock and bonds and the Commissioner is unable satisfactorily to determine the respective values of the several classes of property at the time of payment, or to distinguish the classes of property paid in for stock and for bonds, respectively;

TABLE I—TAXES PAID 1917 BY TWENTY SELECTED COAL MINING COMPANIES

No.	Code No.	Net Income	Total Tax	Total Tax to Net Income, Per Cent
1	38	\$35,751	\$5,122	14.33
2	142	35,978	20,545	57.10
3	190	50,449	8,038	15.93
4	6	50,900	27,870	54.75
5	97	78,835	14,250	18.08
6	267	79,657	46,382	58.23
7	72	86,710	20,746	23.93
8	208	84,944	50,436	59.38
9	107	107,676	17,851	16.58
10	219	104,109	59,657	57.30
11	77	171,553	40,360	23.53
12	19	177,395	106,795	60.20
13	214	288,789	72,245	25.02
14	232	271,944	154,243	56.71
15	67	377,762	128,072	33.90
16	253	360,328	198,953	55.21
17	36	526,778	128,849	24.46
18	250	541,722	301,592	55.67
19	62	666,220	211,550	31.75
20	157	612,358	311,370	50.83

In analyzing the foregoing table many questions arise, among which are: (1) Why does Company No. 2 pay four times the tax paid by Company No. 1 on a similar income? (2) Why should Company No. 18 pay over one hundred fifty thousand dollars more than

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(d) Where upon application by the corporation the Commissioner finds and so declares of record that the tax if determined without benefit of this section would, owing to abnormal conditions affecting the capital or income of the corporation, work upon the corporation an exceptional hardship evidenced by gross disproportion between the tax computed without benefit of this section and the tax computed by reference to the representative corporations specified in Sec. 328. This subdivision shall not apply to any case (1) in which the tax (computed without benefit of this section) is high merely because the corporation earned within the taxable year a high rate of profit upon a normal invested capital, nor (2) in which 50 per centum or more of the gross income of the corporation for the taxable year (computed under Sec. 233 of Title II) consists of gains, profits, commissions, or other income, derived on a cost-plus basis from a government contract or contracts made between April 6, 1917, and Nov. 11, 1918, both dates inclusive.

Sec. 328. (a) That in the cases specified in Sec. 327 the tax shall be the amount which bears the same ratio to the net income of the taxpayer (in excess of the specific exemption of \$3,000) for the taxable year as the average tax of representative corporations engaged in a like or similar trade or business bears to their average net income (in excess of the specific exemption of \$3,000) for such year. In the case of a foreign corporation or of a corporation entitled to the benefits of Sec. 262 the tax shall be computed without deducting the specific exemption of \$3,000 either for the taxpayer or the representative corporations.

In computing the tax under this section the Commissioner shall compare the taxpayer only with representative corporations whose invested capital can be satisfactorily determined under Sec. 326 and which are, as nearly as may be, similarly circumstanced with respect to gross income, net income, profits per unit of business transacted and capital employed, the amount and rate of war profits or excess profits, and all other relevant facts and circumstances.

(b) For the purposes of subdivision (a) the ratios between the average tax and the average net income of representative corporations shall be determined by the Commissioner in accordance with regulation prescribed by him with the approval of the Secretary.

(c) The Commissioner shall keep a record of all cases in which the tax is determined in the manner prescribed in subdivision (a), containing the name and address of each taxpayer, the business in which engaged, the amount of invested capital and net income shown by the return, and the amount of invested capital as determined under such subdivision. The Commissioner shall furnish a copy of such record and other detailed information with respect to such cases when required by resolution of either House of Congress, without regard to the restrictions contained in Sec. 257.

Under Sec. 210 of the Revenue Act of 1917 and Sec. 327(a) of the Revenue Acts of 1918 and 1921 a concern's profits tax liability should be determined under the provisions of said sections where the statutory invested capital cannot be determined. This condition may arise where through defective accounting or lack of adequate data the statutory invested capital cannot be determined.

Under Sec. 327(d) a large number of coal-mining corporations are entitled to special relief. In order to obtain relief under this provision a corporation's profits tax liability must (1) be in excess of the average profits tax paid by representative corporations similarly circumstanced; (2) impose an exceptional hardship on the corporation by reason of its having to pay a profits tax that is in excess of the average profits tax paid by representative concerns; and (3) be

excessive due to the existence of abnormal conditions.

(1) It is obvious that to obtain relief under the special assessment provisions a corporation's profits tax liability must be in excess of the profits tax paid by representative concerns. As a general rule if a corporation's profits tax is excessive it is not a difficult matter to determine the abnormalities causing the excessive tax, and to obtain special relief.

It is not essential to submit with the application for special relief data showing the average profits tax of representative concerns. Such data if available, however, will give the taxpayer some idea as to whether his tax is excessive and also aid the Income Tax Unit in arriving at the average tax.

In order to determine whether a concern's profits tax liability is in excess of the average tax of representative concerns, an analysis should be made of available statistics of representative competing concerns. Each case must be considered separately and no general rules can be laid down. The following example illustrates one of the many ways of determining an excessive profits tax rate:

Assume that Company A has an annual output of 100,000 tons of coal and has 500,000 tons of coal reserves. The cost value of the coal reserves at \$1 per ton would give Company A an invested capital of \$500,000.

Companies B, C, D and E, representative competitors of A, also mine an average of 100,000 tons a year, but they have average coal reserves of 2,000,000 tons that cost \$2,000,000. The cost value of the coal reserves would give B, C, D and E an average invested capital of \$2,000,000.

It is apparent that A's competitors obtain the benefit of a larger capitalization and as a result pay a much lower profits tax, for the reason that a larger invested capital results in a lower profits tax.

(2) The profits tax as determined under Sec. 326 must impose an exceptional hardship. The term "exceptional hardship" as used in Sec. 327(d) means the hardship of inequality evidenced by gross disproportion between the tax computed without the benefit of Sec. 327 and 328 and the tax computed by reference to representative concerns specified in Sec. 328, but inequality alone is not sufficient to grant relief under Sec. 328, the inequality must be due to abnormal conditions affecting capital or income.

A gross disproportion and exceptional hardship may exist where a concern's profits tax liability on a net income of \$100,000 is \$40,000 and where the average tax paid by representative concerns on \$100,000 incomes is \$35,000. The terms "gross disproportion" and "exceptional hardship" do not mean that in order to obtain relief a corporation's tax liability must be double the average tax of representative concerns.

(3) The exceptional hardship caused by an excessive profits tax must be due to the existence of "abnormal conditions" affecting the net income or capital of a corporation. The amount of relief obtained under the special relief provisions depends largely on discovering the abnormal conditions peculiar to each case and citing decisions of the Income Tax Unit in support thereof.

The phrase "abnormal conditions affecting the capital or income of a corporation" has been defined by the

Wherever a company has borrowed much money or rents plant and equipment its taxes under the revenue acts will be excessive, except as modified by the special relief provisions which enable it to pay taxes proportional to those "of representative corporations engaged in a like or similar trade or business."

Income Tax Unit to include the following cases, among others:

(a) Where a corporation is placed in a position of inequality because of the time, or manner of organization. An illustration, of one of the numerous abnormal conditions coming within the scope of this definition, is as follows:

Company A was organized in 1905 and acquired coal lands containing 2,000,000 tons of coal at \$1 per ton. On Jan. 1, 1918, there remained 1,000,000 tons of coal and A's invested capital was \$1,000,000.

Companies B, C and D acquire similar coal lands on Dec. 31, 1917, containing an average of 1,000,000 tons of coal at \$2 per ton. The average invested capital of B, C and D is \$2,000,000.

A, B, C and D each mine 100,000 tons of coal and each makes a profit of \$100,000. A's tax would be excessive compared with B, C and D for the reason that A would only be allowed \$1,000,000 invested capital, and B, C and D an average invested capital of \$2,000,000 on similar net incomes.

Company A would be entitled to relief for the reason that it is placed in a position of inequality because of the *time* of organization. In this example A would also have an abnormal condition affecting net income for the reason that B, C and D would be allowed a depletion rate based on Dec. 31, 1917, values, whereas A, at best, could obtain only a depletion rate based on March 1, 1913, values. No recognition is given to the fact that under the statutory provisions of the law, A had capital unproductively invested in the 1,000,000 tons of coal since 1905. The only way these inequalities can be removed is under the special relief provisions.

(b) Where the capital employed, although a material income-producing factor, is small, or a large part borrowed. One of the many examples of this abnormal condition in the coal mining industry is as follows:

A operating a mine valued at \$1,000,000, composed of coal reserves valued at \$800,000 and a plant valued at \$200,000. A rents the plant and pays a nominal rental. The coal reserves were acquired by the payment of \$100,000 cash and a mortgage of \$700,000. A's statutory invested capital would be \$100,000 and he would be entitled to relief under the provisions of Sec. 327(d) for the reason that the capital employed, although a material income-producing factor, was in a large part borrowed. An exceptional hardship would be imposed because similar representative concerns that had no borrowed money would be allowed \$800,000 for statutory capital purposes. The rental payment in this case is analogous to an interest payment and the renting of plant or equipment results in the same abnormal condition as the use of borrowed money.

(c) Where intangible assets of recognized value and substantial in amount, built up or developed by the taxpayer are excluded from the invested capital computed under Sec. 326. This definition would include patents, trade names, good will, etc., developed by the taxpayer.

(d) Where the net income for the year is abnor-

mally high, due to the realization in one year of income earned during a period of years.

This condition may arise where the taxable net income of a corporation is the fruit of activities antedating the taxable year, or where the taxable net income is to some extent the result of capital unproductively invested in prior years. This abnormality, to a large extent, is the cause of many coal-mining companies paying an excessive tax for the reason that "carrying charges" are charged directly to operations. This also is one of the reasons why the coal-mining industry as a whole pays about the highest profits-tax rates of the numerous industries in the United States under the Federal Profits Tax Laws.

"Carrying charges" are capital expenditures made in prior years that benefit future years. Such charges accrue where assets, such as coal reserves, are carried

upon which no profit will be realized until some future date. A few "carrying charges" in the coal-mining industry may be mentioned to illustrate the principles that distinguish them:

(1) Interest on money borrowed to carry coal reserves upon which no profit will be realized until some future date;

(2) An estimated interest charge on the "owned capital," i.e., capital stock and surplus that is invested in assets upon which no profit will be realized until some future date;

(3) Development expenses.

Where a mineral deposit has a life of twenty years, nineteen-twentieths of the first year's "carrying charges" should be capitalized and amortized on a unit basis to the unmined reserves. As the federal tax laws do not take cognizance of this fact under the statutory provisions of the law, the only source of relief is under the special relief provisions, the abnormal condition in this case being caused by the taxable net income being the result of capital unproductively employed in prior years and the fruits of activities antedating the taxable year. A concrete example of "carrying charges" is as follows:

A buys with borrowed money a coal deposit containing 200,000 tons of coal for \$100,000. The interest charge is 8 per cent per annum on the borrowed money. The deposit has a life of two years, 100,000 tons being sold the first year for \$200,000 and 100,000 tons in the second year for \$200,000. Assume for the sake of simplicity that the interest charges are the only expenditures.

At the end of the first year A liquidates all the borrowed money, and charges to the first year's profits the entire 8 per cent interest payment. The following erroneous yearly statement of profits results:

	First Year	Second Year
Income.....	\$200,000	\$200,000
Depletion.....	50,000	50,000
Total.....	\$150,000	\$150,000
Interest.....	8,000	None
Net Income.....	\$142,000	\$150,000

It can be seen from an analysis of this illustration that the first year's income is understated and the second year's overstated, for the reason that the \$8,000 interest charge is a "carrying charge" to the extent

If a coal-mining company or coal brokerage firm believes that its federal profit taxes have been overpaid and are excessive, application should be made for consideration under the special relief provisions. Great care should be taken that the reasons why special relief is necessary are cited in detail together with the facts upon which such reasons are based. Where the tax has been assessed and paid a claim for refund should be filed as soon as possible to prevent the tolling of the statute of limitations.

of \$4,000 which should have been capitalized in the first year and charged as an expense in the second year. Where a corporation's taxable year is analogous to the second year in the above example the net income may be said to be the result of capital unproductively invested in prior years. A corporation that has mined in a taxable year coal that has been carried for a period of years is placed at a serious disadvantage with a concern that mines from a coal deposit with a comparatively short life.

(e) Where a corporation's war-profits credit due to an abnormal pre-war period is less than the war profits credit allowed representative concerns with normal pre-war periods.

(f) Where a corporation has paid no salaries to its officers or has paid them salaries which were unusually low in comparison with the salaries paid to officers of representative concerns. It must be proven, however, that the officers for whom it is claimed were entitled to

a salary for actually rendered services and were not merely "figureheads."

(g) Where a corporation's net income is abnormally high due to the realization of profits on the sale of capital assets. An example of this abnormality is where a corporation liquidates all or part of its business.

(h) Where proper recognition or allowance cannot be made for amortization, obsolescence or exceptional depletion due to the World War. In connection with amortization allowances the Income Tax Unit has recently held in A.R.R. 3920, Bulletin 11-29-1146 that, "Coal used in the manufacture of war materials is an article which contributed to the war."

It would therefore follow that coal-mining companies were entitled to amortization of war facilities, and that where proper recognition or allowance cannot be made for amortization, obsolescence or exceptional depletion, consideration should be granted under the special relief provisions.

Pennsylvania Coals Suited to Baking, but Need Is Not Obvious

STUDIES of low-temperature carbonization of the Pittsburgh and Upper Kittanning coals, made at the Pittsburgh Experiment Station, by the U. S. Bureau of Mines in co-operation with the Carnegie Institute of Technology indicate that the Pittsburgh bed of coal is in general well suited to that process. When carbonized at 550 deg. C. in a stationary vertical retort it will yield per ton 33 to 35 gallons of tar, 3,500 cu.ft. of 600-B.t.u. gas, 1,400 lb. of coke having 10-per cent of volatile matter, and 6 to 8 lb. of ammonium sulphate.

The other parts of the Pittsburgh bed—namely, the rooster, the lower roof and the upper roof are of similar coking quality, differing only in the quantity of by-products yielded. These decrease in the order given. The yield of tar from the upper roof is only 66 per cent of that from the regular seam, and from the rooster coal 75 per cent. The difference is largely due to the variation in the ash content of the different sections, and not to the chemical composition of the coals.

TAR YIELD OF SEMI-BITUMINOUS COAL LOW

The Upper Kittanning coal tested was not a good low-temperature coking coal. The coke was not dense, and the yield of by products was low. The particular coal coked was a semi-bituminous coal with low volatile matter and was not expected to yield much tar.

The total quantity of crude light oil suitable for motor fuel that was obtained directly from Pittsburgh or Freeport coal by distillation at 550 deg. C., and by cracking is approximately 7.1 gallons per ton, or 2.6 per cent by weight of the coal. The net refined motor fuel from the process is 4.6 gallons per ton, or 1.7 per cent by weight of the coal.

Superheated steam has an effect upon the byproducts of low-temperature carbonization. The tars obtained by its use were more viscous and contained a smaller quantity of light oils and a larger quantity of heavy oils. The quantity of byproducts obtained by carbonizing with superheated steam was practically the same as without steam. To some extent the steam prevented secondary decomposition.

Research on the low-temperature carbonization of coal has been in progress for a number of years, the main object being to produce a coke more suitable for

domestic use than the high-temperature product of the gas works and coke ovens, and at the same time to effect a higher recovery of constituents in the tar oils, according to J. D. Davis, fuels chemist, Bureau of Mines, and V. Frank Parry, research fellow, Carnegie Institute of Technology, in Bulletin 8, Coal Mining Investigations, just published by the Carnegie Institute of Technology, Pittsburgh, Pa.

Much valuable data has been accumulated, but this in the United States has not as yet led to any industrial development worth mentioning. Since the World War, investigators have been particularly active in England, where one of the main incentives is the production of fuel oil which that country would like to obtain from a domestic source. Presumably, there is also a good demand for low-temperature coke for open fires in English homes.

DEMAND SMALL FOR LOW-TEMPERATURE PRODUCTS

In Germany, during the war, research on low-temperature tar oils was carried on intensively on account of the demand for lubricants which would substitute for mineral oils. Such lubricants can be made from refined tars, and quantities of lubricants were made from that source during that period, but it is doubtful whether they are competing now with imported petroleum oils. Obviously, a definite demand must exist for low-temperature products before any extensive development of the method can be expected. The abundant supply of petroleum in the United States and a like supply of coal suitable for high-temperature coking would seem at least for a time to preclude competition of low temperature products in either field.

There is, however, a strong possibility of better utilization of waste coals and coals of inferior rank by low-temperature methods, and this phase of the subject should be a fruitful field for research. Further, the utilization of low-temperature tar oils for special purposes, as for example, for the preservation of timber, is a reasonable expectation; as is also the improvement of high-temperature coke by preliminary low-temperature treatment. These points have yet to be proved industrially practicable.

Bulletin 8, "The Low-Temperature Carbonization of Pennsylvania Coals—the Pittsburgh and Upper Kittanning Beds," may be obtained from the Carnegie Institute of Technology, Pittsburgh, Pa., at a price of 40c.

Institute of Mining and Metallurgical Engineers Take Stock of Progress

Year Has Seen Great Development in Conveyor Mining, Flotation of Coal in Quicksand and Dry Cleaning of Coal—New Light on Rock Dusting—Foreign Lights Illuminate Domestic Problems.

With only a few coal-mining company officials present to discuss the able papers presented and read, the American Institute of Mining and Metallurgical Engineers held at the Engineers' Societies Building, New York City many eventful sessions during its 129th meeting, Feb. 18-21. Several sections were continually in progress and plenty of entertainment was provided to fill the evenings, recesses and the final day.

The first evening was enlivened by a smoker with radio and slide hits at the institute's officers. Only with difficulty could the crowd be accommodated. The radio proved its ability to give vent to mysterious raucous sounds, finally announcing that President Mathewson was needed in the cloak room as his stored apparel was leaking. A clever trickster discovered a hare down Secretary Sharpless' back, and explained the art of jugglery most satisfactorily, only to mystify the crowd by performing the feat in an entirely different and inexplicable way. A film explaining radio and one portraying a fierce and combative mouse were other features. Harlowe Hardinge exhibited the music obtainable by bending a common hand-saw and stroking its edge with a fiddle bow. If you think this an easy trick, just try it before you make up your mind.

MEMBERS IN CANADIAN MOVIES

On the evening of Tuesday, motion pictures taken by the Ontario government of the trip of the institute through Toronto and the mining regions of that province were presented, several of the members recognizing themselves and their friends on the shining sheet. The films have been presented to the institute by the Ontario government. Lantern slides and motion pictures exhibited also an eventful fishing trip in Canada and two men undertaking, at different times, to ride on a moose as that animal swam in one of the lakes of the North Country. Neither ride was long, nor was the ending of it graceful, but the narrator's story and the pursuit in a canoe as portrayed on the screen was worth traveling a long way to hear and see. A snow-packing roller with wheels built like big screws showed how it is proposed to "mush" in northern latitudes where the removal of the snow is not possible. A buffet lunch and a dance concluded the evening's entertainment.

Wednesday evening ushered in the annual dinner in the Waldorf-Astoria with J. V. W. Reynnders as toastmaster and E. P. Mathewson, the retiring president; William Kelly, the new president and Dr. R. V. Wheeler, Director

of the British Safety-in-Mines Station, as speakers. The James Douglas medal was presented to C. W. Merrill as recognition of his work in cyanidation and other forms of metallurgical practice.

On Tuesday morning the annual business session was held in the auditorium. The report of the secretary showed a shrinkage in membership of 285, reducing the roll from 9,413 to 9,128. The gross loss of membership was 960, of which 173 was a loss by resignation, 78 by death and 709 by suspension. Many foreign members resigned owing to the burden of meeting the dues resulting from the decline in the value of currency in the countries in which they lived. Of the 9,128 members, 18 are honorary, 6,956 full members, 839 associates and 1,315 junior associates. Three past presidents died during the year 1923—Robert W. Hunt, Horace V. Winchell, and Albert R. Ledoux; Edwin M. Ludlow dying in the present year.

The treasurer reported gross receipts of \$208,433.04 and gross expenditures of \$198,036.14 and a valuation of assets of \$725,062.89 of which \$141,031.37 was in various funds, \$41,993.01 in cash and \$5,940.02 in paper on hand.

WILLIAM KELLY NAMED PRESIDENT

The tellers announced through the secretary that William Kelly, of Vulcan, Mich., was elected president; E. L. De Golyer, of New York City, and C. W. Merrill, of San Francisco, vice-presidents and directors. The directors elected were R. V. Norris, Wilkes-Barre, Pa.; G. O. Smith, Washington, D. C.; P. B. Butler, Joplin, Mo.; B. D. Quarrie, Cleveland, Ohio, and L. D. Ricketts of Warren, Ariz. Both the amendments to the constitution received almost unanimous adoption, that to Art. II, Sec. 2, receiving 1,719 favorable to 194 unfavorable votes and that to Art. III, Sec. 3, receiving 1,484 ayes to 424 noes. About 50 unmarked ballots were thrown out in each vote. About a third of the membership voted on the Mellon taxation plan, 98 per cent being in favor of its adoption.

H. A. Wheeler advocated a reduction in the number of directors, the replacement of short monthly board meetings by quarterly sessions of longer duration and the payment of directors' traveling expenses, but several directors mostly from New York spoke against the change. R. A. Parker, of Denver, Col., wanted the board to be elected locally and not at large even though the country is districted and directors have to be chosen in certain numbers from each district.

A large number of members attended the excursion on the last day to the Bethlehem Steel Works. They were

shown the 424 Kopper ovens, each of a capacity of 13½ tons consuming 7,000 tons of coal daily and producing 5,000 tons of coke, 45,000,000 cu.ft. of gas, 175,000 lb. of ammonium sulphate, 50,000 gallons of tar and 18,000 gallons of light oils. Five kinds of coal are used in these ovens after mixing. They visited also the blast furnaces of which there are seven at the Lehigh plant, the mixing plant and two 200-ton basic tilting furnaces. The visitors also saw the rolling mills and were entertained by the Steel Works at a buffet lunch.

European Methods Contrasted With American

George S. Rice, in the principal address of the first session of the joint committees on Coal & Coke, Ground Movement & Subsidence, compared the method and conditions of the European collieries with those of America, using many lantern slides to illustrate his remarks. His first picture showing the Wemyss (pronounced Weems) Colliery showed how close some of the mines were to tidewater; so close in fact, as to make a railroad almost unnecessary. Mr. Rice said that in Great Britain and in Europe generally the coal did not seem to have the bone which makes the washing of coal such a difficult undertaking in the United States. Washers that give good results in Great Britain might not serve as well here.

In Great Britain the dump must be at least 80 yd. from the head of the shaft, Mr. Rice said. In France, Belgium and Germany as also in Great Britain steel arching was preferred to concrete wherever the pressure of the roof was extreme. It had the advantage of flexibility. In the latter country, at least, corrugated iron had been used for lagging, this on the suggestion of the Henry Louis.

DUSTING NOT COMPULSORY, BUT USED

A slide showed a chalk stripping in France where chalk was being mined for grinding into dust for use in immunizing the mines from explosions. The chalk contains many flints. These are not crushed but separated from the chalk and used for road material. Rock dusting is not compulsory in France but is quite generally used, nevertheless.

Mr. Rice also showed some oil mines in Alsace. In earlier days mines had been opened in the oil shales but the accidents had been so frequent that they were abandoned. Later the shales were drilled and a part of the oil abstracted in that manner. When the oil thus obtainable had been extracted

mines again were opened. The drilling had reduced the gas pressure and with good ventilation, it was possible to work them safely. The roof and shale were extremely rotten and in some mines it was necessary to board up the working face except where the shale was being removed. In others, forepoling only was required, but the work was quite difficult and expensive.

Narrow passageways were driven through the shale and the oil seeped out and ran in channels underneath the track to the shaft where it was pumped to the surface. The risk of explosion was naturally greater than in coal mines and the use of picks was forbidden for it was feared that they might spark and ignite the gas. The rock worked hard on the face but broke easily when released from the mass. Every precaution had to be taken for the gas had a much lower explosive limit than methane. The Germans opened the mines but the French were now continuing their operation. Mr. Rice said that it was the intention to remove all the shale so as to give an opportunity to recover all the oil.

The speaker also showed several of the destroyed and renovated mines and explained how the shafts were repaired by cementation, diving bells with peep holes in certain instances being lowered into the water from which to observe the condition of the walls of the shaft. He also showed some liquid-oxygen blasts in quarries, explaining that these explosives had been used in coal mines by the Germans.

It is believed that they had many explosions from this cause, but as they occurred during the war, no word of them reached the public. He said that they should not be used in underground coal mines as they gave out much flame. He added that sometimes powdered coal was used with the liquid oxygen as the material the oxygenation of which produced the blast.

At the opening of the meeting, H. Eustace Mitton, member of the Council of the (British) Institution of Mining Engineers was introduced by the chairman, Howard N. Eavenson, and made some remarks. Dr. R. V. Wheeler, Director British Safety-in-Mines Station at Eskmeals, Cumberland, England, detained by an investigation of a recent disaster, was unable to be present.

Subcommittees on Industrial Relations Report

During the year 1923, according to B. F. Tillson, assistant superintendent, New Jersey Zinc Co., and chairman of the Safety Subcommittee of the Industrial Relations Section in a report made to that committee, the number of chapters of the Joseph A. Holmes Safety Association grew from 35 to 81 and probably is now between 85 and 90. These chapters are distributed through the mining camps of some fifteen states in this country.

Although during the past year the coal industry has had nine serious disasters, which caused the death of 287 men, yet many advances have been made in coal-mine safety practices and installations, based at least to a certain extent on suggestions and experi-

ences in connection with the serious coal-mine disasters which occurred during the latter part of 1922 and the early part of 1923.

The principal causes of these major mine disasters were: The use of open lights, the use of black blasting powder, and the sparking of electrical apparatus. Open lights in three major disasters resulted in the loss of 109 lives and in three minor disasters caused the death of three and the injury of 21 other men. Black powder caused in two major and three minor disasters the death of 24 men. Sparking electrical apparatus caused two major disasters and the death of 147 men.

Use of rock dust for restriction or prevention of explosions has been taken up in earnest, especially in the western states; at one mining camp alone over six miles of underground haulageway has been rock-dusted and nearly 2,000 V-troughs for rock-dust barriers have been placed at strategic points underground.

EXPLOSIVES REDUCED 25 PER CENT

Permissible explosives have been substituted in a number of mines for black powder; mines which had been blasting with miners on shift are now restricting blasting until the end of that working period; other mines which were blasting after the main shift, but had permitted the holes to be loaded by miners while on shift, have adopted the practice of not allowing any explosive in the mine during the regular working hours, the holes being both loaded and fired after the shift. Some coal mines have adopted a system of air spacing in blasting holes with intent to increase the percentage of lump coal and decrease the quantity of slack and of dangerous fine dust sent into the air. The result has been very satisfactory as the objects outlined have been accomplished and at the same time the quantity of explosive has been reduced 25 or more per cent.

Some coal mines are experimenting with the use of storage batteries, not only for gathering purposes, but also for main haulage and for undercutting machines, the intent being to remove electric power wires from the mines, or at any rate, from the vicinity of the working places.

Sprinkling systems for the wetting of mines have been greatly extended. In 1923 one company laid nearly 35 miles of water lines underground for sprinkling purposes. Every working place in these mines has its water line and is provided with about 20 ft. of rubber hose, the man working at the face being required to wet the coal before shoveling it into the car and also to sprinkle the top of the car when loaded.

The practice of using a water spray on the cutting chain of shortwall undercutting machines in coal mines has spread rapidly and not only makes the air of the place practically dustless while undercutting, but also makes the dreaded "bug dust" harmless. In fact the wet "bug dust" helps to kill the dust from subsequent blasting and shoveling.

A new permissible electric cap lamp has been placed on the market and its lighting capacity is said to be equal to that of the ordinary carbide light. It

has the advantage over the carbide lamp that without attention it furnishes light throughout the entire shift. This lamp may replace open lights in both coal and metal mines as it will not cause fires or explosions and it gives better light than other safety lamps, and at least as good as ordinary open flame lamps, and does not require attention during the shift.

A number of coal mines have removed from use all flame safety lamps except those magnetically locked and equipped with automatic or friction igniter.

For use as auxiliary power for main fan operation in case of failure of the primary power, gas or kerosene engines are being placed in such manner that the auxiliary power may be applied to this fan within a very few minutes after interruption of primary power. One coal company has created a new position not only giving the experienced mining man, who has been appointed, charge of safety work but also full operating authority. Hence he has power to enforce immediately such action as he sees fit to recommend as needed to assure safety.

Among the numerous activities of the U. S. Bureau of Mines as to health and safety in mines the following may be mentioned:

Ventilation and dust studies were continued in metal mines and extended into coal mines and much interesting data collected as to the effect of various kinds of dusts (silicious, non-silicious, coal dust, or a mixture of coal and rock dust) upon health. Also, a study was made as to the effect upon underground workers of practically continuous breathing of small quantities of carbon monoxide.

NEW DUST SAMPLER INVENTED

A new method was developed for the sampling of dust from air with special applicability to mine air in coal or metal mines. The instrument is called the Impinger and its principle is the forcing of the air samples through a fluid, thus filtering the dust out of the air and leaving it in the fluid where it is available for later analytical work.

An extended study was made, in underground openings, of frictional coefficients in connection with air flow under various conditions. The U. S. Bureau of Mines also instituted during the year what is known as Safety Service work under which bureau engineers, after making mine inspections, furnish confidential written reports to the operator embodying the conclusions of the engineer as to the condition relative to safety with recommendations as to betterments.

Arthur Notman, consulting engineer, of New York City, reported for the subcommittee on Employment and Industrial Organization, setting in action a lively discussion on immigration and of the proposed law for the further restricting of the entry of aliens. B. F. Tillson declared that the industries of the United States, judging from past records of immigration, were at least 1,500,000 men short of these requirements and added that the law, by admitting more Northern Europeans, was not providing for any relief; for none of these men would perform common labor. He saw no hope except in the

raising of wages to such a level that the man who labored with his hands would be better paid than the man who was engaged at brain labor. Some questioned whether the Southern Europeans were inferior in any way to the Northern and said they were more desirable because inured to labor. Those Europeans who had neither Asiatic nor African admixture in their blood were capable of becoming citizens of great value to the country though they might be below our educational standards.

E. A. Holbrook, Dean of Mining, Pennsylvania State College, made a report on education for the subcommittee, of which he was chairman. This report, made partly to "sell" the advantages of safety to the American Institute of Mining and Metallurgical Engineers, was a masterly study of the economics of mine accidents and is well qualified to "sell" the safety idea to those who do not yet realize its importance as an engineering study in mine operation. It will be published later in *Coal Age*.

SAVINGS IN COMPENSATION

In brief, it showed that if rates for compensation as high as 2.1 per cent of the total cost of operation were reduced to 0.91 per cent the difference in cost between the extremes at a mine employing 500 men would be about \$17,000 per year. He added that the average time lost owing to temporary compensable accidents in Pennsylvania alone was equivalent to 899,958 man-days. "This means," he said, "that 3,600 men are supported constantly who are doing no work."

Dr. R. R. Sayers, chief surgeon, U. S. Bureau of Mines, was not present but sent a paper entitled "Observations on Health Conditions in Mines of Foreign Countries. Most of his references were to diseases and conditions found in metal mines. He said, however: "In view of the health hazard due to breathing silicious dust, the question of safe rock dust is much discussed in Great Britain.

"Mortality statistics of workers have been carefully studied. On the basis of these studies, certain dusts have been found to be relatively harmless, at least no more harmful than coal dust, all investigators being agreed that limestone dust is the safest, especially if it contains a percentage of magnesium. Shale dusts of varying composition are used in some coal mines for dusting purposes without apparent harm to the men exposed.

"Animals have been subjected to various types of dust and the effects noted. Dr. A. Mavrogordato, of South Africa, believes that it is possible to determine the relative safety of breathing a given dust within three months by animal experimentation. Dr. W. E. Guy, of London, thinks that the time required would be at least one year. However, they use different methods and the time for reaction might vary accordingly."

As to fatigue, Dr. Sayers said: "Dr. C. S. Myers, of the National Institute of Industrial Psychology, states that he has been able to decrease the fatigue and increase the efficiency of coal miners by training the men to use the pick properly. Dr. Myers advises a

slower stroke in picking coal but a faster stroke in picking down hard stone." Sidney Rolle, U. S. Metals Refining Co., Carteret, N. J., presided at the meeting.

Ways of Lowering Mine Costs And of Bettering Coal

Mining by the "V" system was described by Glenn B. Southward, chief engineer, West Virginia Coal & Coke Co., at the Coal meeting held under the chairmanship of Howard N. Eavenson, consulting engineer, Pittsburgh, Pa. *Coal Age* has so completely described this method in an article which appeared Feb. 7 on pages 197-203 that much further elaboration is not needed. Mr. Southward said:

"The design was perfected in the summer of 1921 by myself, and a trial face was started in December of that year. This was intended mainly as a test on the mechanical equipment and a preliminary experiment on roof action. During these experiments, development was started for the "V" system but because of the six months' interruption by a strike, mining on the "V" faces was not begun until late in 1922. The trial's on the "V" system continued through an experimental period of several months and by March, 1923, we were convinced that an operating system had been devised. Since that time no changes have been made except in details. These were introduced to increase efficiency and reduce cost.

STRAIGHT FACES WERE FAILURE

"During the experimental period straight faces were tried but they failed. The first trials on the "V" system were with faces 100 ft. long and a central angle of 90 deg. This made a span of 160 ft. from point to point. With these dimensions the beam effect was not obtained; the span was too great and the roof action was practically the same as when straight faces were used. It was some time before this fact was fully accepted, because it was always possible that the failures on the 90-deg. angle were caused by ineffective timbering or improper methods. Several procedures were thoroughly tried; these involved different sizes and spacing of posts, cribs and packwalls, also different timing of roof falls. Falls over large areas and over small were duly tried, but the results were practically the same in every case—the top fell inside the points and along the faces."

Speaking about falls which trespass on the working faces Mr. Southward said, "The falls do not generally come to any extent within the points, except where the top is weak. As such times, the face conveyors are shortened to a point of safety and mining is not interrupted. The output is decreased for only one or two days, for the faces are lengthened on each succeeding cut after the fall and soon regain their full length." He added that the first panel was close to the outcrop and that the outside faces were therefore under light cover. In consequence the roof would not span the normal width, and it was thought best to shorten this length of span by shortening the faces. This left

a narrow pillar unmined but no more coal was lost than would have been left in had the room-and-pillar method been used under similar conditions. Mr. Southward continued:

"The plan described is a combination of conveyors and mine cars, but it is doubtful if this is the most efficient or the most desirable arrangement. A plan is now under consideration, and experimental work on it is being started, to extend the conveyor system all the way to the tippie, thus eliminating all mine-car haulage. Because of the increased output per employee and the consequent reduction in the houses required, also by the elimination of all track, haulage and gathering locomotives and reducing the number of mining machines and pumps, it has been estimated that the cost of installing an all-conveyor mine should be from 25 to 40 per cent less than that required for a room-and-pillar mine of the same output. This, however, is mainly theoretical at this time."

EIGHT UNITS WORK INDEPENDENTLY

Speaking of the flexibility of the system Mr. Southward said, "With 600 ft. of working face in an area 300 ft. wide, there are eight separate operating units and an interruption on any one of these faces does not affect the operation of the others; whereas with a long single face a fall or other interruption may stop the entire output until the trouble is removed. In case a fall should occur within any angle so as to close a face completely, it would not be necessary to reopen this as the coal in the point could be recovered by lengthening the adjoining face on the next cross-entry."

In answer to questions, Mr. Southward said that on each face four or five daymen were employed. He declared there was too much waste thrown among the timbers to make their recovery economical. As to the possibility of caves should the mine operation be irregular, he said that about July 4, 1923, the mine was idle for 10 days and when work was resumed no change was observable. However, a fall had occurred just before that suspension relieving the pillars from a considerable part of the weight. A fall is made every 60 ft. He could not say what would happen if a fall were left hanging when work was suspended. It would not be good engineering to permit this to happen. The mine runs on a two-shift basis, the coal being loaded in the day and being cut and shot at night.

PREFER MECHANICAL PRECIPITATION

Ray W. Arms then read a paper on the "Dry Cleaning of Coal" for which no space is available for reprinting at this time. The paper is well worthy of publication and will appear in an early issue of *Coal Age*. Mr. Arms frankly admitted that difficulties had been experienced at McComas, W. Va., in the sizing of the coal and in the collection of dust similar to those detailed by Frank Young in a paper describing the brilliant plant at Raton, N. M., published in *Coal Age*, May 17, 1923, pp. 791-797. These difficulties have been overcome. The air-cleaning machines at McComas and Wyco, W. Va., have a

larger capacity than those at Raton. The reduction of ash in coals of various regions has varied from 46 to 64 per cent, No. 2 buckwheat from the Pennsylvania anthracite field having exhibited the larger reduction. The ash which was 18.7 in the crude coal becoming 8.5 per cent after treatment. Mr. Arms said that Mr. Nesbitt, of Pittsburgh Pa., had favored electrical precipitation of the finest dusts but after investigation had decided that mechanical precipitation by baffles was preferable.

E. M. Chance described the Chance system of cleaning coal by floating it in a quicksand maintained at a given density. He advocated the crushing of the rejects from one flotation tank and their washing in another so as to prevent clean coal being lost by being dragged down by bone or slate. The coal could be crushed in its entirety but that would prevent the production of any coarse coal and add unduly to the sizes under $\frac{1}{8}$ in. that cause the formation of slimes which it is hard to separate from their interstitial moisture.

Accident Reduction Sought in Forum with Safety Council

Three notable addresses on safety in mining occupied the joint session of the Industrial Relations Committee with the Mining Section of the National Safety Council, Feb. 19. R. Dawson Hall was chairman. Among these papers, that by W. W. Adams on "Mine Accident Statistics" was perhaps the most important. Mr. Adams has combined the reports made by members of the National Safety Council in a series of tabulations giving far more detailed information, perhaps, than previously has been available. Certainly, it has this transcendent importance that it stretches across state lines and so combines the experience of many fields.

This paper will be published in *Coal Age*. It shows, what may not be universally true, that the haulage hazard is greater in the rooms than on the haulage roads. As the chairman declared, the figures lead to the conclusion that the gathering hazard is greater than the main-haulage risk. It seems possible that there will hereafter be less gathering by mules and locomotives. When coal is brought by conveyors to the main roadways this hazard will be eliminated, and as it shows itself to be extremely important its eradication will be a great gain for safety.

When B. F. Tillson at the autumn meeting of the National Safety Council suggested that the cars might be kept in the main roadways, thus making a car with a larger wheel base feasible in accord with A. J. Hoskins' suggestion, he probably did not realize how close the development of the conveyor brought that improvement. A few short months have convinced the industry that conveyors are well justified and a notable reduction in the gathering hazard may result. Cars, as the chairman said, may not have to be uncoupled either in the mine or indeed outside of it provided the rotary-dump or the bottom-dump car is introduced. Fur-

thermore, larger cars on straighter tracks may have a larger wheel base and may be equipped with better brakes. Is it too much to hope that they may be actuated by air, which will come into action at the will of the motorman, or if a car or cars become uncoupled? Better haulage conditions may result; more than counteracting the increase of hazard from that source which recent years has shown. In fact, here again, better engineering and greater economy will mean increased safety.

Speaking of the gas and dust explosion hazard, John T. Ryan said that in the northern field of France not a single man had even been burned by a gas explosion since 1917, showing an almost unbelievable progress in the avoidance of the explosion hazard. Dean Hollbrook asked Mr. Greensfelder if fuses could be so arranged that they could not be cut off at improper lengths. Mr. Greensfelder believed that this would be difficult. Furthermore, he said that it would have to be taken up with the fuse companies, fuse not being manufactured by powder firms. It was suggested that the coal companies sell the fuse in suitable lengths for blasting. The chairman thought that this might make matters worse, compelling the man who wanted to use a "skin-em-back" to use a half length which might be shorter and more risky than the length he would otherwise use. R. N. Hosler suggested that the use of fuse be abandoned entirely, and J. J. Walsh declared that electric batteries soon might be required by law in Pennsylvania mines, the increased safety more than compensating for the cost.

MAGNETIC ROPE TEST COMPLICATED

R. L. Sanford read a paper on "Magnetic Investigations of Hoisting Rope," saying that the purpose was to test the rope by some simple magnetic method as it traveled up the shaft. Unfortunately, the rope was under strain in the act of hoisting and that strain varied with the position of the rope in the shaft and with the acceleration or retardation of the cage. As the magnetic qualities varied with the strain and changed sign during an increase in load, and as parts of the rope might be in strain as laid in the rope and released from strain when the rope was stretched, the subject was quite complicated and not to be settled without careful investigation, which he was making in the hope that some way out of the difficulty might be found.

He said in answer of W. R. Chedsey that electrical resistance was a poor way of determining the condition of the rope, for it varied with the contact between the wires in the strand and the lubrication. The current had to cross between the strands and a well-lubricated rope might behave like one that was severely rusted. Mr. Chedsey asked Mr. Sanford's opinion as to the use of high-frequency currents in rope testing, and the latter replied that with such frequencies there was what is known as a "skin effect," the current tending to follow the outside of the rope which was just the reverse of what was desired. We can form visually some idea of the condition of the exterior of

the rope, but of the interior we know nothing till we cut and destroy it.

H. Foster Bain's paper on "The Bureau of Mines' Work for Safety," read in his absence by T. T. Read, brought out the fact that our keen desire for industrial accident-prevention work was consequent on the amelioration of the other hazards of life. This had brought out in bright light the dangers of industry. When sixty million men died from smallpox in Europe in the limits of a single century (the Eighteenth), when murder was so common that men shook hands with the idea of disarming an appearing friend but possible enemy, no one but the victim cared much about a chance accident or death that might happen as a result of the careless actions of some fellow worker or employer. "Industrial hazards," said he, "now come out in relief just as the candle shines when electric lights are turned off."

ACCIDENT RELIEF CONSIDERED

Mr. Bain said that the desire was universal to "do something" about mine accidents. The work of the Bureau was to ascertain what that "something" should be. He said, "Under our system of dual government, regulatory powers in the mines rest with the states but, where prior to formulating regulations, extensive and expensive research in technical matters is required, there is obvious economy in the states acting through the Federal government, and thus avoiding duplication and disagreement. The Bureau spent approximately a quarter of a million dollars in its five years' work at the experimental mine on dust barriers. Obviously it would be poor economy to have each of the 29 coal-mining states duplicate this work, and though the amount spent may seem large it is to be remembered that the property damage alone in one coal-mine explosion is often larger."

T. T. Read then read his paper on "Mental Hygiene in Industry." He remarked in his summary "that the engineer will not have attained the full measure of a man until to the fairly complete mastery he has attained over mechanical forces he had added a corresponding degree of mastery over the other, less measurable but no less potent forces that act on human beings who are the most important factors in industry."

In the round table which followed, Mr. Pallister declared that inquiry should be made into the possibility of radio causing the premature explosion of blasts, such explosions having been caused a quarter of a mile from a high-power radio station.

What Australasia May Teach

Fresh from a sojourn in Australasia, Dr. A. J. Lanza, at the final session of the Industrial Relations Committee, gave an interesting account of labor conditions in Australia and New Zealand where the workers intent on governmental operation of all industry deliberately seek to make operating conditions unbearable with the idea of forcing government ownership.

Strikes are deliberately arranged, not for the correction of grievances actual

or imagined, but solely for their effect on the morale of the management; here today, there tomorrow and at a third mine the next day. The antagonism between labor and capital has reached a chronic stage.

Doctor Lanza said that only two plants had attempted industrial relations work, but it had been successful where introduced. He emphasized the importance of studying the historical background of these disagreements and believed that the conditions in Australia were the outcome of long inherited antagonisms. It is not to be supposed that the larger mines lacked change houses or favorable working conditions. The metal mines certainly took good care of their men, taking temperature readings and dust counts and providing excellent circulation of air. That could not be said of the coal mines, which, strange to say, in Australia lagged behind the metal mines, doubtless because the former were smaller operations and because the metal mines had found it necessary to combat the dangers of silicious dust.

Speaking about nystagmus, Doctor Lanza said there was none of it in metal mines but the coal mines had it. J. W. Paul suggested it might come from using hand lamps and hanging them up. The glare from the suspended lamp in the darkness might cause the spasms of the eyeball, termed nystagmus, but Doctor Lanza said the lights were carried in many ways. In response to a question by R. D. Hall, he said he was not ill-disposed to believe that some germ might be the cause of nystagmus. The spasmodic movement of the eyeball from right to left and left to right was so marked, no one could suggest that the disease was one of imagination or malingering.

REPRESENTATION NOT NECESSARY

Robert E. Tally's paper was read by Arthur Notman, the chairman. Mr. Tally who is connected with the United Verde Copper Co., Jerome, Ariz., said his company had no employee's representation. "This plan," he said, "is very satisfactory for large organizations, and also for such small companies as have their work scattered over a large area. However, there are conditions under which such a plan is not necessary."

L. K. Silcox, of the Chicago, Milwaukee & St. Paul R.R., not being present, his paper was read by Sidney Rolle. He laid emphasis in this paper on the historic development of the labor unions through the merchant, craft and yeoman, or journeyman guilds. He declared that "many lessons and inferences might be drawn from the industrial evolution of England, not the least of which is the utter futility of legislative action as a means of augmenting a change, and that open rebellion or forceful reaction has but slight influence upon the general trend, for it is a recognized fact that great national crises have left but slight impress on society, while important changes have taken place slowly and by almost imperceptible development." That is to say, only the history of evolution, not the history of events, counts in the life of the race.

Opportunities for Mining Engineers Canvassed

What changes in the mechanical equipment of collieries will do to advance the interest of the mining engineer in coal mines was the subject of R. Dawson Hall's address at a joint meeting of the institute with the Mining & Metallurgical Society of America, held under the chairmanship of B. B. Gottsberger, of Yale University.

After detailing the revolutionary changes sure to arise from the introduction of the conveyor and the mechanical shovel, Mr. Hall said, "Clearly where such changes are taking place, there is room for men who have an ability to grasp new ideas and practices and to perfect them. The 'Cousin Jacks' of metal mining have their duplicates in the coal industry, and unfortunately the latter industry has never had the benefit of the extensive introduction of technical graduates which has marked and modified the development of metal mining. Most of the colleges are laying more stress on metal than on coal mining, though there is probably equal opportunity in both. It will be almost impossible to make a successful rebirth of the coal industry without a large incursion of technical men."

FOREIGN MINING NOT HOPEFUL

T. W. Finch spoke about the "New Fields for Mining Engineers in Foreign Countries," but was not particularly hopeful. In China, Americans are soon replaced by native technicians, who may not devise new methods, but can adopt those already in operation. In Russia and Siberia, Americans are welcome to operate the properties that local capital cannot handle or which local opinion regards as of dubious value. Coal is China's chief asset, but already many companies are in the field.

L. W. Mayer, a banker, discussed "The Engineer's Relation to Bankers." He said that the engineer had as yet neither properly evaluated his services nor was he duly valued by the investment world. When advertisements for bond issues were published, the lawyer's approval of their legality appeared but the engineer's name did not appear. The engineer in fact was usually not well enough known to carry due weight with the public.

He declared that the banker engaged the attorney without inquiring his charges; whereas when he looked for an engineer he shopped around and took care to see he got the lowest figure. The lawyer's fee he regarded as a charge he must prepare to meet, however high. The engineer's fee was something he could beat down to the lowest figure. In fact, the engineer entered the industry mainly because it appealed to his lust for adventure and travel and the lawyer because the profession promised lucrative reward.

The engineer's judgment was as good as the lawyer's or the banker's especially as to his part, the cost of the plant, but he usually failed to consider the overhead, the cost of legal advice and of getting the capital and the heavy charge for interest between the

time of acquiring the capital and arriving at the estimated production.

N. C. Rockwood urged in his paper the needs of the rock-products industry for engineers who would study its problems as carefully as engineers had studied those of coal and metal mining and metallurgy. Even the sand business needed geological, mechanical and marketing study.

Who's Who in Safety

What the foreman and the workman can do to vitalize and drive forward a safety movement was emphasized by two speakers at the final session of the Industrial Relations committee, Feb. 20. At this meeting, Sidney Rolle presided. The first paper, entitled the "Vital Factor in Industrial Relations," by G. M. Gillette, was read by Mr. Rolle. The author pointed out that in all industrial organizations the foreman was the direct point of contact between the management and the workers. He is the go-between, so to speak, and must represent the company to the employee and the employee to the company. If he is a man of vindictive character, this fact will sadly detract from his usefulness as a foreman. If, on the other hand, he is a man of kindly and sympathetic disposition, with the ability to lead and not drive, he may become a potent factor in averting industrial strife.

INDUSTRIAL PLAN SUCCESSFUL

In discussing this paper, W. R. Webster, of the Bridgeport Brass Co., stated that his firm adopted the industrial plan at the direct suggestion of the United States Government. It has, however, worked successfully. The company representatives in the deliberative body, established under the industrial plan, are almost invariably foremen. Matters of plant safety are placed entirely in the hands of a committee which is held strictly responsible for all accidents. This also has had a decidedly beneficial effect.

The plan has also done much to reduce radicalism and has served effectively in transferring the viewpoint of the company to the minds of the workmen. It is highly effective as a means of education. Why one man is paid more for his services than another is a mystery to most workers. When it is explained that the services which the higher priced man renders are more valuable than those of the man lower paid, much rabid radicalism disappears.

Mr. Lavine stated that behind the non-commissioned officer to which the foreman had been likened was inflexible justice. Mistakes in the management of industrial concerns often bring on strikes, working to the disadvantage of all concerned. The ordinary worker desires responsibility and when it is given him, much of his radicalism vanishes. Regardless of the efficiency of the foreman, the management must sell itself and its fairness to its men.

(Additional interesting discussions and some of the articles read will appear next week.)

News
Of the Industry

Stockpiles of Soft Coal Near Peak Jan. 1
With 62,000,000 Tons

Two Million Tons Added Since Oct. 1—Supply Would Last 46 Days at
Current Rate of Consumption—Retailers' Stocks of
Anthracite Increase 60 per Cent

Consumers of bituminous coal had reserve stocks of 62,000,000 tons of that fuel on Jan. 1, 1924, according to a survey by the Bureau of the Census and the U. S. Geological Survey. The year just passed was one of practically uninterrupted accumulation of reserve stocks, and the inventory at its close revealed the following facts: Stocks on Jan. 1, 1924, were 2,000,000 tons larger than on Oct. 1, 1923, and about 6,000,000 tons larger than Sept. 1. In comparison with corresponding dates of preceding years, stocks on Jan. 1, 1924, were 72 per cent larger than in 1923, 29 per cent larger than in 1922, 35 per cent larger than in 1921, and even exceeded those on Jan. 1, 1919, by 7 per cent. In fact on only two dates for which stock records are available has the present supply been exceeded—Armistice Day, 1918, and April 1, 1922, on each of which dates stocks totaled 63,000,000 tons.

Measured in terms of tons, stocks increased 3.3 per cent during the last quarter of 1923. Measured in terms of days' supply, the increase was 2.2 per cent, the percentages being based on averages which assume that the supply was evenly distributed. In the estimate, which is based on reports from a selected list of about 5,000 consumers, no account has been taken of coal in the bins of householders, concerning which no statistics are available; nor steamship fuel, nor the tonnage on the Lake docks, which item is classed as coal in transit.

In addition to the quantity estimated as in storage piles of actual consumers, the following quantities are known to have been in transit on Jan. 1: On the commercial docks of Lakes Superior and Michigan, 7,800,000 tons; in storage

at the mines or at intermediate points, 390,000 tons; unbilled loads at mines or en route to consuming centers, 790,000 tons.

As shown graphically in Fig. 1, coal consumers had larger stocks at the beginning of 1924 than on any corresponding date for which records are available. In comparison with dates on which reserves were large, the stocks on Jan. 1, 1924, were 18 per cent larger than those on March 1, 1922, 28 per cent larger than those on Nov. 1, 1921, 35 per cent larger than those on Jan. 1, 1921, and but 2 per cent less than those on Armistice Day, 1918, when record stocks were available. The present stocks, even though less than at the close of the war, are more adequate, for the rate of consumption is now somewhat less.

Estimates based on the reports from consumers and supplemented by information from other sources indicate that consumption plus exports in the last quarter of 1923 was at the rate of approximately 10,200,000 tons per 7-day week.

Stocks in Days' Supply

Fig. 2, which is based upon data in the table herewith, compares the days' supply held by the seven principal classes of consumers on Jan. 1, 1924, with that on the same date two years ago. The importance of the rate of consumption in determining the adequacy of stocks is shown here, for had the rate of consumption on the earlier date been equal to that now prevailing, the supply on Jan. 1, 1922, would have been sufficient for less than 35 days instead of the 41 days shown.

The average stocks on Jan. 1, 1924, were sufficient to last 46 days, at the

rate of consumption in the last three months of 1923, against a 45-days' supply on Oct. 1. Despite the increase of 6,000,000 tons in actual tonnage, the supply on Jan. 1 was sufficient for only the same number of days as that on Sept. 1, 1923, owing to an appreciable increase in rate of consumption. In terms of days' supply the stocks on Sept. 1, 1923, and Jan. 1, 1924, are the highest recorded. It should be remembered, however, that any change in the consumption rate since Jan. 1 will be reflected in the days' supply.

Fig. 3 offers a graphic presentation, by states, of the variations in stocks. The map shows the days' supply held at general industrial establishments, excluding byproduct coke plants and steel works. This is the largest single group of consumers and the one that illustrates best the geographical distribution of reserves. Changes in business activity in this group are quickly reflected in the coal market, and, likewise changes in the coal market are soon manifested in the stocks held by general industrials.

Over the country as a whole the stocks held by industrial plants on Jan. 1 were sufficient to last 55 days on the average, a decrease of one day from the supply on Oct. 1 and Sept. 1. Here, too, the importance of consumption is strikingly shown, for the actual tonnage held by this group on Jan. 1 was about 8 per cent larger than on Sept. 1. In comparison with Oct. 1, however, industrials had a somewhat smaller tonnage on Jan. 1.

The distribution of stocks between states, as shown by the map, is typical of dates when reserves were heavy and business active. The entire territory east of the Mississippi had at least a 30-days' supply, except in Illinois, West Virginia, and Maryland, coal-producing states where consumers are close to the mines. Reserves were heaviest in New England, the Upper Peninsula of Michigan, and the Atlantic Coast states. The smallest stocks, as usual, were in that belt of states which extends west from Illinois through the center of the country to the Pacific Coast, and in the

Days' Supply of Bituminous Coal in Hands of Various Classes of Consumers, Nov. 11, 1918, to Jan. 1, 1924 (a)
(Figures represent number of days supply would last at current rate of consumption at time of stock taking)

	Nov. 11, 1918	Jan. 1, 1919	Jan. 1, 1921	Nov. 1, 1921	Jan. 1, 1922	Mar. 1, 1922	Jan. 1, 1923	July 1, 1923	Aug. 1, 1923	Sept. 1, 1923	Oct. 1, 1923b	Jan. 1, 1924b
Byproduct coke plants.....	35	32	29	38	42	39	19	26	27	30	33	35
Steel plants.....	45	42	42	46	48	48	27	35	35	33	39	43
Other industrials.....	71	65	64	67	51	51	40	46	54	56	56	55
Coal-gas plants.....	85	81	55	87	89	89	60	89	104	110	91	91
Electric utilities.....	49	49	44	54	51	51	33	48	52	52	49	51
Coal dealers, bituminous.....	37	39	30	46	33	33	16	39	45	38	36	34
Railroads.....	31	32	23	31	35	35	16	28	39	44	41	44
Total bituminous.....	45	42	39	43	41	41	26c	37c	44c	46c	45c	46c

(a) The figures in this table are estimates based on incomplete data. (b) The rate of consumption used in calculating the days' supply on Oct. 1, 1923, and Jan. 1, 1924, was the quantity consumed from Oct. 1 to Dec. 31, 1923. (c) Subject to revision.

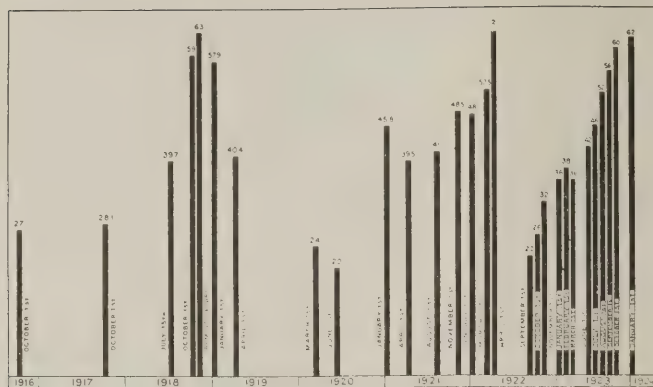


Fig. 1—Total Commercial Stocks of Bituminous Coal, Oct. 1, 1916, to Jan. 1, 1924

Figures represent million net tons and include coal in the hands of railroads, industrial consumers, public utilities, and retail dealers. Coal for steamship fuel, on Lake docks, in transit, and in the bins of householders is not included. These exceptions are important, the coal on wheels having proved at times a greatly disturbing factor in the calculations of would-be statisticians.

lignite-producing states of Texas and Montana.

The map in Fig. 4 compares, state by state, the tonnages held by industrials on Jan. 1, 1924, and on the same date in 1922. In 26 states stocks increased at least 5 per cent. whereas decreases to that extent occurred in but 14 states. Practically the entire eastern section of the country and the Southwestern States were particularly well supplied when compared with 1922, and appreciable decreases were confined to the Northwestern and Rocky Mountain States.

Reports from the electric-utility plants show preceptible increases in stocks during the last four months of 1923, but consumption increased to even a greater extent, and the 51 days' supply available on Jan. 1, 1924, would have lasted one day less than the supply on Sept. 1. The tonnage held by such plants on Jan. 1, 1924, was considerably larger than on that date in 1922, but owing to the greatly reduced demand for electric power then prevailing, the smaller stocks were sufficient for the same number of days' consumption.

Reserves at coal-gas plants increased

somewhat during September, and remained practically stationary during the remainder of the year. The days' supply of gas coal decreased sharply from 110 days' on Sept. 1, to 91 days' on Jan. 1. This decline may be attributed to the usual seasonal increase in the demand for gas during the fall and winter months. In spite of the decrease, stocks on Jan. 1 were larger than on any corresponding date for which figures are available.

Complete returns from the byproduct coke and steel plants showed the following reserves on Jan. 1, 1924, at the rate of consumption prevailing from Oct. 1 to Dec. 31, 1923, and on Jan. 1, 1922:

Byproduct Plants

	Jan. 1, 1924	Jan. 1, 1922
Low volatile.....	41 days	54 days
High volatile.....	33 days	38 days
Average.....	35 days	42 days

Steel Works

	Jan. 1, 1924	Jan. 1, 1922
Steam coal.....	35 days	41 days
Gas coal.....	60 days	58 days
Average.....	43 days	48 days

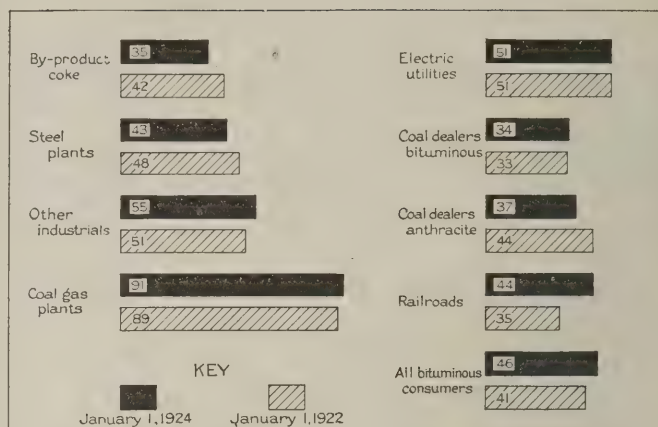


Fig. 2—Days' Supply Held by Different Classes of Consumers, Jan. 1, 1924, and Jan. 1, 1922

At the rate soft coal was burned in the last quarter of 1923, total stocks on Jan. 1 were sufficient to last 46 days, an increase of 1 day over the supply on Oct. 1. Stocks on Jan. 1, 1922, were sufficient to last 41 days at the rate of consumption then prevailing.

In terms of tons byproduct coke plants had a 40-per cent larger reserve on Jan. 1, 1924, than on that date two years ago, and the stocks at steel plants were 7 per cent larger. The larger stocks were more than offset by the increased rate of consumption in 1923, and when expressed in days' supply the reserves at byproduct plants fell 17 per cent, at steel plants 10 per cent.

The railroads accumulated coal steadily during 1923, and on Jan. 1, 1924, had on hand an enormous total of approximately 19,000,000 net tons, the largest quantity ever recorded, excepting only stocks on April 1, 1922, when the railroads had stored about 19,800,000 tons in anticipation of the strike. This supply, which includes the coal in stockpiles, cars and chutes, was sufficient to last 44 days, a supply equal to that on Sept. 1, 1923, despite the regular seasonal increase in consumption.

The demand for soft coal for household purposes increased sharply with the arrival of winter weather, and stocks held by retailers declined from 38 days' supply on Sept. 1 to 34 days on Jan. 1. The reserves held by retailers at the beginning of the year com-

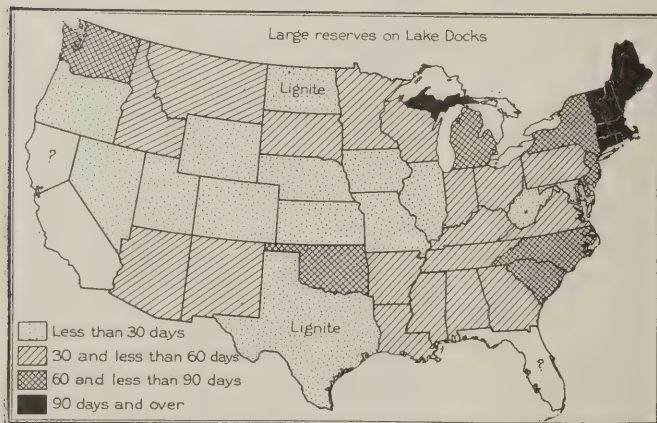


Fig. 3—Days' Supply of Bituminous Coal on Hand at Industrial Plants, Jan. 1, 1924

At the average rate of consumption that prevailed during the last quarter of 1923, reserve stocks at industrial plants, other than steel and byproduct coke, would have lasted on the average 55 days. Of the states east of the Mississippi only West Virginia and Maryland had less than a 30-days' supply. New England and the Upper Peninsula of Michigan had supplies sufficient for 90 days or more. Based on reports from 2,210 plants.

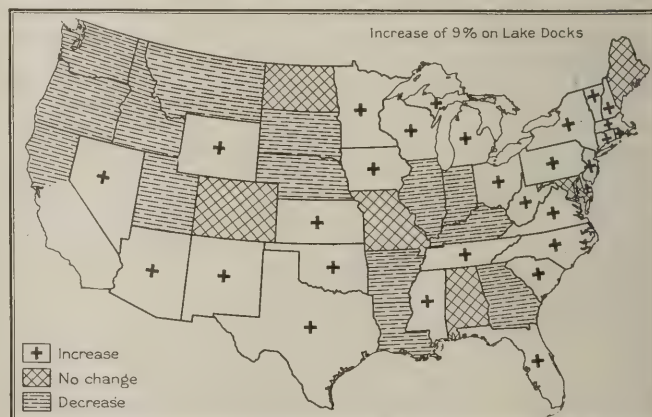


Fig. 4—Stocks of Industrials on Jan. 1, 1924, Compared With Those on Jan. 1, 1922

The map shows the changes in tonnage on hand at 1,846 identical industrial plants other than steel and byproduct-coke works. Industrial plants have steadily added to their reserves since the close of the miners' strike in 1922. In 26 states the quantity held on Jan. 1, 1924, was larger than it was on the corresponding date two years ago, when coal was being accumulated in anticipation of a strike.

pared favorably with those on other winter dates.

Lake navigation remained open unusually late in the season just passed, and receipts of soft coal during the last quarter of 1923 exceeded shipments off the docks by 14 per cent. Stocks on Jan. 1, 1924, were 7,805,533 tons compared with 6,861,706 tons Oct. 1, 1923.

Reports from an incomplete list of producers who store, showed that the quantity held by them decreased from 440,000 tons on Sept. 1, to 375,000 tons on Oct. 1 and 385,000 tons on January 1. Unbilled coal standing in cars at the mines increased from 470,000 tons to 786,000 tons in the same period.

Stocks of coke at byproduct coke plants decreased from 501,000 net tons on Sept. 1 to 476,000 tons on Oct. 1. Coke was accumulated during the last quarter of 1923, however, and on Jan. 1, 1924, the total on hand was 772,000 tons. This is the second largest figure on record, being 22 per cent less than that for March 1, 1922, the date of record stocks of coke.

Anthracite—Retail dealers' stocks of anthracite increased during the last three months of 1923, and their total supply on Jan. 1 was about 60 per cent more than on Oct. 1. Reports from the docks on Lake Superior and Lake Michigan that handle anthracite showed a total of 513,000 tons on Jan. 1. The production of anthracite was interrupted by a general anthracite miners' strike for about two and a half weeks in September and by the occurrence of holidays in November and December. Demand for domestic sizes continued brisk up to the close of the year, and the mines worked close to capacity whenever possible. Since Jan. 1, production has fallen off slightly.

Facts relating to production and retail dealers' deliveries indicate that householders' stocks probably are normal for this time of year. The tonnage produced flowed steadily to the consumers practically as fast as it could be mined, and retailers were not able to build up their reserves to normal until midwinter.

Retailers' receipts exceeded their deliveries during the last three months of 1923, and their reserves on the first of the year had increased sharply over those on Oct. 1. It has not been possible to make a canvass of all the coal dealers, but reports from a group of 474 who have reported regularly since Jan. 1, 1919, show a total of 1,063,277 net tons on Jan. 1, 1924, against 663,340 tons on Oct. 1. This was an increase in tonnage of approximately 60 per cent. In terms of days' supply the increase was 60 per cent.

Stocks of anthracite on the upper Lake docks increased during the last three months of 1923, the total on Jan. 1 being 65 per cent larger than on Oct. 1.

Production of bituminous was maintained at a high rate during January and February, and it seems probable that coal has continued to flow into storage. Anthracite production has declined slightly since Jan. 1, and as severe winter weather has prevailed in many parts of the country, it seems likely that retailers' stocks have decreased somewhat.

Western Kentucky Consolidation

Frank D. Rash, president of the St. Bernard Mining Co., of Earlington, Ky., announced on Feb. 19 that there is a deal pending, which probably will be closed within thirty or sixty days, for the sale of his company's property in western Kentucky to the North American Co., of New York, owners of much public-utility and associated property throughout the Middle West, including the West Kentucky Coal Co., of Sturgis, Ky., with eleven western Kentucky mines. This deal would bring the two largest west Kentucky mining groups under one control. Mr. Rash is to remain with the company.

Denies Scandal in Transfer Of Alaska Coal Lands

Colonel John R. Steese, of the U. S. Army Engineers and chairman of the Alaska Railroad Commission, who was in Buffalo Feb. 18 to speak to army men, said that there was nothing illegal or scandalous about the transfer of Matanuska coal lands from the Navy Department to the Interior Department. He labeled as "bunk" the charges made by John E. Ballaine, Alaska Railroad contractor, in a letter to President Coolidge, that the transaction paralleled the Teapot Dome affair.

"After the Navy Department had spent about \$1,500,000 in the development of these coal regions, the big oil discoveries of 1914 were made in California," said Colonel Steese. "The navy decided then to use oil as fuel and power in the Pacific fleet, because of the reduced price of oil, and as a result abandoned the Matanuska coal regions. The natural consequence of the abandonment of these lands was that the lands were then classified as 'public domain' and properly referred to the Department of the Interior. As I understand it, Secretary Fall, while head of the Department of the Interior, attempted to dispose of the coal lands to private interests, but in a proper, legal manner.

"The lands were public domain and any private persons or corporations could acquire a lease to the regions under a leasehold from the Department of the Interior."

Factory Will Make Mine Loaders Exclusively

Because of the importance of mechanical loading, a factory exclusively devoted to the manufacture of underground loading machines has been provided by the Joy Machine Co. A celebration was held Feb. 9 to mark both the completion of the first of its new heavy-type loading machinery and the opening of the factory at Evansville, Ind. The company claims that this is the first factory dedicated to the sole purpose of producing this important adjunct to mining equipment. Already 200 Joy loaders are in service.

Supreme Court Sets Aside Addy Conviction

Conviction of the Matthew Addy Co. and Benjamin N. Ford, its vice-president, on charges of violating the Lever Act by selling coal at a higher margin than fixed in the Presidential proclamation of Aug. 23, 1917, was set aside by the U. S. Supreme Court in a decision rendered Feb. 25. The defendants are coal jobbers of Cincinnati.

Under a contract dated July 31, 1917, the defendants bought coal from the Bluefield Coal & Coke Co. at \$3.25 per ton f.o.b. mine in West Virginia. They were convicted of selling some of this coal in August and September, 1917, at \$3.50 per ton, f.o.b. mine. The margin fixed for jobbers in the Aug. 23 proclamation of the President was 15c. per ton.

In reversing the District Court and the Circuit Court of Appeals, the Supreme Court declared that the proclamation of Aug. 23 was not retroactive and that the transaction was begun before the proclamation was issued. "No imperative reason appears for treating jobbers who had bought but who had not contracted to sell with less consideration than was accorded those with agreements for sale irrespective of the stipulated price," the opinion stated.

Sandefur-Canoe Creek Case To Be Argued April 7

The Supreme Court Feb. 25 granted a motion to advance the case of S. C. Sandefur against the Canoe Creek Coal Co. and assigned the case for argument on April 7. Sandefur was convicted of contempt of court by the U. S. District Court of Western Kentucky for violating an injunction restraining strikers from interfering with employees of the coal company. He demanded and was refused a jury trial. The Circuit Court of Appeals of the Sixth Circuit, to which an appeal was taken, has asked the Supreme Court for instructions as to whether Sec. 22 of the Clayton Act, which requires a conviction upon a jury trial as a condition precedent to punishment for contempt, upon demand for a jury in the case specified, imposes a valid restriction upon the inherent judicial power of the U. S. district courts, as the appellant insists. It is upon this point that arguments will be made in April.

Another African Coal Field

The discovery of coal at Stamprietfontein, about forty-five miles from Marienthal in the mandate territory of Southwest Africa, has been reported. The seam is said to be 14 ft. thick and was discovered at a depth of 143 ft. in one of the government boreholes. It has been traced for four or five kilometers, but the exact area of the coal field is uncertain. Some doubt seems to prevail as to the successful development of any coal discovered in Southwest Africa, the chief difficulties being those of transport and the question of labor, as the local natives (negroes) are much averse to working underground.

Dominion Miners Ratify Pact And Return to Work

The pact between the provisional executive of the United Mine Workers for the eastern Canada district and the British Empire Steel Corporation (Dominion Coal Co.) has been ratified by most of the miners who went on strike for increased wages one month ago. The question was voted on by the various locals in the United Mine Workers for the affected territory, and the striking miners decided by a fairly large majority to return to work. The agreement between the executive and the company heads provides for a 5 per cent increase in wages and no reduction in the banking periods.

The Stellarton local, one of the most powerful locals in the district, voted strongly against returning to work and demanded the return of the 1921 wage agreement. Provisional President Barrett and International President Lewis were assailed at the various meetings held by the miners. Phalen local, of Glace Bay, although scoring the officers and eulogizing the deposed secretary, J. B. McLachlan, now serving a two-year term in Dorchester (N. B.) prison, the most radical local of all, agreed to return to work. Provisional President Barrett threatens to expel the Stellarton local unless the members of that local return to work within ten days.

Rocky Mountain Engineers Talk Safety

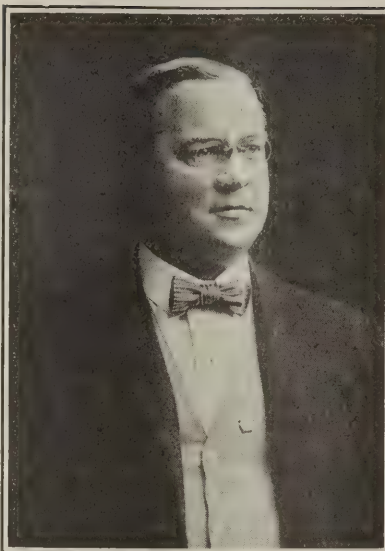
Safety first, last and all the time was the central theme of the 18th regular meeting of the Rocky Mountain Coal Mining Institute, at Denver, Feb. 13 to 15. It was the keynote of President George B. Pryde's address on Wednesday morning, the opening day, and it ran on down through most of the program, although other matters also were covered.

On Wednesday afternoon papers were read by L. S. Ickis on "Automatic Substation Control," relating primarily to equipment for automatically regulating rotary converters and motor-generator sets. Mr. Ickis' paper, and that following, "Beautification of Industrial Towns," by S. R. De Boer, a prominent landscape architect of Denver, were illustrated by lantern slides.

Mr. De Boer's discussion was particularly interesting to the Wyoming delegates, who see so little of trees at home. Mr. De Boer stated that a considerable amount of beautification could be done at a small expenditure. He also discussed the planning and arrangement of small cities.

Following Mr. De Boer, Thomas Foster, superintendent of the Union Pacific Coal Co.'s operations at Reliance, Wyo., read a paper entitled, "Coal Dust in Mines." This is a live subject to the mines in the Rocky Mountain region, where the air is so dry.

The banquet to members and their ladies was given Wednesday evening in the Cathedral room of the Albany Hotel. Pliny F. Sharp, one of the youngest old members of the organization, presiding as toastmaster, kept his audience in high humor introducing E.



Joseph Struthers

Secretary of the Engineers Club and former secretary of the American Institute of Mining and Metallurgical Engineers, who died of pneumonia, Feb. 18.

N. Weitzel, a past president; George B. Pryde, president, and Colonel Philip S. Van Cise, the District Attorney for Denver, so well known in the West for his recent conviction of the infamous Bunko gang. Colonel Van Cise spoke on "The Problem of the Criminal."

The Rocky Music Coal Players then presented "The Silly Selling Singers Symphony," in "The Coal Bloc, a Ton of Unscreened Fun," written by Nobudi Will Admittit, arranged and directed by Forrest Rutherford. "The Coal Bloc" is a one-act comedy detailing a meeting to nominate a candidate to represent "coal" in the coming presidential race. After the show, a large crowd remained to dance.

The Thursday morning session began with the report of the Safety Committee; President Pryde, chairman. The report was thoroughly discussed by many members. In the afternoon, R. L. Hair, division superintendent of the Colorado Fuel & Iron Co., described the "Mine Sprinkling" methods in use by his company. Dan Harrington, of the U. S. G. S., told of the safety measures being taken at the Phelps Dodge Co.'s mines at Dawson, N. M. He described the Dawson mines as the safest he had ever seen.

The Friday morning session was devoted to the reading and discussion of a paper on "Use of Overcutting Machines," by T. A. Stroup, superintendent of the Utah Fuel Co.'s Clearcreek mine. Friday afternoon the following officers were elected: President, William Littlejohn, general superintendent of the Utah Fuel Co.; vice-president for New Mexico, Horace Moses, general manager of the Gallup-American Coal Co.; vice-president for Wyoming, E. S. Brooks, vice-president and general manager of the Union Pacific Coal Co.; vice-president for Colorado, James Dalrymple, State Mine Inspector; vice-president for Utah, John Forrester, chief engineer of the U. S. Fuel Co.; secretary-treasurer, Benedict Shubart, of Denver.

U. S.-British Co-operation Sought for Mining Safety

While there are barriers, real or imaginary, to close political co-operation between nations, there are no obstacles to close international relationships between those engaged in technical and scientific work. This is one of the thoughts developed by speakers at a luncheon, Feb. 25, tendered Dr. R. V. Wheeler and W. R. Chapman by George S. Rice, chief mining engineer of the U. S. Bureau of Mines. Dr. Wheeler and Mr. Chapman are in this country to complete arrangements for a definite program of co-operation between the United States and British governments on matters pertaining to safety in mining. Dr. Wheeler is director of the British Government's experiment station at Eskmeals and is professor of fuel technology at Sheffield University. Mr. Chapman is a chemist attached to the technical staff at Eskmeals. Henry Walker, deputy chief inspector of mines for Great Britain, who will assist in these arrangements, had not arrived in America in time to attend this luncheon.

In the course of remarks at the luncheon, Director Bain, of the Bureau of Mines, pointed out that when the Bureau of Mines was created its research program was based to a considerable extent on information that had been developed by the British. Since that time there has been some informal co-operation between the Bureau and the British agencies engaged in similar work. Much good, he said, had resulted from the informal work and it gives a measure with which to estimate the much greater benefits likely to flow from the formal relationship which now is being entered upon. He spoke of the desirability of close relationships along professional lines.

Dr. Wheeler, in his remarks, declared that the Bureau of Mines has been the ideal toward which comparable activities of the British Government are striving. It has been only since the passage of the Mining Industries Act, he explained, that the British agencies have been in a position to hold up their end of such a proposition, the act providing funds for research.

Again Ask Change of Venue In Armed-March Case

As in other counties, where cases growing out of the armed march of 1921 in southern West Virginia have been tried, the defense in the case of the State of West Virginia against C. F. Keeney, president of District 17, United Mine Workers, as a last resort has applied for another change of venue and sought permission of Judge J. W. Eary in the Circuit Court of Fayette County to obtain affidavits to show that the defendants could not obtain a fair trial. The motion was overruled by the court on the ground that the defense had already had ample time to obtain such affidavits without waiting until the time set for the trial. The cases have dragged along for three years largely as a result of frequent changes of venue.

Long Step Toward Stabilization in 3-Year Contract Is Washington View

Regret Felt That It Fails to Provide for Modifications as Conditions Change—Keen Competition Likely to Cause Rapid Elimination of High-Cost Mines

By PAUL WOOTON
Washington Correspondent of *Coal Age*

The three-year contract agreed to by miners' union officials and soft-coal operators of the Central Competitive Field is regarded in Washington as a decided step forward. The ideal condition, in the opinion of most officials who have special knowledge of coal, is to have long-time contracts, but with provision for a certain amount of flexibility to take care of changing conditions. Regret is expressed that no start was made in that direction in this contract. It is believed generally, however, that experience under this contract will be such as to pave the way for the automatic rise and fall of wage scales to follow the real value of money.

All are agreed that the next three years will be ones of strenuous competition and painful readjustment. Competition already has reached a point that calls special attention to the great expansion which has taken place during the past seven years in the coal-producing industry. The elimination of high-cost mines will proceed at a much more rapid rate from this time forward.

The situation has brought with it a demand that the industry keep watch on the rate of its own expansion. It is suggested that the National Coal Association could perform a helpful service to the industry and to the public if it were to compile and keep up currently basic information with regard to the opening of new mines. It is believed that in normal times comparatively few new mines would be opened if the total amount of expansion in progress were known. Even under present prospects when many relatively low-cost operations are facing an uncertain future, it is known that new mines are being opened and that many other new mines are in prospect.

If the real facts were known, it is believed that the operators themselves would be inclined to defer new enterprises, but the principal influence of exact information would be in retarding the banks and other financial interests from backing such propositions.

The situation with regard to new coal mines is much like that which overtook the raisin growers. A few years ago, they took advantage of a propitious situation to boost the price of their product to an artificially high level. This caused existing vineyards to expand their acreage and induced an army of farmers to embark in vine growing. The resulting overproduction led to staggering losses.

In many industries the financing is so centralized that a careful check is kept on expansion. Most new coal mines are financed in the immediate locality. The backers, as a rule, have no conception of the number of properties being opened in similar fashion. It takes a couple of years for a new

coal mine to reach the point where it really begins to produce. By that time it may be evident that there is overproduction of coal, but then the capital investment is so great that production must proceed at the sacrifice of profit and in some instances at actual loss.

With the situation which now impends there is new reason for information in regard to new mines to be generally available. Production has proceeded for a long period without interruption. Stocks are large and three years of peace stretch ahead. In addition the country's consumption of coal is not increasing at the same rate maintained during the twenty years preceding 1919. The higher coal prices which have prevailed over a period of seven years have turned the attention of the consumer to economies in the use of coal. It formerly was so cheap that there was no incentive to attempt to eliminate waste.

The elimination of waste in fuel, however, now has reached the point where it is almost the rage. Very material economies have been effected. The Geological Survey reports show, for instance, that during the last five years there has been a reduction of 25 per cent in the amount of coal necessary to produce a kilowatt hour. The coke industry has gone from a beehive to a byproduct basis. The gas that once was wasted is now being burned under boilers and in furnaces. The International Railroad Fuel Association points to some very striking savings in the increased number of locomotive miles attained. A great wave of hydroelectric development is under way. The enormous production of petroleum has a deeper significance than the actual coal displaced by fuel oil. It has curtailed a large amount of new business which would have come to the coal com-

panies. An example is the retarding of electric line development, due to the use of the automobile. The bunker business is rapidly being lost.

All of these things taken together have resulted in a decided flattening of the curve indicating the average rate of increase in coal consumption.

Under contracts of one and two years, strikes or suspensions were frequent enough to have some stimulating effect throughout the period of the contract. They offered enough encouragement to the new small mine to keep the crop large. The hope now is to acquaint the prospective operators of such properties with the fact that a very different situation now faces such enterprise. If this can be brought home to them, it is recognized that a long step toward stabilization will have been taken.

British Columbia Gloomy Over Coal Industry

"Disabilities and Problems of the Coal Mining Industry of British Columbia" was the subject discussed at the opening session of the annual meeting of the Canadian Institute of Mining & Metallurgy (British Columbia Division) held at Vancouver Feb. 13-15. The addresses of Charles Graham, of the Canadian Collieries (D) Ltd.; C. M. Campbell, of the Cassidy Collieries, Granby Consolidated Mining & Smelting Co.; J. P. Biggs, of the Mines Department, and R. M. Young, of the Crows Nest Pass District, were somewhat gloomy in their general tone.

Owing to fuel-oil competition, the decrease in the export trade and the carriage of coal in ballast by vessels coming to Vancouver City for cargo, the industry, it would appear, is passing through a crisis. Mr. Graham pointed out that the provincial production in 1923 was 600,000 tons less than in 1910 notwithstanding an increase in population and in manufactures.

Reference also was made to the cost of production in the Comox district of Vancouver Island, chiefly because of the shale found with the coal. In speaking of the speculative character of development it was said that an instance had occurred where three boreholes a considerable distance apart apparently had tapped a 17-ft. seam of coal, but when actually opened up it was found that in each case the drill had struck a pocket and all the expenditure had been lost.

Mr. Campbell dealt with the Cassidy Mine. Half of the area being exploited, he said, did not contain coal and the coal measures were badly faulted and the development expenses very heavy. As to the Nicola-Princeton field, it was stated by Mr. Biggs that, though there were no very extensive deposits, the area was important. Production in 1923 had been 233,000 tons.

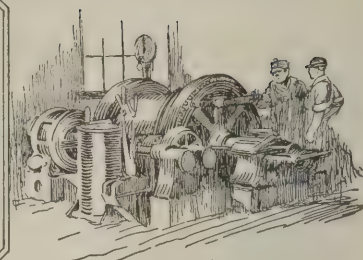
Discussing the Crows Nest field it was said by Mr. Young that the once prosperous industry there had been hurt by reason of the adoption by American railroads of fuel oil. It also had suffered through the removal of the Granby smelter from Grand Forks to Anyox and by the substitution of electricity for coal at the Trail Smelter.

Wage Cutting in This Field?

The Kentucky-Tennessee Coal Operators' Association and the United Mine Workers have been unable to agree on a new wage contract for operations in southeastern Kentucky and eastern Tennessee, the operators refusing to renew the old contract as a result of being in a field that is not fully organized and that is in competition with several unorganized fields. Over the past several months the union agents have been working hard in an effort to organize the miners in the Harlan, Pineville, Middlesboro and surrounding districts, but have not made much headway.



Practical Pointers For Electrical And Mechanical Men



Application of the Diesel Oil-Burning Engine to Coal Mining

About a year ago I was called upon to make a recommendation for a power unit at a coal mine. After looking over the requirements and conditions at the mine I decided that a Diesel oil-burning engine would be entirely suitable and could be used at low cost, at the same time obviating the necessity for expensive maintenance. The engine therefore was installed and has since proved quite successful, but the application of the Diesel engine to a mine power plant is so novel that the question might reasonably be asked, why use a Diesel engine at a coal mine?

To answer this question a short description of the plant may be necessary. The mine is the property of the Laurie Coal Co. located at Vaughan, Nicholas County, W. Va. The power unit is a 125-hp. three-cylinder Selzer-Bush Diesel engine, direct-connected to a 75-kw. 220-volt direct-current Westinghouse generator. Compressed air at 700 lb. pressure is used for starting and is supplied by an Ingersoll-Rand compressor belted to the flywheel of the engine, and stored in four tanks. Fuel oil also is stored in a nearby tank and fed to the engine as required.

The selection of this equipment was based upon economy and simplicity of operation and low maintenance costs.

Economy of operation is the outstanding feature of this power plant. An ordinary isolated steam power plant required for producing the power requirements of this mine would use about 5 tons of coal per day, which at \$2 per ton would make a total of \$10 a day for fuel. The Diesel engine described above consumes 29 gallons of fuel oil per day, which at 6c. per gallon costs \$1.74, a saving of \$8.26 per day, or \$65.20 for a working month of 20 days.

The steam plant would require an engineer and fireman at a total cost of about \$300 per month, whereas the Diesel engine requires the attendance of one man at a cost of about \$175 per month, a saving of \$125 per month. Therefore the fuel and labor saving is \$290 per month or \$3,480 per year.

The operation of the plant is very simple, the engine is started and stopped at will and requires only the turning on of the air and fuel valves and regulation of the mixture to operate it between the limits of no-load to full-load. With a steam plant the boilers must be started some time be-

fore the plant can turn out electrical energy, the delay being from one to five hours, depending upon whether the fires must be newly started or have been previously banked. Compared with the steam engine with its power plant the Diesel engine has few moving parts and is readily accessible for repairs.

The maintenance costs for a Diesel engine are unusually low; repairs consist of replacing small parts and the work can be done very quickly when compared with the time required to take a boiler out of service and make the ordinary repairs which must be made to a boiler plant.

With these many advantages in its favor the application of the Diesel engine at the afore-mentioned mine has proved quite successful and the experiences here no doubt will help to establish its use in the mining field.

WILLIAM SCHAFER,
Electrical Engineer.

Charleston, W. Va.

Tests of Insulating Varnishes

Standard tests have not been developed to measure all the qualities of varnishes but all the important controlling characteristics can be measured and the others approximated from observation and comparison. As no varnish can possess all the desirable qualities to the maximum extent, it is necessary to consider the varnish from the standpoint of the use that is to be made of it and interpret the test results with the view of selecting the most suitable varnish for the purpose in mind.

Specific gravity is a measure of the weight of varnish in relation to that of water. The determination gives a figure that expresses this weight but does not take into account the factors that make it up. High specific gravity might indicate by itself either a high percentage of base (oils and gums) or a solvent of high gravity combined with a normal percentage of base. It is not an indication of the volume of covering or filling material per gallon, or, in other words, of the proportion of base and solvent.

Viscosity is of principal value in comparing samples of the same or similar varnishes. This characteristic is greatly affected by the heat treatment given the oils in the varnish and is not a true indication of the

proportion of base and solvent. It is, however, an important factor affecting the thickness of coating produced by the varnish.

Flash point indicates the probable nature and volatility of the solvent or, in the case of varnishes having a blended solvent, the volatility of the most volatile flammable ingredient.

The evaporation test indicates the relative quantities of solvent which will be lost through evaporation and which will have to be replaced to maintain the varnish at the proper consistency in the dipping tank. This is a factor affecting the cost of using the varnish.

We now come to the point where we must consider the changing features of the varnish as it passes through its other phases toward hardening. As a general rule, the varnishes are applied by dipping until the pieces treated are well saturated. They are then withdrawn from the bath and allowed to drain until the setting stage is reached. At this stage some of the solvent has evaporated and the viscosity of the varnish base is sufficient to stop the flow.

The draining test is of great value in indicating the working characteristics of the varnish during this time. It is important that the various elements be so combined that the thickness of film on surfaces and the volume throughout a mass be as evenly distributed as possible from top to bottom. Of course, mechanical means, such as turning the pieces, may be resorted to, but this takes time and adds to production cost. In such arrangements as conveyor ovens it is next to impossible.

The thickness of coating is controlled by the viscosity, percentage of base, volatility of thinner and speed of withdrawal. When a coil is withdrawn from the varnish, the quantity of liquid varnish then adhering to it is governed by the original viscosity of the varnish itself and the speed of withdrawal. As draining begins, the relation of values is constantly changing, due to the continual evaporation of the solvent, until the time comes when enough solvent has evaporated to allow the inherent strength of the varnish base to maintain stability. Then movement ceases and setting really begins to produce a final outside film which gradually hardens.

It should be remembered in this connection that rapidly evaporating solvents give a shorter flow, and varnishes containing them show a greater increase of deposit from top to bottom of the treated piece, while heavier sol-

vants tend to give longer flow and therefore a more uniform thickness of coating. A solvent of too high a distillation range would introduce objectionable features. For instance, it might slow the drying and affect the enamel or enameled wire.

The time-of-drying test is important, as the results of the other tests may be affected greatly by it. Varnishes dry by evaporation of the solvent and oxidation and polymerization of the oils. Oxidation begins at the surface and progresses inward. Most varnishes contain drying agents to accelerate oxidation, and, due to differences in composition, the drying characteristics may not be the same.

A strong drying action may produce surface drying, which would be indicated by a hard surface free from tack and soft unoxidized varnish underneath. This is an undesirable characteristic and in determining the drying time and preparing the test specimens, precautions should be taken to make sure that the varnish is hardened throughout. Testing the film with the finger nail and examination of the bead or fatty edge give some indications as to the degree of skin hardening as compared to that throughout the mass. It is to be noted that hardening is progressive and continues to the point of final break-up of the varnish at the end of its usefulness.

Dielectric strength, unfortunately, cannot be determined as accurately as would be desired. Although in the tests two dip coats producing four separate films of varnish are specified, it is difficult to obtain a perfectly uniform continuous coating. Dust present in the varnish, or settling on the test specimens while draining, and small air bubbles will produce minute perforations in the film and lower the dielectric strength. The degree of baking also has an important bearing on the dielectric strength. As the varnish hardens through baking, the dielectric strength increases, and in making this test it is important that all varnishes be hardened to the same extent. All films must be of the same thickness, as thinner films harden better and show a higher dielectric strength per mil.

The water-absorption test is of great value, probably being second only to the heat-endurance test. While it is subject to the same conditions affecting the dielectric-strength test, the latter test affords a correction factor, for the reduction in dielectric strength due to immersion in water is the basis of comparison in the water-absorption test. It is important that the films be of the same thickness and of the same degree of hardness. The loss in dielectric strength apparently is governed by the depth to which the water penetrates and the measured dielectric strength is in reality the dielectric strength of the unpenetrated film. A heavier initial film will give a higher dielectric strength, as there will be a greater thickness of unpenetrated varnish at the expiration of the 24-hour period.

Heat endurance is of great importance and is only relatively indicated by the test. The test is a measure of the time a film of given thickness may be baked and still not break when

stretched a specified amount. It is an indication but not an exact measure of the life of the varnish in actual service. In making the bending test, it is important that the test specimens be cooled to the proper temperature and bent over the rods in a uniform manner. If the test specimen is bent quickly, the varnish film will crack more readily, and the test specimens must be bent around the rods at the same speed to obtain comparable results.

The acid, alkali and oil-resistance tests are in the same category with the water-absorption test and are equally important. While, of course, varnishes may be chosen for their resistance to any one of these products, the ideal varnish would withstand all to the greatest possible degree because it is used to protect the rest of the insulation. In general, varnishes containing fairly high percentages of asphaltic ingredients best resist the action of acids, alkalis and water, while those which are high in the drying oils are found to be the most oilproof.

Acids tend to further oxidize the oils until they are finally burned; alkalis tend to saponify them. The black gums are seemingly very little affected by either and are generally hydrofuge. The hardened oils, however, are only slightly affected by transformer or lubricating oils and even by their original solvents. The oil resistance of any varnish is increased by overbaking. In such a case, one can even obtain an oilproof coat from a varnish containing practically no drying vegetable oils. It is essential, therefore, that the tests for oil resistance be made

on varnishes baked to a uniform degree of hardness in relation to their surface drying times.

The test for non-volatile matter is an indication of the proportion of base and solvent by weight. Varnishes are sold by volume and this test does not indicate the proportion by volume. It is of value in making comparisons only where the varnishes tested are of the same type and have solvents of the same specific gravity. The heavy-gravity solvents show a lower percentage of base when computed by weight, and as the varnish manufacturers use solvents of widely varying specific gravities this test should be used with discretion. It is of value and is frequently incorporated in specifications covering the same or similar varnishes.

Bending of Copper

All bends in copper should be made free and easy, that is, they should be given as large a curvature as is possible in the space available. Where sharp bends and sharp fillets are made, the effects of vibration, expansion and contraction, or the throwing out forces due to rotation show up first.

Frequently sharp bends are made at the ends of copper strap field coils and when making the clamped or soldered joints, in many cases the bad conditions that have been set up are overlooked. The sharp bend, or kink, may later be the cause of a motor failure which could easily have been avoided. It often happens that the armature-coil failure is at a point where the wires have been carelessly bent or crossed.

Bonding to Full Capacity Of Mine Rail

The power lost in the return circuit from direct-current motors used in the mines is no doubt greater than that lost in all the alternating-current circuits feeding other machinery. The track-circuit loss in street-railway systems is so well recognized that it is often claimed that any excessive loss in the track circuit will put a street railway company into bankruptcy.

The track system of many mining companies far exceeds that of a large street railway and the operating conditions are far more severe, and consequently power losses may easily become very great. Poor track bonding causes so many accidents, delays and serious troubles to the mining men that it is difficult to know where to begin to enumerate them. Equipment failures, high maintenance costs, high capital charges and high power bills are only a few of the worst results of poor bonding; in fact it affects the

whole operation of the mine from the morale of the workmen to the cost per ton of coal.

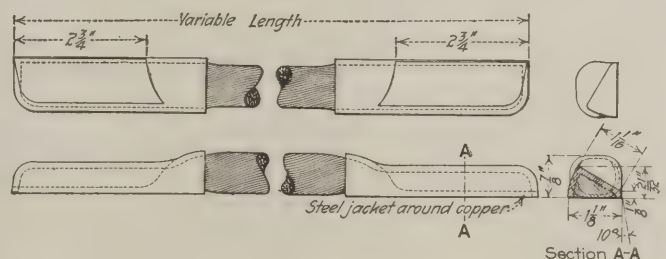
Money spent to provide good bonding soon comes back with large dividends and those men who realize this fact are forever striving to better their mine track conditions. In this respect many engineers are divided on this question into those who believe in bonding the track to the full capacity of the rails and those who rely more on return circuit cables.

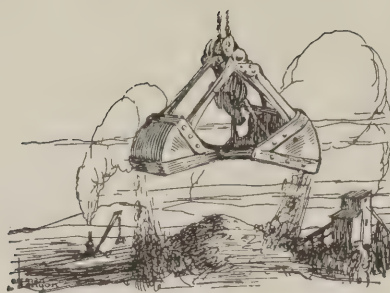
Where heavy rails are used the Pennsylvania Coal and Coke Corporation of Cresson, Pa., has lately adopted the use of an extra heavy bond having a capacity equal to a 350,000 c.m. cable. This bond has been installed with great success and is being applied extensively. No difficulty has been experienced by its use, and voltage tests previously described in *Coal Age* have shown good results.

The illustration shows the type bond now being used. The terminals are steel jacketed and are easily applied to the rail by electric welding.

Large Capacity Rail Bond

This rail bond is designed so as to obtain the full current carrying capacity of the rails and thus greatly reducing the expense of large return cables.





Production And the Market



Conservative Spirit Pervades Soft-Coal Market; Many Consumers Are Relying on Stockpiles

Buying of coal moves along conservative lines, having settled down to a hand-to-mouth basis in some markets, particularly where anthracite domestic sizes are consumed. The Jacksonville agreement assures peace in the Central Competitive Field for the next three years. Users of hard coal will buy during the next month only to meet immediate needs, as there is no new wage agreement to be negotiated. The little activity and hopefulness that was apparent in the soft-coal industry has nearly disappeared and a spirit of pessimism has taken its place to a degree. Buying has dropped and consumers to all appearances have decided to use their reserve stocks in order to avoid a recurrence of fires in stockpiles which caused more or less trouble last fall. The new working agreement has blasted the hopes of many non-union mine owners who had hoped to realize high prices for their product if there should have been a cessation of work in the union mines. Consumers' stocks on Jan. 1, according to government estimates, totaled 62,000,000 tons.

The average price of soft coal, according to *Coal Age* index dropped 2c. to \$2.23 with an index figure of 184, as of Feb. 25, compared with 186 the previous week.

Cold Weather Has Only Limited Effect

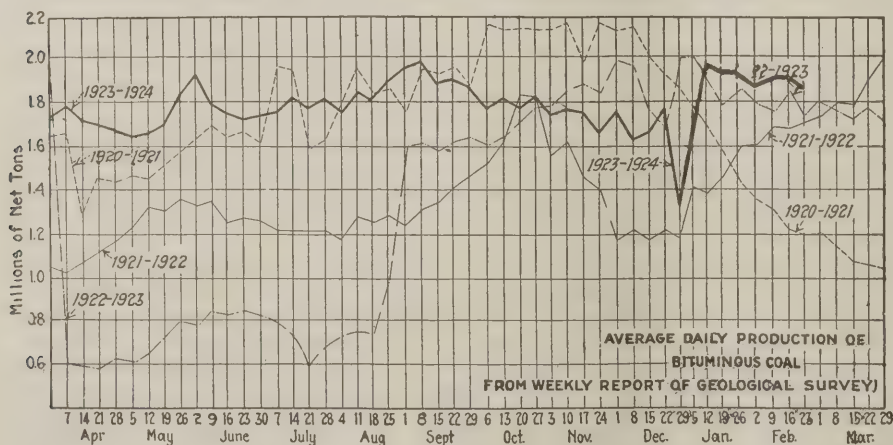
Consumption has been helped in nearly all markets by better coal-burning weather, but there has been comparatively little improvement in general demand. In the Middle West dealers report little buying and demand is generally inactive. Cold weather stimulated the call for domestic lump coal while there is enough screenings available to take care of the demand. Illinois mine owners have "no bills" for all sizes excepting screenings. The mines in the Carterville region are kept in operation because of the continued cold weather

and there is a good demand for Mt. Olive and Standard field coal. No change is reported from St. Louis, where retail dealers are kept busy with the middle grade coals. Demand for Kentucky product is good and some eastern Kentucky mines are sold up for the present. The Jacksonville agreement has injured the prospects of many of these mines, as a general strike or suspension would have meant good prices for these coals.

In the Northwest there is a steady call for coal. The feature of the Duluth market last week was a cut of \$1 in the retail price of Pocahontas coal, bringing the price down to \$8. There has been a slump in the Kansas-Oklahoma territory following the best mid-winter season for several years. The mines are now operating on a three- to four-day weekly basis instead of full time. There has been a let-up in the Ohio steam trade. Consumers are using their surplus supplies and the utilities are practically out of the market.

The clearing of the atmosphere as regards a strike or suspension in the soft-coal fields had its effect on the Pittsburgh market. Coal has become more difficult to sell and some consumers have practically retired from the market. Demand at Boston and throughout New England continues quiet. There have been no market developments. Spot buying is slow and there is not much doing in the contracting phase of the industry. Similar conditions exist along the Atlantic coast. Large reserves preclude the placing of new orders and the prospects are not bright.

Output of soft coal took a slight drop during the week ended Feb. 16, according to the Geological Survey, declining to 11,157,000 net tons, a decrease of 344,000 tons when compared with the previous week, while the output of hard coal dropped to 1,900,000 net tons, a



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Feb. 2.....	10,686,000	11,337,000
Feb. 9 (a).....	10,725,000	11,501,000
Feb. 16 (b).....	10,431,000	11,157,000
Daily average.....	1,739,000	1,859,000
Coal year.....	364,418,000	482,413,000
Daily av. coal year.....	1,348,000	1,793,000

ANTHRACITE

Feb. 2.....	2,056,000	1,893,000
Feb. 9 (a).....	2,023,000	1,906,000
Feb. 16 (b).....	1,828,000	1,900,000
Coal year.....	44,300,000	81,970,000

COKE

Feb. 9.....	359,000	286,000
Feb. 16.....	378,000	293,000
Calendar year.....	2,337,000	1,821,000

(a) Revised from last report. (b) Subject to revision.

decline of but 6,000 tons when compared with the week of Feb. 9. The production of soft coal during the first 269 days of the present coal year has been 482,413,000 net tons, as compared with 364,418,000 net tons during the corresponding period of the coal year 1922-1923.

Cold weather and the heaviest storms of the present winter have speeded up consumption of anthracite. Transportation has not been hindered and both wholesale and retail dealers had sufficient coal on hand to take care of the increased demand.

The settlement of the British dock strike has cleared the dark clouds hovering over England and has blocked the hopes of American exporters who expected to ship considerable coal abroad. The local export situation is without special features. There is plenty of coal at Hampton Roads to meet all requirements. A little more activity is noted at Baltimore. Dumpings at Hampton Roads during the week ended Feb. 21 were 360,491 net tons, a decrease of 34,973 tons when compared with the previous week.

Midwest Business Sags

There was no heart in the Midwest coal trade during the past week. Nobody is buying much and nothing is in demand. Cold weather stimulated some trade in domestic lump at a little less than the circular prices, but other domestic sizes dragged and screenings business just barely absorbed the volume of fine coal available. Franklin County lump is on its way down from \$3.75 and the middle sizes are passing \$3 downward bound. Screenings stick at \$1.90@2 and may rise with the inevitable drop in production generally. Central Illinois lump is \$3, with screenings unchanged from last week. Eastern coals are weakening on the Chicago market. Pocahontas lump can hardly command the top price of \$3.75 and mine-run is softening at \$2.50. Good eastern Kentucky lump tends downward from \$3.25.

All Illinois mines had plenty of "no bills" of all sizes, excepting screenings, and these "no bills" kept some mines from working this week. If it had not been for the cold weather mining would have been at a standstill in the Cartersville field. Railroad tonnage is reported light and mines working are getting from two to three days a week, the latter where railroad contracts are included.

The Association operators are holding pretty well to-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Feb. 26 1923	Feb. 11 1924	Feb. 18 1924	Feb. 25 1924†	Midwest	Market Quoted	Feb. 26 1923	Feb. 11 1924	Feb. 18 1924	Feb. 25 1924†	
Smokeless lump.....	Columbus....	\$7.00	\$3.60	\$3.60	\$4.00@	\$4.25	Franklin, Ill. lump.....	Chicago.....	\$4.60	\$3.50	\$3.50	\$3.25@	\$3.75
Smokeless mine run.....	Columbus....	4.50	2.10	2.10	2.00@	2.25	Franklin, Ill. mine run.....	Chicago.....	3.35	2.35	2.35	2.25@	2.50
Smokeless screenings.....	Columbus....	4.45	1.50	1.55	1.45@	1.70	Franklin, Ill. screenings...	Chicago.....	2.35	1.80	1.95	1.90@	2.00
Smokeless lump.....	Chicago.....	7.00	3.60	3.60	3.50@	3.75	Central, Ill. lump.....	Chicago.....	3.35	3.10	3.10	3.00@	3.25
Smokeless mine run.....	Chicago.....	4.50	2.50	2.50	2.50		Central, Ill. mine run.....	Chicago.....	2.60	2.10	2.10	2.00@	2.25
Smokeless lump.....	Cincinnati.....	7.50	3.60	3.75	3.50@	4.00	Central, Ill. screenings...	Chicago.....	1.60	1.35	1.50	1.40@	1.60
Smokeless mine run.....	Cincinnati.....	4.75	2.60	2.60	2.50@	2.75	Ind. 4th Vein lump.....	Chicago.....	4.35	3.10	3.10	3.00@	3.25
Smokeless screenings.....	Cincinnati.....	4.10	2.10	1.85	1.75@	2.00	Ind. 4th Vein mine run.....	Chicago.....	3.10	2.60	2.60	2.50@	2.75
*Smokeless mine run.....	Boston.....	6.20	4.80	4.75	4.60@	4.85	Ind. 4th Vein screenings...	Chicago.....	2.10	1.70	1.70	1.65@	1.80
Clearfield mine run.....	Boston.....	3.75	2.05	1.95	1.50@	2.40	Ind. 5th Vein lump.....	Chicago.....	3.60	2.60	2.60	2.50@	2.75
Cambria mine run.....	Boston.....	4.35	2.50	2.50	2.25@	3.00	Ind. 5th Vein mine run.....	Chicago.....	2.60	2.10	2.10	2.00@	2.25
Somerset mine run.....	Boston.....	4.00	2.25	2.25	2.00@	2.65	Ind. 5th Vein screenings...	Chicago.....	1.80	1.45	1.45	1.40@	1.50
Pool 1 (Navy Standard).....	New York.....	4.75	3.00	3.00	2.75@	3.25	Mt. Olive lump.....	St. Louis.....	3.10	3.10	3.10	3.00@	3.25
Pool 1 (Navy Standard).....	Philadelphia..	4.70	3.00	3.00	2.75@	3.25	Mt. Olive mine run.....	St. Louis.....	2.50	2.50	2.50	2.50	
Pool 1 (Navy Standard).....	Baltimore.....	3.85	2.25	2.25	2.00@	2.50	Mt. Olive screenings...	St. Louis.....	1.50	1.35	1.35	1.25@	1.50
Pool 9 (Super. Low Vol.).....	New York.....	4.25	2.30	2.30	2.10@	2.50	Standard lump.....	St. Louis.....	3.10	2.75	2.75	2.65@	2.90
Pool 9 (Super. Low Vol.).....	Philadelphia..	3.50	1.90	1.85	1.70@	2.00	Standard mine run.....	St. Louis.....	2.25	1.95	1.95	1.90@	2.00
Pool 9 (Super. Low Vol.).....	Baltimore.....	3.50	1.95	1.95	1.80@	2.25	Standard screenings...	St. Louis.....	1.45	.75	.80	1.15	
Pool 10 (H.Gr.Low Vol.).....	New York.....	3.60	1.85	1.85	1.70@	2.00	West Ky. lump.....	Louisville.....	3.35	2.85	2.85	2.75@	3.00
Pool 10 (H.Gr.Low Vol.).....	Philadelphia..	3.50	1.85	1.85	1.70@	2.00	West Ky. mine run.....	Louisville.....	2.20	1.70	1.70	1.50@	1.90
Pool 10 (H.Gr.Low Vol.).....	Baltimore.....	3.25	1.80	1.70	1.65@	1.75	West Ky. screenings...	Louisville.....	1.85	1.05	1.20	1.10@	1.50
Pool 11 (Low Vol.).....	New York.....	2.90	1.60	1.60	1.50@	1.75	West Ky. lump.....	Chicago.....	3.60	2.85	2.85	2.75@	3.00
Pool 11 (Low Vol.).....	Philadelphia..	3.05	1.65	1.65	1.55@	1.75	West Ky. mine run.....	Chicago.....	1.95	1.60	1.60	1.50@	1.75
Pool 11 (Low Vol.).....	Baltimore.....	2.60	1.60	1.55	1.50@	1.60							

High-Volatile, Eastern		Feb. 26 1923	Feb. 11 1924	Feb. 18 1924	Feb. 25 1924†	South and Southwest		Feb. 26 1923	Feb. 11 1924	Feb. 18 1924	Feb. 25 1924†		
Pool 54-64 (Gas and St.)..	New York...	2.25	1.60	1.60	1.50@	1.75	Big Seam lump.....	Birmingham..	3.85	3.85	3.75@	4.00	
Pool 54-64 (Gas and St.)..	Philadelphia..	2.45	1.70	1.70	1.50@	1.80	Big Seam mine run.....	Birmingham..	2.10	1.75	1.75	1.75@	1.85
Pool 54-64 (Gas and St.)..	Baltimore....	2.65	1.50	1.50	1.45@	1.55	Big Seam (washed)....	Birmingham..	2.60	2.10	2.10	2.00@	2.25
Pittsburgh se'd gas.....	Pittsburgh...	4.10	2.55	2.55	2.50@	2.65	S. E. Ky. lump.....	Chicago.....	4.60	3.35	3.10	3.00@	3.25
Pittsburgh gas mine run...	Pittsburgh...	2.75	2.00	2.10	2.00@	2.25	S. E. Ky. mine run.....	Chicago.....	2.85	2.00	1.85	1.75@	2.00
Pittsburgh mine run (St.)..	Pittsburgh...	4.10	2.30	2.35	2.25@	2.40	S. E. Ky. lump.....	Louisville...	5.00	3.25	3.25	3.00@	3.50
Pittsburgh slack (Gas)....	Pittsburgh...	2.80	1.55	1.55	1.45@	1.65	S. E. Ky. mine run...	Louisville...	2.60	1.80	1.80	1.65@	2.00
Kanawha lump.....	Columbus....	4.50	2.60	2.70	2.50@	2.75	S. E. Ky. screenings...	Louisville...	2.20	1.35	1.40	1.15@	1.60
Kanawha mine run.....	Columbus....	2.85	1.60	1.60	1.50@	1.75	S. E. Ky. lump.....	Cincinnati..	4.75	3.15	3.05	2.75@	3.00
Kanawha screenings.....	Columbus....	2.45	1.05	1.15	1.10@	1.25	S. E. Ky. mine run...	Cincinnati..	2.35	2.05	1.75	1.65@	1.85
W. Va. lump.....	Cincinnati..	4.75	3.10	3.10	2.75@	3.25	S. E. Ky. screenings...	Cincinnati..	2.10	1.25	1.25	1.00@	1.25
W. Va. gas mine run.....	Cincinnati..	2.75	2.10	1.75	1.60@	1.75	Kansas lump.....	Kansas City..	5.00	5.00	5.00	5.00	
W. Va. steam mine run...	Cincinnati..	2.50	2.10	1.75	1.60@	1.75	Kansas mine run.....	Kansas City..	3.50	3.50	3.50	3.50	
W. Va. screenings.....	Cincinnati..	2.35	1.25	1.25	1.15@	1.25	Kansas screenings...	Kansas City..	2.50	2.25	2.25	2.25	
Hooking lump.....	Columbus....	4.30	2.75	2.75	2.50@	2.75							
Hooking mine run.....	Columbus....	2.60	1.85	1.85	1.75@	2.00							
Hooking screenings.....	Columbus....	2.10	1.05	1.15	1.10@	1.25							
Pitta. No. 8 lump.....	Cleveland...	4.35	2.40	2.40	2.00@	2.20							
Pitta. No. 8 mine run...	Cleveland...	3.85	1.80	1.80	1.80@	1.85							
Pitta. No. 8 screenings...	Cleveland...	2.90	1.45	1.45	1.35@	1.40							

* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in *italics*.

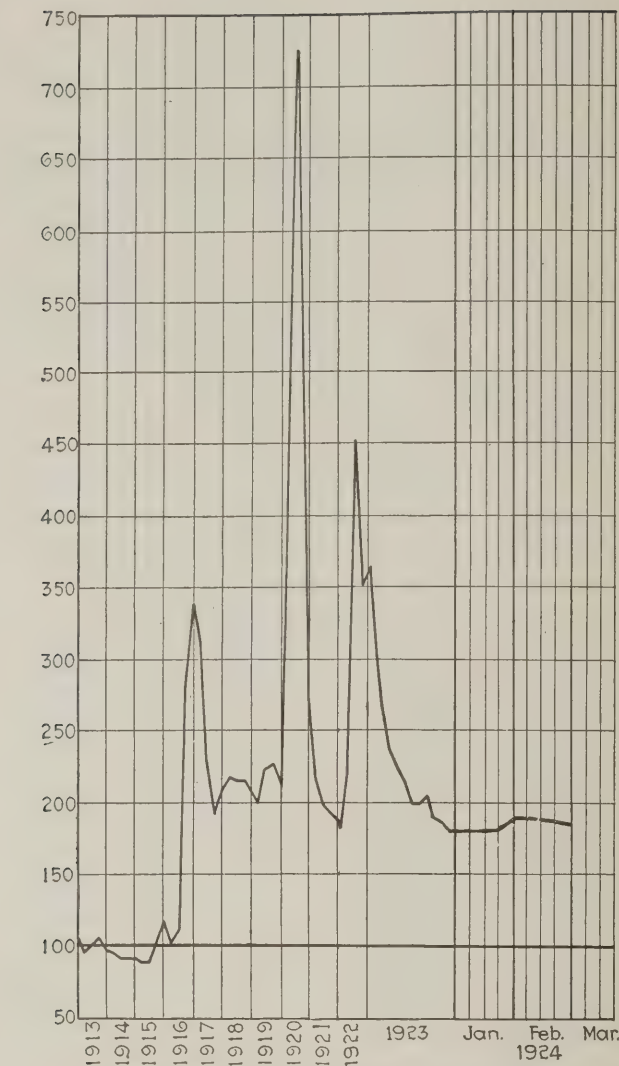
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Feb. 26, 1923		Feb. 18, 1924		Feb. 25, 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34	\$9.00	\$7.75@8.25	\$8.00@8.50	\$8.00@9.25	\$8.00@8.50	\$8.00@9.25
Broken.....	Philadelphia.....	2.39		7.90@8.10				
Egg.....	New York.....	2.34	9.25@12.00	8.00@8.35	8.25@9.00	8.75@9.25	8.00@8.75	8.75@9.25
Egg.....	Philadelphia.....	2.39	9.25@11.00	8.10@8.35	8.50@10.00	8.75@9.25	8.50@10.00	8.75@9.25
Egg.....	Chicago.....	5.06	12.00@12.50	7.20@8.25	7.50@8.80	8.00@8.35	7.50@8.80	8.00@8.35
Stove.....	New York.....	2.34	9.25@12.00	8.00@8.35	9.50@10.25	8.75@9.25	9.25@10.25	8.75@9.25
Stove.....	Philadelphia.....	2.39	9.25@11.00	8.15@8.35	9.85@11.00	8.90@9.25	9.85@11.00	8.90@9.25
Stove.....	Chicago.....	5.06	12.00@12.50	7.35@8.25	7.95@9.25	8.00@8.35	7.95@9.25	8.00@8.35
Chestnut.....	New York.....	2.34	9.25@12.00	8.00@8.35	9.50@10.25	8.75@9.25	9.25@10.25	8.75@9.25
Chestnut.....	Philadelphia.....	2.39	9.25@11.00	8.15@8.35	9.85@11.50	8.90@9.25	9.85@11.00	8.90@9.25
Chestnut.....	Chicago.....	5.06	12.00@12.50	7.35@8.35	7.95@9.25	8.00@8.35	7.95@9.25	8.00@8.35
Range.....	New York.....	2.34		8.25		9.00		9.00
Pea.....	New York.....	2.22	7.50@11.00	6.15@6.30	4.50@6.25	6.15	4.50@6.25	6.15@6.65
Pea.....	Philadelphia.....	2.14	7.00@9.00	6.15@6.20	5.25@6.50	6.35@6.60	4.75@6.50	6.35@6.60
Pea.....	Chicago.....	4.79	7.00@8.00	5.49@6.03	4.50@5.60	5.40@6.05	4.50@5.60	5.40@6.05
Buckwheat No. 1.....	New York.....	2.22	4.50@5.25	4.00@4.10	2.25@3.50	3.50	2.25@3.50	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	4.00@5.00	4.00	2.25@3.50	3.50	2.25@3.50	3.50
Rice.....	New York.....	2.22	2.25@3.00	2.75@3.00	2.00@2.50	2.50	1.75@2.50	2.50
Rice.....	Philadelphia.....	2.14	2.75@3.00	2.75@3.00	1.75@2.50	2.50	1.75@2.50	2.50
Barley.....	New York.....	2.22	1.50@2.00	1.40@2.00	1.50@1.75	1.50	1.50@1.75	1.50
Barley.....	Philadelphia.....	2.14	1.40@2.00	2.00	1.25@1.50	1.50	1.25@1.50	1.50
Birdseye.....	New York.....	2.22		2.10		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics



Index	1924				1923
	Feb. 25	Feb. 18	Feb. 11	Feb. 26	
Weighted average price	\$2.23	\$2.25	\$2.27	\$3.49	

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

gether, with ore or two cutting prices to the level of the independents. The Association prices are \$3.75 for lump, \$3.50 for egg and \$3.25 for nut, in the country. The independents are selling lump at \$3@3.25, egg \$2.75@3 and nut \$2.50@2.75. Some of the Standard operators are doing as well on sizes as the independents in the Carterville field.

The Mt. Olive situation is considerably improved. There has been a good demand for domestic and the steam is taking care of nut and screenings. Mines work four to five days. In the Standard district conditions have been bad, but are showing up better under the temporary demand, though prices have not improved.

St. Louis Demand Is Fair

Retailers report business in St. Louis fairly good on cheaper and middle grades of coal. A little activity on high-grade coal is seen in isolated spots. Demand is light for smokeless, anthracite and coke. Wagonload steam shows improvement, while the demand for carload steam locally has been somewhat better, especially for screenings. Country domestic is responding to the cold wave, for cheaper grades principally. Dealers are carrying small stocks. Country steam is not a factor and is seldom heard from. There are no changes in retail prices.

Kentucky Lump and Steam Move

Another spell of cold weather is resulting in slightly better demand from retailers for Kentucky coal, coming at a time when the jobbers and operators were beginning to need additional business on prepared sizes, as steam demand has been quite good. Eastern Kentucky mines in many instances are busy and are sold up for a few days to come with the result that prices are fairly steady although it is asserted that the top price on prime block coal has slumped from \$3.75 to \$3.50. Eastern Kentucky has been moving good tonnage into various districts and has been maintaining prices well.

With the signing of the wage agreement at Jacksonville, Fla., last week, Kentucky operators have lost the last chance for the expected general strike, which would have meant big business and good prices to the non-union fields of Kentucky. However, the non-union fields are operating largely on the 1917 wage scale and are steadily underselling union fields, with the result that if there is much business in the spring and early summer they should get a fair share of it.

With the exception of slightly weaker screenings in western Kentucky the market shows no change over the week. Pea, slack and fine screenings are offered at from 90c. to \$1 as against \$1@1.10 as the minimum a week ago. General movement is fair and a full car supply is reported. However, the outlook is for a slow and draggy spring. Many of the operators working under a no-strike contract which has a year yet to run, had been entertaining strong hopes of a national strike this year. One section of the field has a contract expiring on March 31, and there is some question as to whether or not this will be renewed.

Northwest Prices Sinking

The feature of the Duluth market this week is a cut in the price of Pocahontas. One dollar has been lopped off the price, making lump \$8. Run of mine remains the same at \$6.50 and screening are off 25c. to \$5.25. All other bituminous and anthracite coals are the same. Consumers are holding off again, and trade is considered dull. There is about 2,225,000 tons of free coal on docks at Duluth-Superior. This amount is not excessive, and will be fairly well cleared up by the opening of navigation, unless the construction of territory caused by the "unfair" freight rates causes unusual loss in distribution.

The Milwaukee coal market continues on an even and satisfactory basis. The local demand is brisk because of harsh and stormy weather. Country transportation conditions are nearly normal again and orders are being filled more promptly. There have been no important changes in prices at Milwaukee.

Western Trade Slumps

A slump has started in the Kansas-Oklahoma territory following the best midwinter season for several years. Operators report their mines working from three to four days a week, whereas they were working full time. A surplus of all grades had begun to accumulate last week. The surplus of screenings remains little changed this week, but there has been an increase in the surplus of nut and lump. A resumption of price shading further reflects the changing conditions. Folder prices are unchanged, however. Kansas lump is quoted at \$5; nut at \$4.25; mine run at \$3.50 and screenings at \$2.25.

In Colorado the resumption of warm weather has again caused a marked decline in the production and marketing of coal. Mines worked on an average of thirty-one hours for the past week. The operators' weekly reports show that 26 per cent of the full working time was lost on account of no market.

Prices remain unchanged. The transportation and car situation has been favorable except in Routt County, where the mines are experiencing considerable car shortage.

Prices have been shot to pieces in Utah. Operators are cutting 50 to 70c. a ton from mine quotations and dealers' prices have cut from 50c. to \$1.50. The change is on prepared sizes only. Mine prices have been as follows: Lump, \$4.50; domestic lump, \$3.75; stove, \$3.75; nut, \$3.50; mine-run, \$3.50; screen slack, \$1.75; straight slack, \$1.25. A new price circular is expected soon. One cause for the

cut is the fact that three more mutual concerns are trying to get started at Salt Lake City. They have been undercutting the trade 50c. a ton. However, the market is low all around.

Buyers Disappear from Ohio Markets

Buyers in the Ohio markets have practically disappeared since the signing of the Jacksonville agreement. Prices have dropped and the market is extremely quiet. Car movement into the southeastern Kentucky, Big Sandy, Logan County and Kanawha fields, according to reports from Cincinnati, is steadily increasing and most of the mines are reporting about four days a week. Inquiry from Michigan points has slackened. The smokeless operators have been keeping close watch on the British and the French situation. Some contract business is being talked of. Specialized coals are quoted as follows: Egg, \$3@3.25; lump, \$3.75@4.

Operators and brokers in the Cleveland market experienced a decline in business last week. Spot prices show a tendency to weaken but it is not felt that they will go much lower. Since the early part of last week curtailment has been necessary in many operations and production has been considerably cut. The eastern Ohio No. 8 field during the week ended Feb. 16 produced 362,000 tons of coal, or about 52 per cent of potential capacity, which is estimated at about 700,000 tons.

In and around Columbus there was a let-up in the steam-coal trade and large users are scarcely buying current needs. Utilities are temporarily out of the market, while some of the large users of screenings are out of the market because of coal-pile fires. Consumption is about normal, especially in iron and steel industries, while railroad demand is not quite as strong as formerly. Demand for domestic consumption is a weather proposition with a seasonal demand reported from all sections of the state. Dealers are not disposed to accumulate stocks and are buying on a hand-to-mouth basis.

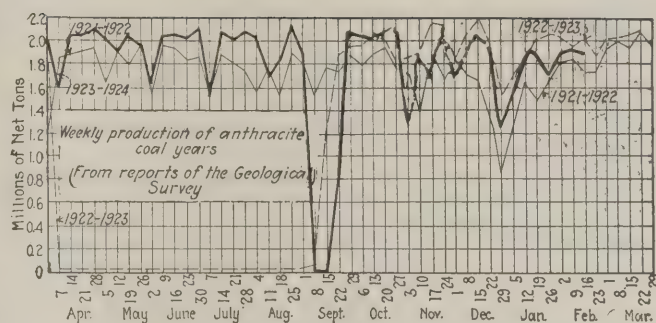
There is absolutely no change in price of coal in the Pittsburgh district or adjacent districts that can be traced to the wage settlement. Sellers have found the market very dull since the settlement, but they had found it practically as dull for a short time before. Consumption of coal is at a high rate. The steel mills are running well and railroad operations are running heavier than in December. Domestic consumption is good, and mine operations in the past few weeks in the district have averaged about 55 per cent.

Since the Jacksonville adjustment forecasts what will be done at a joint conference to be held at Altoona next month, operators in central Pennsylvania are making offers and many inquiries are being received, so that there is little doubt but that the basis for signing up for contract coal can be readily reached.

Trade at Buffalo is quiet notwithstanding heavy snow-falls and stormy weather. There is little activity.

Dull Outlook in New England

The settlement at Jacksonville relieves the last lingering worry of any New England buyers, and doubtless we are in for a long period of dullness. There is little spot buying in any direction, and no consumer with stocks sixty to ninety days ahead can be roused to any immediate interest in the price of coal. Receipts all-rail and by water are about on the average of the past six months, and no marked



increase or decrease is looked for in the near future. Quotas on contract are being accepted reasonably well, but as most of the latter are on a monthly basis, subject to occasional price revision, there is no special significance in the moderate volume coming forward.

Hampton Roads quotations are for the most part unchanged, \$4.75 per gross ton f.o.b. vessel being the asking price of most of the agencies, although there are some who say they are netting \$2.35 and upward per gross ton at the mines for Western business. Likewise there are shippers who are frankly selling for less than \$4.75 at Newport News and Norfolk to move demurrage coal. It is evident that effort will be made to sign up buyers on the \$4.75 basis, a figure that on the 1917 wage scale gives the producer a small margin, but it remains to be seen how nearly stable the market can be made for Navy standard grades.

Pocahontas and New River certainly have the call in practically all the territory here within 100 miles of tide-water. While certain of the factors rehandling coal from cargoes for inland distribution are trying to go through the motions of placing coal at \$6.50 per gross ton on cars Boston or Providence, it is clear that the only actual sales are by those interests willing to accept \$6 as a maximum.

From central Pennsylvania there is only a small tonnage being received by rail and water. The Philadelphia piers show a pronounced slump in the volume dumped for New England, and the New York piers have suffered a similar falling off in business. Except in remote places where Pennsylvania coal can be sold at a moderate freight rate in comparison with market rates from Hampton Roads there are only restricted openings for coal mined on the terms of the union contract.

Activity Lacking in Seaboard Markets

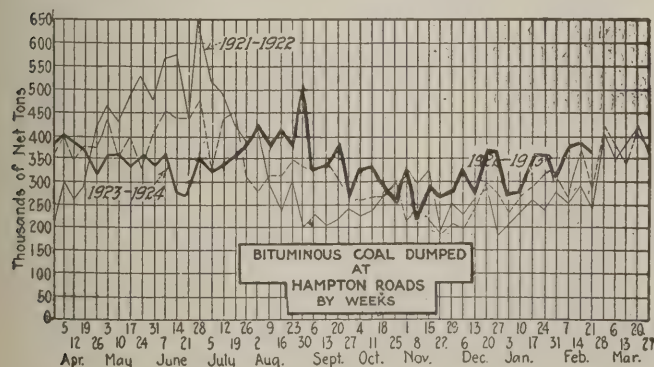
The soft-coal trade along the Atlantic seaboard from New York to Baltimore shows little activity. There are no immediate indications of betterment and buyers are not in the market for heavy tonnages, although there is no surplus of free coals. Contract coal is moving in good volume. At New York receipts at the railroad terminals increased over the holidays but this was to be expected. The prices have not changed materially.

Anthracite Market on Even Basis

The cold weather has kept the anthracite market on an even basis. Demand is regular and wholesale as well as retail dealers are able to keep their stocks moving. Demand, of course, centers around stove and chestnut, but production is more than sufficient to keep consumers supplied. Some of the companies, it is asserted, are storing pea coal. The steam sizes are moving in good volume. Demand for barley is the strongest and some of the independent product of this size is quoted at more than the company schedule of \$1.50.

Car Loadings, Surpluses and Shortages

	Car Loaded	
	All Cars	Coal Cars
Week ended Feb. 9, 1924	138,017	199,791
Previous week	929,936	198,955
Same week in 1923	849,352	190,990
	Surplus Cars	
	All Cars	Coal Cars
Feb. 7, 1924	138,017	53,758
Same date in 1923	28,628	7,438
Jan. 31, 1924	169,036	67,578
	Car Shortage	
	All Cars	Coal Cars
Feb. 7, 1924	6,998	.....
Jan. 31, 1924	4,958	.....



Foreign Market And Export News

British Coal Market Breathes Easier with Settlement of Dock Strike

Fear that the British coal market would be seriously hampered by the dock workers' strike were quickly dissipated with the announcement that an agreement had been reached, although the men did not return to work immediately. The terms are regarded as a concession to the demands of the men, but they are heartily approved, as they averted what threatened to be a serious labor difficulty.

Output of British coal during the week ended Feb. 9 was 5,804,000 tons, according to a cable to *Coal Age*, as compared with 5,245,000 tons the previous week, or an increase of more than 500,000 tons. The output for the corresponding week of 1923 was 5,567,000 tons.

Exporting of Welsh coals continued uninterrupted, notwithstanding the labor trouble. Demand from foreign buyers was good. Mine owners are looking forward to contract making. Prompt shipments also are reported as easier.

Unfilled orders carried over from January, the threat of a transport strike, and the accumulation of new orders held up by the recent rail strike combine to create a very firm tone. Practically without exception collieries are substantially booked for the next two or three weeks. The demand for early coal is pressing. Inquiry from Europe, Italy and South America is strong. There is little business with Germany but a good demand from the Near East.

Unable to carry out their present commitments, operators are reluctant to accept new business, and in many cases will not take orders for delivery before March. It will be impossible to keep the collieries working fully under the prevailing conditions.

The prospects at Newcastle for February are bright, and all sections enjoy a good demand.

French Coal Market Steady; Demand Fairly Active

The French coal market continues steady. Demand is fairly active and there is a good supply of coal being furnished to Belgium by the Nord and Pas de Calais collieries. The reduction of 3 fr. requested by the government authorities in the prices of all coals effective Feb. 1 widened the range in the selling prices of French and the various foreign coals. Some inconvenience to sellers and buyers has resulted from the recent imposition of restrictions on exports by the government officials, and miners' delegates have been in conference with the Belgian authorities regarding the new rules.

Inquiry for British coals has been dull and the congestion at the British docks had little if any effect on France.

During the first 29 days of January the S.C.O.F. received through Az Ehang and Aix la Chapelle 246,777 tons of coke. The Société des Cokes de Hauts-Fourneaux, which had charge of the reparation fuels, dissolved on Jan. 31, and its successor is in course of organization. It is expected the new price for coke will be 143.5 fr. delivered on the frontier. Deliveries of coke from the Ruhr at present amount to about one-third of the requirements of the French metallurgical industry, making additional purchases necessary from either the French collieries or from British, Belgian or Dutch cokeries.

More Activity at Hampton Roads

Considerable activity in coastwise and foreign movement was reported at Hampton Roads last week, with consequent diminishing supplies at tidewater. Bunker trade was reported fair, but prices continued at a low level, being strengthened but slightly by increased trade.

Inquiries from Italy and South America were reported on an increase, and the prospect for foreign business was brighter than for several previous weeks. Prices at tidewater were proving attractive to foreign shippers, and several good orders were said to have been booked recently.

The tone of the market was somewhat stronger, and there was an indication that trade would improve in the near future. Shippers were optimistic over business during March and April, with prospects of a number of good contracts April 1.

Export Clearances, Week Ended

Feb. 23, 1924.

FROM BALTIMORE

	Tons
For Chile	
Br. SS. Wearbridge.....	5,474
For Italy	
Ital. SS. Premuda.....	6,446
For Porto Rico	
Amer. SS. Millinocket.....	3,505
For Peru	
Jap. SS. Norway Maru (Coke).....	5,025

FROM HAMPTON ROADS

For Canada	
Amer. Schr. Orleans, for Hamilton.....	999
Dan. SS. Bornholm, for Halifax.....	1,200
Br. SS. Rose Castle, for Halifax.....	6,951
Nor. SS. Jan, for Halifax.....	1,411
For France	
Nor. SS. Annavore, for Fort de France.....	4,851
For Brazil	
Jap. SS. Chile Maru, for Rio de Janeiro.....	6,671
For Italy	
Ital. SS. Matanzas, for Cagliari.....	2,870
For Uruguay	
Br. SS. Magdala, for Montevideo.....	6,072
For West Indies	
Dan. SS. Nordhavet, for Barbados.....	4,703

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Feb. 14	Feb. 21
Cars on hand.....	1,018	847
Tons on hand.....	65,824	55,982
Tons dumped for week.....	181,046	151,875
Tonnage waiting.....	12,000	10,000

Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,276	865
Tons on hand.....	85,450	58,450
Tons dumped for week.....	98,132	105,017
Tonnage waiting.....	21,260	33,877

C. & O. piers, Newport News:		
Cars on hand.....	1,274	1,460
Tons on hand.....	63,290	72,940
Tons dumped for week.....	73,915	64,975
Tonnage waiting.....		5,800

Pier and Bunker Prices, Gross Tons

PIERS

	Feb. 16	Feb. 23†
Pool 9, New York.....	\$4.90@ \$5.25	\$5.00@ \$5.25
Pool 10, New York.....	4.75@ 5.00	4.75@ 5.00
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.80@ 5.90	4.85@ 4.90
Pools 5-6-7 Hamp. Rds..	4.35	4.25@ 4.35
Pool 2, Hamp. Roads.....	4.60@ 4.70	4.60@ 4.75

BUNKERS

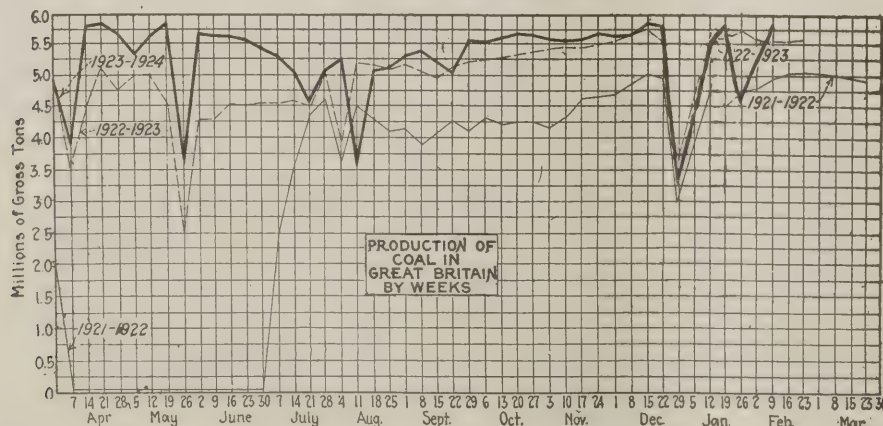
Pool 9, New York.....	5.20@ 5.55	5.30@ 5.55
Pool 10, New York.....	5.05@ 5.30	5.05@ 5.30
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 4.90	4.65@ 5.10
Pool 1, Hamp. Roads.....	4.90	4.90
Pool 2, Hamp. Roads.....	4.70	4.75

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to *Coal Age*

Cardiff:	Feb. 16	Feb. 23†
Admiralty, large. 30s. 6d. @ 31s. 6d.		30s. @ 31s.
Steam smalls.	22s. @ 23s.	22s. 6d.
Newcastle:		
Best steams.....	25s. 6d. @ 26s.	24s. 9d. @ 25s. 6d.
Best gas.....	25s.	25s.
Best bunkers.....	25s. @ 26s.	23s. 6d. @ 24s.

†Advances over previous week shown in heavy type, declines in italics.



Traffic News

Rate Change to Lake Ports Unlikely This Season

While the prospects favor an ultimate increase in the freight differential from the Southern coal fields to lower Lake ports, as compared with the rates from points of origin in the Pittsburgh and eastern Ohio regions to the same destinations, it is practically certain that no rate changes will be ordered in time to have a bearing on this year's Lake business.

The hearing before the Interstate Commerce Commission at which the testimony of the Pittsburgh and the Ohio operators was taken was concluded Feb. 21. The commission then gave the Southern operators and railroads a period of two months for the preparation of their cases. This unexpected delay in the progress of the case precludes any probability of a decision being handed down before the close of navigation next autumn. This calculation is based on the average time required for the consideration of a case of comparable intricacy.

Burden of Proof of Weight Loss Up to Consignee

In remanding the case for a new trial the Alabama Supreme Court recently held in the cause of James C. Davis, Director General, etc., vs. Samuel Zimmerman, appealed from the Mobile Circuit Court, that the transportation company could not be held liable for loss in weight of coal between shipping point and destination by reason of natural drainage and evaporation, and ruled that the burden of proof of loss other than from natural causes must be furnished by the consignee. The coal in question was shipped from Birmingham district mines to Zimmern at Mobile, Ala. The lower court awarded Zimmern \$2,136.40.

To Construct Lines in Illinois And Kentucky

After reargument, the Interstate Commerce Commission has affirmed the authority granted to the Southern Illinois & Kentucky R.R. to construct lines in Illinois and Kentucky to form, with existing facilities, a continuous line from Edgewood, Ill., to Fulton, Ky. The line is to be operated by the Illinois Central. The new line was justified largely because it gives a particularly favorable outlet for coal.

C. R. & E. Seeks Bond Issue To Improve Line

The Coal River & Eastern Ry. has asked the Interstate Commerce Commission for authority to issue \$500,000 in first mortgage bonds and \$1,000,000 in capital stock for the purpose of completing and improving its line. Of the total, \$550,000 is to be applied on

the purchase of equipment and increasing the weight of rail on the Laurel Creek line as may be required by mine development in that section. The Coal River Collieries is to receive the bonds and \$250,000 of the stock for the railroad property. The remainder of the stock is to be sold to individuals by the Brotherhood Investment Co.

Million Tons of Hard Coal Moved By Lehigh Valley in Month

The Lehigh Valley R.R. loaded 997,601 tons of anthracite during January, 1924, as compared with 1,190,564 tons in January, 1923, and 805,277 tons in the same month of 1922. It was stated at the offices of the company that a comparison with last year's figures is hardly indicative of conditions in that loadings in the winter of 1923 were exceptionally high following the settlement of the anthracite strike, the 1922 figures being more representative of an average month.

\$20,000,000 Cut-Off Again Is Approved

The Interstate Commerce Commission in Washington, on Feb. 16, for a second time approved action of the Illinois Central R.R. in its proposed plan to spend \$20,000,000 in a cut-off line of 169 miles from Fulton, Ky., to Edgewood, Ill., which will materially shorten the distance traversed in direct movement north from Kentucky and the South. The new line will open up a considerable amount of new territory for coal production it is said.

More Promotions on B. & O.

The following changes and promotions have been announced by the freight traffic department of the Baltimore & Ohio R.R. effective Feb. 15: J. L. Hayes is appointed assistant general freight agent, Baltimore, Md., vice George S. Harlan, promoted; R. J. Beggs, division freight agent, Cumberland, Md., is appointed assistant general freight agent, Baltimore, Md., vice H. G. Settle, promoted; C. M. Gosnell, division freight agent, New York, N. Y., is transferred to Baltimore as division freight agent, succeeding Mr. Hayes.

New Locomotives on C. & O.

The Chesapeake & Ohio has begun to put in commission some of its new locomotives, measuring 109 ft. over all, including tenders. These engines will be operated between Hunton and Clifton Forge. Twenty-five of the engines in all are to be delivered, having been built by the American Locomotive Co. at a cost of about \$100,000 each. Each locomotive develops simple tractive power of 103,500 lb., is equipped with 16 drivers measuring 57 in. in diameter and has a total weight of 565,000 lb.

Industrial Notes

The National Engineering Societies has inaugurated a policy calculated to insure the needed funds to provide a **national employment service for engineers**, with offices in leading cities throughout the country. Under this policy the Societies continue their financial support and this is supplemented by contributions from those deriving benefit from this enterprise, as no profit to anyone is to be taken; simply a self-supporting service. Contributions if on a basis of but 25 per cent of the fees which must be necessarily exacted by a commercial agency will make possible the realization of a national service. With the new plan fully developed representatives of the Employment Service will visit those with positions available to get first-hand information as to the requirements of the job. Over 55,000 engineers, including the most prominent of the profession, are members of the Societies conducting the service, thereby ensuring employers a selection from engineers of known antecedents and whose records have been closely scrutinized. Engineers seeking opportunities may arrange to obtain weekly by first-class mail the current list of openings. Their availability also is announced in the respective publications of the Engineering Societies.

Obituary

James Gorman, extensively interested in smokeless coal properties in low-volatile territory, died in Lynchburg, Va., Feb. 18. Mr. Gorman's death was entirely unexpected and the news of his demise was a distinct shock to associates and friends in the southern part of the state. He had for a number of years been associated with J. C. Sullivan in his operations and only recently at the annual meeting of the Smith Pocahontas Coal Co. was named as the head of that concern, operating at Caloric on the main line of the Virginian Ry.

John W. Trounce, vice-president of the Buffalo & Susquehanna Coal & Coke Co., in charge of sales, and vice-president of the Goodyear Lumber Co., died suddenly at his home in Toronto, Ont., Feb. 18, aged 50 years. His death was a great shock to associates in the coal trade, as he had been attending to business as usual in the week prior to his death. He was born at Port Perry, Ont., and as a young man settled in Buffalo, obtaining a position with the Good-year lumber and coal interests, with which he was associated for thirty years. He had a large acquaintance and many friends in the Eastern states and in Canada.

William Donald Clark, well known in coal trade circles in the Fairmont region and construction engineer of the Domestic Coke Corporation of Fairmont, died of pneumonia at the home of his wife's mother at Fairmont during the second week of February. A son of Mr. and Mrs. George A. Clark, of Sidney, N. Y., and a graduate of Cornell University, Mr. Clark became connected with the Domestic Coke Corporation about five years ago. He married Miss Lucille Hart, of Fairmont, on Oct. 30, 1922, and is survived by her and by an infant son, William Donald, Jr., as well as by his parents and one brother, John A. Clark, an official of the Hope Gas Co., of Clarksburg.

Robert Gage, 77, one of the organizers of the Robert Gage Coal Co., of Ray City, Mich., and an owner of Michigan coal mines for years, died suddenly at his home in Jackson, Mich., Jan. 30.

Coming Meetings

Upper Potomac Coal Association. Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

Northwestern Pennsylvania Coal Operators' Association. Annual meeting March 4, Butler, Pa. Secretary, T. F. Diefenderfer, Butler, Pa.

Canadian Institute of Mining and Metallurgy. Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

News Items From Field and Trade

ALABAMA

Four convicts were burned to death in a fire which destroyed the prison at the Flat Top coal mines of the Sloss Sheffield Steel & Iron Co. on the night of Feb. 15. There were about 500 prisoners in the building at the time of the fire, all but four of whom were rescued and held in the prison walls. A number of other buildings in the enclosure also were burned, the total loss being over \$100,000, though no official figures have been given out. The convicts were under the care and supervision of the State Convict Board. It is announced by officials of the company that the building will be replaced as early as practical with a structure of modern design.

S. V. Shelburne, well known in Birmingham wholesale and retail coal circles, suffered the loss of the larger part of his left forearm when he slipped and fell beside the railroad track in the yards of the Pan American Coal Co., of which he is president, when cars were being switched thereon, his arm and hand being so badly crushed under the car wheels as to render amputation necessary just below the elbow. Mr. Shelburne also is president of the Shelburne Sales Co.

It is announced that the mine of the Thomas Creek Coal Co., at Carbon Hill, Walker County, will soon resume operations. The operation has been idle for several months.

ALASKA

First actual demonstration of the value of Matanuska coal for coking purposes was made Feb. 2 when material produced in the ovens of the Alaska Railroad successfully smelted a charge of 4,800 lb. of scrap iron used in castings by the railroad. The coal came from Coal Creek, Chickaloon section of the Matanuska fields. It is pronounced by the foundry foreman as equal to any coke imported from eastern mines. The test finally solves the problem of smelting metalliferous ores, upon which had been pending negotiations for a smelting plant on the railroad.

ARKANSAS

Operation of the Western Coal & Mining Co.'s mine No. 6, near Denning, which had been idle since late in November, when the engine room was destroyed by fire, has been resumed. The hoisting engine was damaged beyond repair, necessitating the purchase of a new one. The mine employs approximately 75 miners.

The Fort Smith Spadra Coal Co., Fort Smith, with a capital of \$100,000, incorporated by W. D. Logue, W. G. Pendergrass and others will develop mines near Hartman, its present daily capacity being 600 tons.

COLORADO

During the month of January Colorado mines produced 1,209,152 tons of coal. This is an increase of 221,362 tons over the production for the same month last year. The average number of men employed in and about the mines was 13,896 and average number of days worked for the month was 20.2.

INDIANA

Dr. W. N. Logan, state geologist and head of the department of economic geology at Indiana University, has been honored with a fellowship in the Royal Society of Arts, of London, England. His selection is recognition of his work in the geological field of science and research.

The Enterprise Coal and Mining Co. of Sullivan, Ind., has filed certificate of final dissolution.

ILLINOIS

Big Creek Coals, Inc., in Mine No. 3, near Harrisburg, established a record for Saline County, Feb. 14, by mining, hoisting and placing into cars 4,187 tons of coal. The previous record for Saline County was 4,162

tons mined last year at the Harco mine. January production by the Big Creek company was the largest in the company's history, though only three of the six mines worked.

The Union Colliery Co., at its Kathleen mine, near Dowell, on Feb. 15 paid the 800 men employed approximately \$95,000. The output of coal mined that fortnight, in thirteen working days, required 1,196 cars to transport it. The average of wages earned by all employees was \$123.19. The highest pay was \$194.45. Mike Maller, who led the list with 234 tons of coal, drew it.

KENTUCKY

The coal taxation bills on a tonnage basis which are now in the Kentucky General Assembly are in amounts of from 1 to 3 per cent of the sale price of the coal mined. The Nelson bill in the house was for 2½ per cent, but Mr. Nelson is willing to reduce this to 2 per cent. He figures last year's state production at about forty-three million tons, roughly valued at \$150,000,000 and figures that coal would produce about \$3,700,000 for the state in additional tax.

Fred M. Sackett, of the Byrne & Speed Coal Co., Louisville, who is affiliated with retail, jobbing and operating coal companies, has issued a statement refusing to seek nomination as U. S. Senator, but says that he would accept such an honor if tendered him by the Republican Party.

The Jones Brothers Coal Co., capital \$30,000, has been incorporated in Madisonville by F. P. Jones, T. H. Jones and others.

The Harlan-Jellico Coal Co. has been incorporated in Louisville by J. M. Dougherty, Dorothy Feil and others, with a capital of \$15,000.

The Reliance Coal & Coke Co., of Glomawr, is reported to have purchased the plant of the Defiance Coal & Coke Co., in Defiance, Ky.

The Lorena Coal Co. has been incorporated in Pineville, by D. E. Starbuck, W. R. Hughes and others.

The Willis-Harlan Coal Co., Hima, has increased its capital stock from \$40,000 to \$100,000.

MINNESOTA

The Duluth Chamber of Commerce has decided to fight the battle of the dock companies and throw the weight of its influence and the aid of its traffic department in the fight for adjustment of freight rates. At a meeting held at the Chamber the representatives of all dock companies presented their case and said that unless freight rates were changed it would mean the ruination of the companies. Plans already are under way for lessee shipments to the Head-of-the-Lakes next season.

The Superior Coal & Dock Co., is now drawn into the financial difficulties of its parent concern, the bankrupt Maynard Coal Co. The Emmons-Hawkins Hardware Co., of Huntington, W. Va., has petitioned the federal court at Duluth to administer the dock company's assets in Minnesota, complaining that the Maynard Coal Co. has failed to meet a promissory note for \$3,917 and declaring a majority of the dock company's stock is held by the Maynard Coal Co.

F. A. Wildes, State Superintendent of Mines, told the Minnesota Federation of Architectural and Engineering Societies at its annual convention held at Duluth a few weeks ago, that investigation of the fuel possibilities of the innumerable peat beds in Minnesota had reached a point "that we may confidently expect something important." Mr. Wildes spoke on "Development of Peat for Fuel Purposes." The price of this new fuel on the market, he said, must be so low that the coal operators cannot meet the competition. It will not be enough that this peat fuel can be sold for a few dollars under the present price of coal, but must be below the total actual cost of the coal without profits of any kind.

NEW JERSEY

An act has been passed by the State Senate of New Jersey providing that coal must be sold in units of 2,240 lb. to the ton instead of 2,000 lb. as at present. The bill now goes to the Assembly and then to the Governor for his action.

NEW MEXICO

The U. S. Land Office at Santa Fe has been directed by the Secretary of the Interior to offer for lease a tract of public coal land in New Mexico containing approximately 1,600 acres. The land is in the San Juan River coal field, about 12 miles northwest of Farmington. Lease for the tract will be at a government royalty of 10c. per ton for coal mined, a minimum investment in mining operations of \$100,000 during the first three years of the lease, and a minimum production of 5,000 tons of coal a year beginning with the fourth year of the lease. Lease of this land will be offered at public auction to the highest bidder and the exact date of the offering will be announced at the Santa Fe land office.

NEW YORK

Alfred D. Thompson, who has been vice president of the Titan Fuel Corporation since its organization, has resigned to assume charge of sales of the Sullivan Pocahontas Coal Sales Co., of Charleston, W. Va. This company will handle the tonnage of the Sullivan Pocahontas Co., recently formed through the consolidation of other coal companies in West Virginia, having mines in the Virginian and C. & O. railways. Mr. Thompson was formerly connected with the Pennsylvania Coal & Coke Co. and during the war was assistant deputy commissioner of the Tidewater Coal Exchange New York City.

The Central Coal & Coke Co. report for 1923 show a net income of \$565,615, equal to \$9.20 a share on the \$5,125,000 common stock of \$100 par value outstanding, after interest and provision for the preferred dividends. This compares with net income of \$309,177, or \$4.20 a share earned in 1922. The net sales amounted to \$10,472,857 against \$7,473,700 for 1922, and the surplus for the year was \$164,365 against \$61,677. The balance sheet as of Dec. 31, 1923 shows total current assets of \$3,095,246 against \$3,089,443 last year, and total current liabilities of \$2,765,208 against \$1,009,921, making net working capital \$330,038 compared with \$2,079,522 at the close of 1922. The profit and loss surplus of \$12,676,828 compares with \$13,012,047 for the year previous.

OHIO

Lee Llewellyn, formerly with the Pittsburgh Coal Washer Co., and recognized as an expert on coal preparation has been appointed general manager in charge of sales of the Houston Coal Co., of Cincinnati. Mr. Llewellyn took his B.Sc. at the University of West Virginia in 1899 and a short time later went to Pittsburgh, where he was advanced to the place of directing the designing and manufacture of coal-preparing and cleaning plants for Heyl & Patterson. He remained there for seven years and then transferred the scene of his endeavors to Alabama, where he erected cleaning plants and was for a time in active direction of operations. He returned to Pittsburgh and entered the employ of the Pittsburgh Coal Washer Co. twelve years ago. Mr. Llewellyn succeeds to the position held by the late Kuper Hood. Harry Olmstead, who has been director affairs since last fall, will become Mr. Llewellyn's assistant.

W. D. McKinney, secretary of the Southern Ohio Coal Exchange, Columbus, has been spending considerable time in Washington, D. C., appearing for that organization in the lake freight rate controversy before the I. C. C. In the complaint of the western Pennsylvania and the eastern Ohio operators asking for a revision of freight rates on lake coal, Mr. McKinney is taking a prominent part. The old question of the differential between the Ohio and the Inner Crescent fields is being revived.

C. A. Ilgenfritz has resigned as vice-president of the Stroh-Ilgenfritz Co. to become assistant purchasing agent for the Youngstown Sheet & Tube Co. Henry A. Butler will succeed Mr. Ilgenfritz as vice-president, and the name of the company will be changed to the Stroh-Butler Co. The directors, in addition to J. R. Stroh and Henry A. Butler, are: W. H. Wulf, W. E. Beadling and J. G. Butler, Jr. The Stroh-Butler Co. will continue the business

of the old company, representing producers, and dealing in coal, coke, alloys, fluorspar, steel, firebrick, fireclay and fuel oil. The change is effective March 1.

OKLAHOMA

The business of coal mining does not come under the jurisdiction of the Oklahoma State Corporation Commission, according to a ruling made by the commission. Under this opinion the commission recently dismissed the case of the Oklahoma Farmers Union Exchange vs. the Cherokee Fuel Co., of Henryetta; Consolidated Fuel Co., of Muskogee; Starr Coal Co., of Henryetta; Montezuma Creek Coal Co., of Okmulgee; Midland Coal Co., of Oklahoma City; Southwest Coal Co., of Amarillo, Texas; Superior Coal Co., of McAlester; Edwards Coal Co., of McAlester; Huges Buttery Coal Co., of McAlester, and the McAlester-Collier Coal Co., of Muskogee. C. H. Hyde, as vice president of the exchange, charged that prices of coal at the mines were "unreasonable, excessive and extortionate."

PENNSYLVANIA

Nowhere in the United States is any industry observing the child labor laws more rigidly than in the anthracite regions of Pennsylvania. Dr. Royal Meeker, Secretary of Labor and Industry, said after looking over a report of an investigation into the child labor conditions in 100 collieries in Lackawanna, Luzerne and Schuylkill counties. He asserted that the child labor evil in the anthracite field is a myth and that reports of child welfare organizations claiming that thousands of children are being illegally employed in the hard-coal mines are without foundation. The investigation was made by M. P. Frederick, an inspector of the Department of Labor and Industry who reported that he found only five boys between 14 and 16 years of age employed and that they were working in the breakers and in accordance with the existing legal requirements. Several boys under the legal age were found working with forged age certificates.

Reorganization and refinancing of the Penelec Coal Corporation, the fuel-supplying subsidiary of the Penn Public Service Corporation, is attested by a mortgage recorded in Ebensburg, Cambria County, for \$1,500,000, covering all its properties. The mortgage is dated Feb. 1, 1924, and was given by the Penelec Coal Corporation, which has a Pennsylvania charter but which maintains its principal office in New York City, to the National Bank of Commerce of New York City. The mortgage names the Penn Public Service Corporation as a third party in the agreement, based on the fact that the corporation holds a number of leases on properties included. All underlying securities of the Penelec company are retired by this action. The company owns approximately 6,000 acres of coal lands in Cambria, Indiana, Somerset, Clearfield and Centre Counties.

S. D. Warriner, president of the Lehigh Coal & Navigation Co., in his report for 1923 says that notwithstanding the miners' strike and the general observance of holidays in the anthracite fields, the production of the company was high, being exceeded only in the war years of 1917 and 1918 when working hours were abnormally increased. The income account of the company for the year ended Dec. 1923, shows net income of \$3,473,507, after expenses, charges and taxes, being equivalent to \$5.94 a share on the 584,868 shares of capital stock, compared with net of 11,587.024, or \$2.71 a share on the capital stock in the preceding year.

Eighteen acres of ground purchased by the City of Johnstown for park purposes is underlaid with three veins of coal and the only available outlets conflict with mines of the Cambria Steel plant and the Valley Smokeless Coal Co. Mayor Louis Franke recommends the selling of the coal right to the highest bidder as it would not pay the city to undertake to develop the small tract with so many obstacles in the way.

Sale of the Johnetta Brick & Coal Co., of Johnetta, to the Pittsburgh Plate Glass Company for a cash consideration of \$500,000 has been announced by J. E. Stewart, president of the Johnetta company. Included in the sale was a brick and tile plant employing 400 men and 4,200 acres of coal land.

Shelby D. Dimmick, vice-president of the Glen Alden Coal Co., Scranton, recently was elected president of the Engineers' Society of Northeastern Pennsylvania.

The Franklin Coke Co. at Tippecanoe, Fayette County, is preparing to resume

operations shipping coal after being idle for several months.

The United States Steel Corporation paid nearly \$1,500,000 to its pensioners during 1923, according to the report of the Carnegie Pension Fund. The total showed an increase of more than \$180,000 over 1922. Among pensions paid employees of the different companies were Carnegie Steel Co., Pittsburgh, \$367,469; American Steel & Wire, \$261,263; American Sheet & Tin Plate, \$196,223; National Tube, \$143,031, and H. C. Frick Coke, \$103,838. Since the fund was organized in 1911 \$9,543,235 has been paid in pensions.

UTAH

Articles of incorporation are being filed by the Consumers' Mutual Coal Co. The company will develop lands in Gordon Creek, Carbon County. Headquarters will be at Price. It is stated that the company has valuable properties which it hopes to develop to an ultimate capacity of 2,000 tons a day. The concern will be conducted along mutual lines. Organizers include Donald E. Jenkins, described as a Cincinnati and Salt Lake City capitalist, president; Arthur E. Gibson of Price, vice-president and general manager; J. Tracey Wootton, Salt Lake City attorney, secretary, and others. The treasurer is an assistant cashier of a big Salt Lake City bank.

Coal mined in Utah during January amounted to 529,570 tons compared with 468,735 for the same month last year. It was the best January output since 1920, when 589,668 tons was mined.

VIRGINIA

The New England Fuel & Transportation Co., which recently took over the Crowell & Thurlow vessels, has been reorganized as the Mystic Steamship Co., with J. R. Spear as its representative. The company is affiliated with the New England Coal & Coke Co., of which Mr. Spear also is the Norfolk representative.

The Amherst Fuel Co., of Huntington, W. Va., is contemplating locating an agency in Norfolk, but the details of the transaction have not been made public.

WASHINGTON

Coal operations may soon start on the island of Sucia, off the north of Washington coast. A government permit to prospect has been granted Henry W. Parrott, of Seattle. The island, which rises about 150 ft. at its maximum, is known to be underlaid by two coal seams, the Douglas, about 100 ft. below sea level, and the Newcastle, 200 ft. below sea level.

N. D. Moore, vice-president of the Pacific Coast Coal Co., has been elected president of the Federated Industries of Washington.

The American By-Products Corporation has filed articles of incorporation at Olympia, with a stated capital of \$2,000,000. Offices have been opened at Vancouver, with Henry C. Prudhomme in charge as secretary and general manager. Mr. Prudhomme announced that the new corporation takes over all the interests and assets of the Chemical By-Product Industries, including full ownership of all American and foreign rights to the Gordon Multiple Unit Retort and process for the recovery of oils, chemicals, drugs and other by-products from coal, lignite, oil shale, sawdust and waste wood.

WEST VIRGINIA

An injunction, the outcome of which may have an important bearing on the methods utilized in the mining of coal in West Virginia as well as in other states, is sought by the Chaplin Collieries Co. in the Circuit Court of Monongalia County to restrain the Pursglove Coal Co. from mining Pittsburgh coal underlying Sewickley coal owned by the plaintiff "in such a manner and in such a way as to unnecessarily injure the plaintiff and destroy its mine and endanger the lives of its employees," and to require the defendant to provide such supports as will protect the plaintiff in its property rights. According to parties to the suit there will be an appeal to the Supreme Court of West Virginia and perhaps to the Supreme Court of the United States without regard to the decision reached by the Circuit Court of Monongalia County. The importance of the suit lies in the fact that it will establish a rule, according to coal men, governing the mining of millions of tons of coal in West Virginia and that tracts under which there are more than one seam might be affected.

Union coal miners of southern West Virginia have formed the Pax Mining Co., capitalized at \$1,000,000 and with offices in the Boyce Building, at Charleston. The company will operate on an acreage adjacent to Grippe, on Coal River, its holdings adjoining the properties of the Brotherhood of Locomotive Engineers. Fifty-one per cent of the stock is to be owned and controlled by union miners but other union crafts or card men are to be permitted to buy stock. The president of the company is Otis Lively and its secretary and treasurer is P. R. Cameron. The company is now operating through one opening but plans twelve more openings and expects to reach a production of 2,500 tons a day within the year. Coal to be mined is in the No. 2 gas and the Big Eagle seams.

W. E. Wheeler, of the Wheeler Coal Co., of Columbus, Ohio, was in Charleston recently looking over several mines and has signed agreements to handle the output of the Big Bottom Coal Co., the Betty Ann Colliery Co. and the Lemoyne Coal Co., mines which have a daily average output of 15 cars.

J. C. Baker, of Beckley, W. Va., one of the pioneer mine managers of the Winding Gulf district, has become identified with the Newport News Coal Exchange as a field representative in the New River field. Mr. Baker will have his headquarters at Beckley.

R. R. McFall, treasurer and general manager of the Southern Fuel Co., of Morgantown, has relinquished the management of that company to become vice-president and general manager of the Universal Fuel Co., of Pittsburgh, of which H. J. Booth is president and William Booth secretary. This company operates the Riverseam Coal Co. at Hildebrand in Monongalia County.

Coal is again being shipped by the Coe-Pocahontas Coal Co., operating at Garwood in the vicinity of Clarks Gap on the Virginian Ry. The tract where the company is operating is just undergoing development and preparations are being made to erect a tippie of modern design. Among those largely interested in the Coe-Pocahontas Coal Company are the McQualls.

Six new tipples are to be erected on the properties of the Fordson Coal Co. on the Norfolk & Western Ry. in the Tug River district. The understanding is that five of the new tipples are to be constructed on the Pond Creek properties and one at Twin Branch. They are to be of steel and fully equipped with machinery for the proper preparation of coal.

The Elm Grove Mining Co., of Pittsburgh, operating in Ohio County, W. Va., has been authorized to increase its capital stock from \$2,400,000 to \$3,000,000.

CANADA

Over two million tons of Alberta coal was sold to Canadian points outside the province and the United States during 1923, states the annual report of the provincial mines branch. The total production of coal for the year was 6,866,924 tons, of which 1,382,788 tons was disposed of for consumption in Alberta, 1,937,753 for other provinces, and 83,557 tons in the United States. To the railway companies 3,110,121 tons was sold. The total production for the Alberta mines during 1923 was 890,491 tons over the total for 1922.

The announcement that Vancouver Harbour Commissioners propose the construction of coal bunkers at the Port of Vancouver to give the collieries of the Province of Alberta an opportunity to compete for the Pacific Coast mercantile business has stirred the coal operators of Alberta with enthusiasm and roused some manifestations of bitterness among the coal men of Vancouver Island. The managements of northern Alberta collieries already are organizing so as to be in a position to take full advantage of the new outlet when the time comes. Meanwhile William Sloan, Minister of Mines, and the representatives in the Provincial Legislature of the City of Nanaimo have obtained from the Harbor Commissioners the assurance that the bunkers to be built are not intended for the sole use of Alberta coals but will be open also to handle the coals of the island and other parts of the province. An interesting sidelight on the situation developed when the Home Products Association of Vancouver asked the Nanaimo Board of Trade to indorse the principle of the consumption of home products in preference to those imported. The Nanaimo organization wanted to know where the Vancouver association stood in the matter of encouragement of outside competition with locally produced coal.

New Equipment

Approved Single-Stage Fire Pump

Centrifugal pumps have been used for fire-protection purposes for many years and until recently those recommended by the underwriters were of 500, 750, 1,000 and 1,500 gallons per

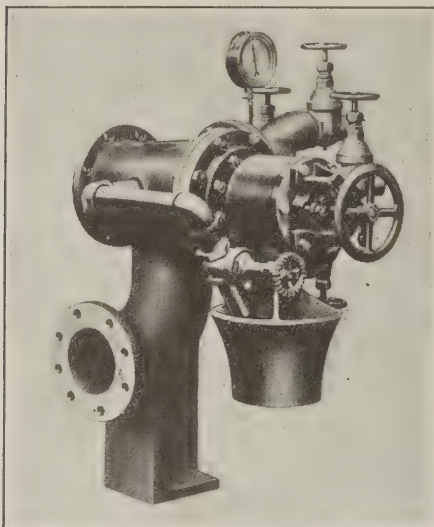


Fig. 1—Fittings for Centrifugal-Type Fire Pump

For control and test of the fire lines a set of fittings such as shown here is highly necessary. Pressure gages show the pressure required to deliver different volumes of water through the various fire lines.

minute capacity suitable for operation at a pressure of 100 lb. gage. Originally these pumps were made in the multistage type and ran at 1,150 r.p.m.; later the specifications were changed to permit the use of multistage 1,800-

r.p.m. pumps, and recently the specifications have been changed to permit the use of single-stage pumps.

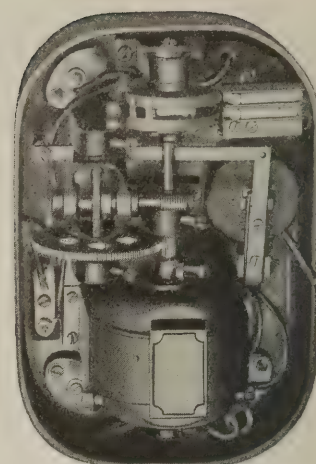
In line with these changes the Allis-Chalmers Mfg. Co. is now building a single-stage fire pump in accordance with the above specifications. The new pump is a development of one of this company's popular single-stage pumps which it is claimed has operated successfully against heads as high as 300 ft.

Auxiliary Relay for Long Time-Limit Service

For the purpose of controlling switching operations, mechanical operations and processes where a long time limit is desired, a relay, known as the type GK auxiliary relay, has been developed by the Westinghouse Electric & Mfg. Co. Extensive use has been made of this relay in automatic substations where various operations must be timed.

The relay is distinctive in that it is self contained and is so enclosed in a dust-proof case that it can be mounted wherever desired. The timing is accurate, yet the device is designed so that it can be adjusted by any careful workman. The possible time limit adjustments range from a maximum of 40 minutes to a minimum of 3 minutes.

The operation is effected by a train of gears and worms driven by a standard fan-type motor. The last shaft in the train which carries the contacts is operated by a worm which is so arranged that it is normally disengaged by a spring. This worm is mounted on a trunnion and is connected to a small electro-magnet which when energized will engage the worm with the gear.



Long Time-Limit Relay

This relay is arranged for time delays varying from 3 minutes to 40 minutes.

This coil usually is connected in parallel with the motor winding so that as soon as the relay is energized the motor is started and the coil energized. The worm then engages and the contact starts to move.

Healing Mule Collar

The Thomson Co., of Fitchburg, Mass., has just announced a new and improved zinc mule collar for mine mules. The hook formerly at the top is not needed in mine service and therefore has been eliminated. A guard has been substituted at the top, so that the collar will be perfectly smooth and prevent catching in mine timbers, ropes, guides, etc.

These collars are much lighter than the usual leather collars and being made of zinc form a zinc oxide protecting and healing surface which assists in the cure of any neck or shoulder sores with which the mule may be suffering. The collars are easily cleaned, thus rendering the collection of germs unlikely. Special springs cushion the shock when starting a load or when the car strikes an obstruction.

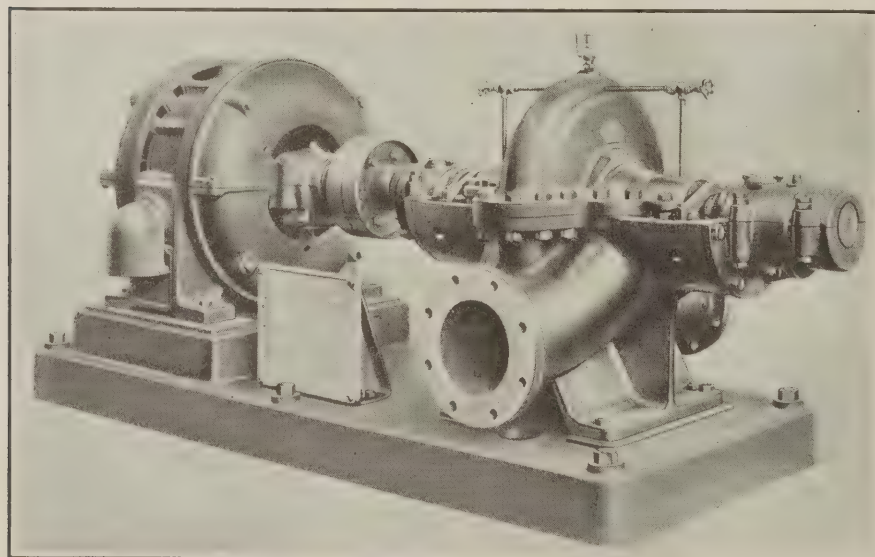
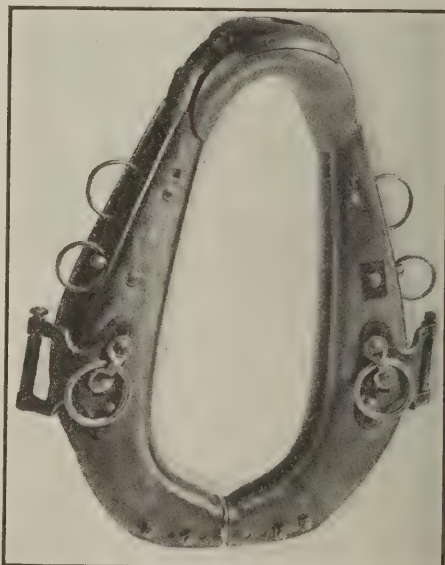


Fig. 2—Single-Stage Fire Pump

Due to the heavy construction of this pump it has been possible to operate it safely on heads ranging as high as 300 ft. The company has been very successful in the manufacture of pumping units because the complete outfit, including the motor, is made in the one factory, thus insuring perfect design and alignment.



Improved Zinc Collar

For mine mules this collar has been made as plain as possible so as to prevent catching into any obstructions along the road.

COAL AGE

McGraw-Hill Company, Inc.
JAMES H. MCGRAW, *President*
E. J. MEHREN, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

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We and They

INVOLVED in the oil scandal are many men who have been foremost in condemning the coal-mining industry. It was McAdoo who believed that the coal men profited unduly, and loudly did he proclaim it. It appears that the price may be too high for coal but cannot be too high for influence at the capital. Someone has well said that "McAdoo would sooner be in right than President." It was Palmer and Daugherty also who lamented the lack of patriotism of mine operators. These government officials, past and present, may be suffering from undue public suspicion, and the coal man, himself too often suspected with little reason, will do well to treat these men with a caution in judgment and a temperance in statement that Palmer and Daugherty too often have failed to evidence.

A Job of Gloom

ONLY a few years ago our thick-walled factories with their small windows were places of dust and dirt, where men worked under a considerable handicap. Did they want to see anything clearly they took it to a window—an open window, the dirt on the windows hiding the sun rays—or to an open door. Now we have larger windows and at night bright lights. Everything can be inspected anywhere in the building. By night or day work goes on unimpeded by gloom, and manufacturers have found that light has paid dividends.

The mines alone have continued dark. They have with few exceptions relied on the uncertain light of cap and hand lamps—in this country principally the former, in Europe mostly the latter. Surely the time is coming when the practice at some mines of illuminating face as well as roadways will be standard.

In the present glutted state of the market clean coal is needed. Theoretically, the operator weighs the coal and refuse that the miner loads, throws away the refuse and pays the miner for all he sends out. As a matter of fact at some mines he probably docks those sending particularly bad coal so heavily that he comes more nearly even when he compares his railroad with his mine-car rates.

However, it is not just to distribute all the cleaning burden on the evil doer and in some cases the loss falls largely, if not entirely, on the operator. In consequence he will do well to give the mine worker of honest intentions a good light whereby to clean his coal. He may save considerable losses at the tippie by so doing. The greater light will cause less material to be wasted, will make it easier to watch the roof, will speed up the work and will make the miner more cheery and less discontented.

Mining is gloomy work at best. A little light at the faces will brighten the day's toil. In the roadways when the men watch the roof for low wires and timbers, they frequently fall by stumbling over coal and slate, upstanding ties and traversing rails. Similarly

when they watch the floor they strike their heads against wire and timbers. A light in the roadway will prevent such accidents which are serious, especially where locomotives are about to run down the fallen man—a trip rider, for instance.

Ten years from now, we shall be wondering, as we look back, that in these days we were contented to light our mines with only the meager light of cap lamps. The change suggested is not a large one, no larger than the change in factory illumination in the past few years.

Light Is Light

NO MATTER the source of advice, if it is good, it is well to heed it. The Coal Commission was in many matters not fair, but this at least is true of it: It expressed the public mind, and after all, it is the reactions of the public that the coal operator has to meet and appease. Let us regard its pronouncements, therefore, as revelations of the popular appraisal of the coal industry and, not seeking in anger to meet its false judgment, endeavor to find a way to merit popular approbation.

The fact is the coal industry is not properly "sold" to the American public. The coal man has argued in heat and passion and not with due calmness. The man who is upset and indignant in making rebuttal is usually not prudent or convincing. He in general only involves himself in his argument.

His better plan is to ask questions and put the public on its defense with a "How?" and a "Why?" The average man thus confronted, asked to give an answer, usually ends by giving convincing evidence that he does not know or appreciate what he has been saying. At least this is gained from the report of the Commission: that every one concedes that it had no solution, had no "How" and no "Why" to give the consumer, the coal man or the mine worker. Where no one can provide a remedy, the public must needs be patient.

What is said about the main part of the report should be modified, because some of its parts, especially the engineering report, was written by efficiency engineers aided by mining men. Unfavorable to our mining practice as it is, it does not err in the direction of excessive censure. Good mines were picked out deliberately for investigation, yet the findings were sufficiently distressing. Fortunately, they were made just at the time when instrumentalities were coming into being that may profoundly modify the inefficiencies described.

There is hope, bright hope, that a few years hence the miner will lose no time at the face, the trips will not stand at the parting and the daymen will not idle at the tippie. The engineering report does not say much about the cure. Like much work by efficiency engineers it relies on co-ordination and co-operation to end evils that only mechanical engineering adequately can remove and that management can merely improve. The conveyor that has revolutionized many industries

is on hand to reconstruct ours. Badly is this tool of industry needed, for the mechanical loader has completely broken down our already faulty transportation system.

The failures to get the anticipated tonnages from mechanical loaders are convincing evidence that the Commission's strictures on irregular mine-car service are justified, and the only way to make loaders do a good day's work with broken roof behind the loading machines is to have a conveyor to remove the coal to some place with an unbroken roof, where cars can be filled steadily. Where several mechanical loaders are used, the only way to prevent the congestion inevitably consequent on the use of several conveyors feeding to several trips is to have an aggregating conveyor receiving from several gathering conveyors and feeding to a single trip or carrying the coal direct to the tippie.

The main Coal Commission report has told what the public thinks. The engineer's portion of it has revealed the glaring inefficiencies that exist underground. Light is light, even if it comes from a commission of which a few at least were men who could not run a mine themselves were they given it without any debt or other encumbrance.

The Commission may have feared to tell the whole truth about the unions, may have palliated what cannot be excused or forgiven, but it told us some matters we would do well to take to heart. Though good counsel was marred often by bad logic, many a true word slipped in and a poor plan it would be to let the evil overshadow the good.

Prices and the Wage Contract

REMARKABLE and almost impossible to forecast has been the trend of recent events in the bituminous-coal industry. It was thought that the western Pennsylvania coal operators would not appear in Jacksonville to negotiate a settlement, but pressure from President Coolidge and Herbert Hoover brought them there.

It seemed almost incredible that with business being lost almost beyond recovery by reason of a high wage scale the operators would consent to sign for the present wage, even though the irresistible though more indirect logic of the situation pointed that way. But sign they did.

Indications pointed to a long fight on the period of contract. But even there again the needle pointed in the wrong direction. The contract was signed for the three years, the miners wanting a four-year contract, and many—perhaps most—of the operators wanting to sign for a single year.

Now that the wage scale has been approved for a period of three years by the subcommittee of miners and operators the public will be wondering what effect the settlement will have on the price of coal. That is a natural question but one not easily answered. The settlement will result in a glutted market for coal, and lower prices might be expected as a result if they had not already attained the irreducible minimum for the present union wage scale. The losses incurred by the operators of union bituminous-coal mines are rapidly drawing them into bankruptcy.

However, the price may be somewhat higher rather than lower. Contracts for coal delivery are lapsing. It was well known that these contracts were all that enabled some operators to keep going. When they come

to an end the mines that relied on them will have to suspend or get a higher price for spot coal. That will tend to stiffen the market. The removal of the weaker brethren will make it possible for those who remain in the field to ask for their coal something a little nearer cost, enough in short to make it more profitable to face the losses of operation in preference to the greater losses of shutdown in an industry where shutdowns are extremely expensive. That hope may be blasted by the low prices of a non-union field ready to cut wages to any figure that will keep its mines running.

Those who close their mines will do so for a long time. They will disband their forces, board up their houses and in some cases let their mines flood if they are shallow and relatively easily drained. It will be clear to them that only a measurable increase in price will make it worth while to undertake the high costs of resumption. In fact their finances during the interim becoming more involved may prevent them from resuming. The low-cost mines, therefore, will get the benefit of the business of those operations which cannot continue to work.

Another element in the situation may enter, however, to get the public cheaper coal—the conveyor and the mechanical loader. The prospect of cheap coal for a long period will force more economical methods of production. It will be recognized that cheaper operation and better preparation will be the only way to keep in the market. The miners will be amenable in view of the financial stress and they will not oppose complete mechanization of the mines. This will have its effect in reducing price. So after all is said it is difficult to forecast the ups and downs of the index of prices, swayed as it is by many adverse influences of an imponderable character.

Safety a Major Consideration

ONE of the first thoughts when business gets unprofitable is to cut off all indirect expenditures—those which do not produce immediate profit. Expenditures on safety are among these, but the cost of running risks is too heavy to make such economies profitable and savings of this kind are certainly not moral.

In fact, at no time is safety more neglected by the mine workers and foremen than during a time of low profits. The miner anxious to make a big day during an unsteady run fails to put up a prop if thereby he can the more promptly fill a car. The motorman and his trip rider, harried to transport a large tonnage and so cut the cost of haulage, run risks in coupling cars, in opening doors and in taking switches. The foreman seeks to reduce costs by bringing pressure to bear on those who would report places for gas. He seeks to have all his men engaged in directly profitable labor and not at work that, as he would put it, merely assures safety.

At such times it is more than ever necessary to remember the cost of physical hazard and to have safety men around the works whose whole standing with the company lies not in the cheapness of coal but in the freedom from accident. Every day's coal should be charged with the accident costs of operating the mine so that the hazard always would be remembered as part of the cost to be lowered. Accidents are not unavoidable charges in mining. They are costs which good management will much reduce, and to overlook them is to involve the mine in difficulties sooner or later.



Lewis Mine Provides Against Electrical Shutdown And Uses Block System of Development

Alternating Current Used for Everything Except Haulage—Main-Line Haulage Equipment Pressed Into Service to Gather Cars—
Gob on Two Sides of Pillar Coal Does Not Prohibit Extraction

BY ALPHONSE F. BROSKY

Assistant Editor, *Coal Age*

FEW operations in the East utilize alternating capacity for all purposes other than haulage. The Lewis mine of the Hudson Coal Co., located at Wolf Summit, W. Va., is one of these. As a result the electrical system employed at this mine is well worthy of careful consideration.

Adoption of alternating current forestalls many of the troubles to which direct-current equipment is subject. At the present time, however, this mine is not developed so extensively that appreciable line losses would be incurred if direct current were employed. Consequently no necessity at present would exist for an excessive yardage of copper feed cable. The officials of this company are, however, anticipating the future needs of this development and providing for the time when the workings will be sufficiently extended to warrant the use of another underground substation, one already having been installed. When such time shall arrive the foresight of the officials who have recommended the present use of alternating current will become apparent.

Briefly, future plans call for the stepping down of a

NOTE—Headpiece shows the tippie of Lewis Mine of the Hudson Coal Co. Because circular picking tables are used the building is more nearly square than most structures of this kind. A belt conveyor brings the coal from the underground workings to the preparator.

22,000-volt incoming line potential in a bank of transformers to be located near the tippie. These will reduce the voltage to 2,200. Branch lines carrying this potential will radiate from the primary transformers to various points on the property, where they will enter the underground workings through boreholes. At these various points, underground transformer stations will be installed to feed the direct-current haulage lines.

Several precautionary measures have been taken at this operation to obviate possible shutdowns, either momentary or prolonged, as well as to surmount the difficulties entailed by fluctuating line voltage. Such measures call for the exercise of considerable study and ingenuity in order to adapt them to the requirements of any particular plant. J. P. Rosier, the electrical adviser at this installation, has solved the difficulties with which he was confronted in a manner that invites the adoption of similar plans at other developments.

ALL EQUIPMENT NOW USES 440 VOLTS

In the present alternating-current system an incoming potential of 22,000 volts is stepped down to 440 volts by means of a bank of three 50-kva. transformers in a surface station near the tippie. Incidentally, this will become the primary transformer station, when proposed extensions and alterations to the system are

made. All equipment now installed, both on the surface and below ground, is rated at 440 volts. At the present time the main conductors are taken down the airshaft to the underground distribution circuit. In order to protect the 440-volt lines and the equipment connected to them from single-phasing and line burn-outs, which might result from falls of roof or from other causes, an alternating-current breaker is employed.

A single-phase and reverse-current relay operates in series with the fan circuit, so that single- or reverse-phasing in the high-tension incoming lines results in shutting down the 50-hp. induction motor, by which the 5-ft. reversible centrifugal fan is driven. This relay automatically opens the main-line alternating-current circuit breaker and holds it open until such time as the phasing difficulty is corrected, after which the breaker closes automatically. The fan must, however, be restarted by hand.

Within the mine the alternating-current lines of 4/0 bare copper are strung on glass insulators fastened to the ribs of the entries. Where these lines cross haulage roads and manways they are suitably protected.

Interruptions to power supply and the burning out of the ventilating-fan motor are imminent causes of worry to the mine manager if he is not prepared to meet such emergencies. Steam, gasoline or oil engines are in many cases installed as stand-bys to provide against such contingencies. The Hudson Coal Co., however, has employed a different type of auxiliary equipment in the form of a 20-hp. direct-current motor that can be driven from the storage battery of a gathering locomotive in the event of a lasting power interruption or from a motor-generator in the underground substation in case the main fan motor should burn out.

This auxiliary direct-current motor is installed directly below the fan pulley, as may be seen in one of the accompanying illustrations. It is provided with a tension or belt tightener in addition to the drive pulley on the motor shaft. This tension may be adjusted by means of a take-up and compression spring, which facilitates a quick adjustment of the driving belt between the auxiliary motor and the fan.

A lead-armored, jute-covered cable extends from this direct-current motor down the air shaft to a bare 2/0 conductor leading to the main switchboard in the

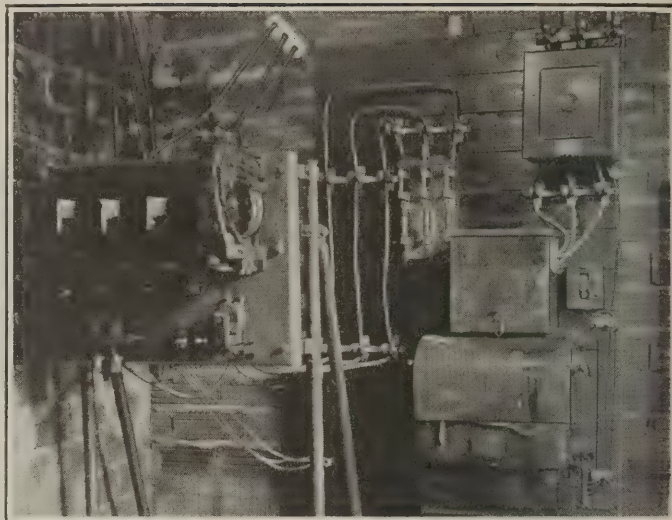


Fig. 2—A.C. Circuit Breaker and Out-of-Phase Relay

The upper cabinet contains the relay which automatically opens the circuit breaker and holds it open until the phasing difficulty has been eliminated. The breaker then closes automatically.

underground substation. Through this switchboard, connections may be made with a 60-kw. 125-volt motor-generator set. This connection will be used in case the regular alternating-current fan motor should fail.

Furthermore, a connection may be made to the storage battery of a 6-ton gathering locomotive in the motor barn should power fail on the incoming line. The capacity of the storage battery on the locomotive is 440 amp.hr., which is sufficient to drive the fan for about 5 hr. at half speed, or 125 r.p.m. When operating at this rate the fan will generate about 50,000 cu.ft. of air per minute.

In addition to the motor-generator set already mentioned, the present underground substation houses a 100-kw., 275-volt, 150-kva. synchronous motor-generator for correcting the power factor. This latter machine is of the three-wire type and is used for charging storage batteries and for supplying direct current to the trolley lines. Should an accident befall this motor-generator set, the 125-volt motor-generator can be switched to the trolley line and one of the storage-battery gathering locomotives can draw power for operation as a main-line trolley machine. This particular locomotive is specially wired and equipped to meet this requirement.

Proper balancing of equipment and the application, in new combinations of principles already known, will confine periods of shutdown to the time required to change over from one source of power to another. There can be little doubt that broader co-ordination of electrical lines and equipment can be so executed as to serve other similar purposes.

MOST OF THE COAL RECOVERED ON SECOND MINING

It is the firm belief of this coal company that in first mining not more than 10 to 15 per cent of the ultimate recovery should be removed from any room section where the roof is tender and falls readily. As a result, the block system of mining, the general layout of which differs but little from that originated in the Fairmont field and used successfully elsewhere, has been chosen. A system of operation was sought for this mine that would incorporate narrow rooms and wide pillars, as these pillars were expected to stand for a long period with a minimum of timbering. It was necessary also that the pillars should be of such dimensions that

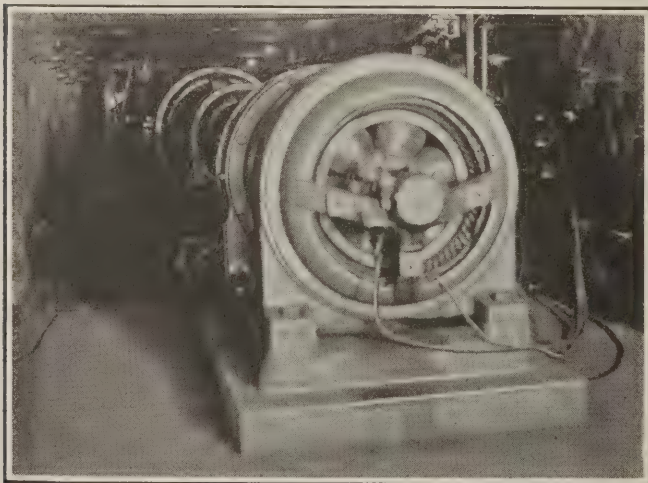


Fig. 1—Motor-Generator Sets Underground

One of these units furnishes direct current at 275 volts to the trolley lines; the other furnishes 125 volt direct current for battery charging, for operation of the standby fan motor and for operation of a storage battery and trolley locomotive when the main haulage unit fails.

they might be split, slabbed or split again to form wing pillars.

It was the conviction of the officials of the Hudson Coal Co., that flexibility in the recovery of big pillars would eliminate some of the dangers usually encountered in retreat working and make possible the mining of gob-encroached pillars that otherwise might be lost. Furthermore, the system adopted possesses an additional advantage, in that it permits pillar blocks to be mined if desired by some modification of longwall method in conjunction with mechanical loaders and conveyors. No other system could be found that would meet the present and future needs of the Lewis mine, and as a consequence, no other recourse remained but to adopt the block system of room-and-pillar working, which in reality is only a modification of the almost universal system in vogue throughout this country.

Coal is mined by the block system in several other operations in the Fairmont field, and at Fleming, Ky., the Elkhorn Coal Corporation is operating in this way in the thick Elkhorn bed under the typically heavy cover of the Kentucky mountains, an exceptionally high recovery being attained. I mention these instances of the successful utilization of this system to substantiate its practicability and to refute various rumors that have received circulation recently and that tend to foster a contrary belief.

In some cases this system has been unsuccessful and much coal has been lost, not only by isolation of stumps and larger portions of blocks in the goaf, but by the squeezing as the result of negligence of large areas already laid out in blocks. The prime principles governing successful mining by rooms and block pillars are no different from those that must be observed in all other working-place layouts.

These are, (1) that no pillars must be allowed to lag behind the line or front of retreat; (2) that every body of coal, large or small, lost in the gob adds to the difficulty of controlling the roof and, (3) that every precaution must be taken to make the roof break as near as possible to the retreating pillars. Officials of both the Elkhorn Coal Corporation and the Hudson Coal Co., believe that success with this system throughout long periods of time and with little or no reduction in recovery is dependent on the ability of the mine foreman to make his daily advances regularly and systematically.

The Lewis mine operates in the Pittsburgh seam which has an average thickness at this point of 7 ft. It is located in a tract of 1,034 acres. At the tippie, which is located at the northwestern corner of the property, the thickness of cover slightly exceeds 50 ft. Consequently, as mentioned in *Coal Age* of Dec. 20, 1923, p. 919, the coal is brought to the surface by a belt conveyor 247 ft. long center to center and installed on an inclination of 18 deg. The main heading is driven southward from the slope bottom on the strike of the coal and incidentally in close proximity to the western boundary of the property. Five entries have been thus driven. One is employed for haulage, one as a manway and three as air courses. Two of these passages are intakes and three are returns. They are driven 10 ft. wide on 40-ft. centers and are protected by barrier pillars 400 ft. wide.

Face headings on 350-ft. centers are driven eastward to the rise at an angle of 72 deg. to the main headings. Rooms are driven parallel to the main heading on 90-ft. centers and the pillars between them are

subdivided into 80-ft. blocks by crosscuts on 90-ft. centers, these crosscuts being driven parallel to the face headings. The relative directions of headings and crosscuts with regard to the faces and butts of the coal have been fixed as described for the reason that the major part of the tight working in the blocks is against the faces. Rooms are made 12 ft. wide. The layout differs from the block system as usually employed, in that crosscuts are driven in adjacent room pillars in such a way as to stagger the pillar blocks. By this means, the roof is not greatly weakened at the corners of the blocks.

PILLAR COAL IS EASILY RECOVERED

The pillar coal is easily recovered by splitting a block in two and by pulling the wing pillars from crosscuts in each half of the block. It is needless to go into further details, for the methods of attack of necessity vary with the conditions encountered. Most of the tight work is facilitated by top cutting with arcwall machines, so that, in shooting, the roof is not disturbed.

Rooms and pillar blocks are at present developed in an area of about 125 acres, of which only a small portion has been completely mined. A pillar section off No. 2 heading and one off No. 6 heading yield most of the present output, amounting to 1,500 tons daily. Another section is being started off No. 9 heading, in compliance with the development plan which calls for an ultimate daily capacity of about 3,000 tons. Gob lines are maintained at an angle of about 45 deg. to the heading. Where they meet, they will form an angle of 90 deg. Eventually, when these three sections are

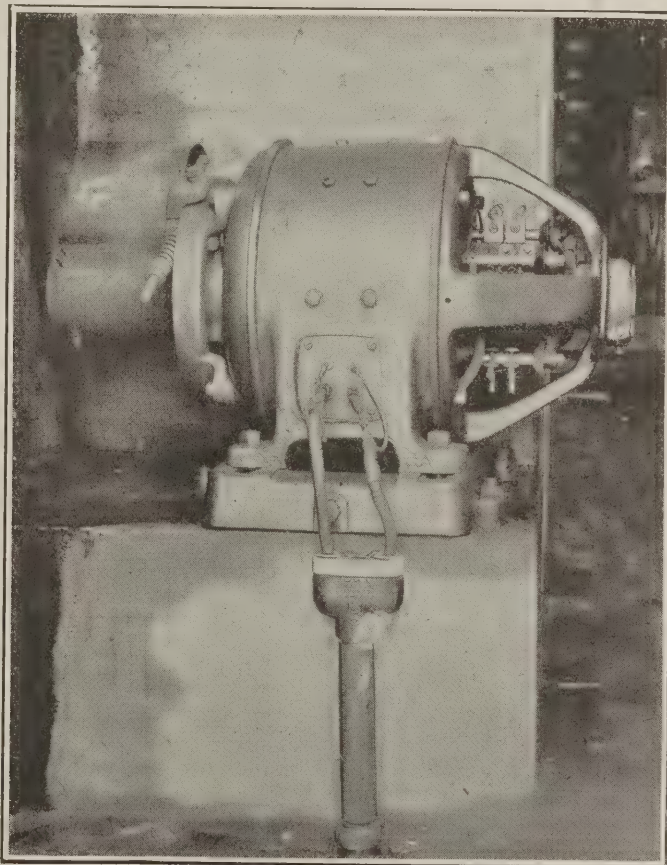


Fig. 3—Standby Motor for the Fan

This d.c. motor, installed with its pulley directly under the fan pulley, may draw current either from the 125 volt motor-generator set in the underground substation or from the storage battery of a gathering locomotive in the motor barn.

FIG. 4

Main Heading

Because the bottom in this mine swells excessively under the action of moisture the ties are here so closely spaced as to almost floor the track. Drainage ditches also must be kept open religiously. Both the ribs of this heading and the steel roof beams fitted with lagging have been white-washed thus greatly aiding in the illumination. Abundant light at points such as this is a great aid to accident prevention.



connected through the goaf the continuous line thus formed will be in the shape of saw teeth.

Some engineers hold that additional roof trouble is encountered at the point where gob lines of two approaching pillar sections meet in the manner above described. No doubt this is true to a certain extent, but difficulty of this kind so far experienced has not been sufficiently great to induce those who have adopted this plan to alter it. No unusual roof trouble is apparent in either of the two approaching pillar sections, and it is hardly probable that much coal will be lost at the point where the two sections meet.

The junction angle between the gob lines, however, should not be less than 90 deg. The early attainment of capacity production necessitates such a procedure, otherwise a sufficient number of working places would not be available. Advocates of the saw-tooth gob line assert that the loss of coal in the trough of these teeth is not excessive. Although these points have not yet been created in the Lewis mine, the management does not anticipate any serious difficulty when the gob lines close.

The conditions prevalent in this mine are almost ideal for the use of storage-battery locomotives for gathering. This is because the main heading is on the strike of the coal, which dips only sufficiently to establish a natural grade of about 1 per cent in favor of the loads on the cross-headings. It should be recalled, also, that practically all the coal lies east of the main heading.

Five 6-ton storage-battery locomotives gather the coal and deliver it to the main sidetrack located 2,000 ft. from the slope bottom. From this sidetrack the entire output, totaling at present 1,500 tons per day, is hauled to the rotary dump at the foot of the slope by an 8-ton duplex trolley and storage-battery locomotive. Inasmuch as this latter machine is equipped with two motors, one drawing its energy from storage batteries and the other taking current from the trolley wire, it is prepared to assist in gathering when not engaged in haulage.

The wisdom of this choice of equipment is imme-

diately apparent. All five gathering locomotives are kept busy throughout the shift, each serving about twenty working places and gathering 300 tons of coal and hauling it a distance of approximately 1,800 ft. to the main sidetrack. The provision of a storage battery on the main-line haulage locomotive renders this machine a self-contained unit capable of traveling anywhere in the mine regardless of whether the track is trolleyed and bonded or otherwise. It thus adds greatly to the flexibility of the haulage system and to the utility of the machine itself.

ROMANS BURNED BRITISH COAL.—Excavation has proved beyond all doubt that coal was used by the Romans; ashes and stores of the unburnt mineral are being found all along the Wall, at Lanchester and Ebchester, in Durham, at Wroxeter, in Shropshire, and elsewhere. [The Wall to which reference is made is the Roman wall between the Tyne, near Newcastle, and the Solway on the western coast.] For the most part, it appears to have been used for working iron, but it was possibly also used for heating hypocausts [furnaces which heated the floors of Roman bathhouses]. There seems good reason to believe that it formed the fuel of the sacred fire in the temple of Minerva at Bath, as Solinus, writing about the end of the third century, comments on the "stony balls" which were left as ashes by this sacred fire. That such coal as was used by the Romans was obtained from outcrops, where the seams came to the surface is more than probable. There appears to be no certain evidence of any regular mining for coal at this period.—*English Industries in the Middle Ages*, by L. F. Salzman.

W. W. ODELL, fuel engineer, U. S. Bureau of Mines, has commenced the study of peat as a fuel, and is spending some time at the Minneapolis experiment station of the bureau, in the northern peat district. So far he has made preliminary studies as to the best methods of attacking the problem with the funds available.

How the Modern Underfeed Stoker Works, and Why*

Number of Underfeed Stokers Has Increased Rapidly—What Special Features in Design Have Been Introduced for Burning Western Coals—Progress of Ash in Fire Must Be Given Serious Consideration

BY JOSEPH G. WORKER†

IN ANY study of fuel-burning equipment, we must discriminate between theory and good practical operating engineering. Our problem in fuel burning is not entirely one of selecting the most efficient thermal system. We must consider also those physical factors in the fuel bed which vitally affect its combustion and determine its ultimate efficiency.

Low flue-gas temperatures, preheated air, hollow-wall construction, etc., affect the overall efficiency of a combustion system from five to ten per cent, but they are not a part of any one particular combustion system, although they may be provided with any one of them. In our endeavor to find any given condition which will give the best results from a dollar-and-cents basis great care must be taken to see that the results obtained are not attributed to the wrong causes.

The mechanical stoker, more than any other piece of boiler-room equipment, has made it possible to design boiler plants of the present high capacity, to burn

were equipped with one type or other of underfeed stoker, about 200,000 hp. were provided with some type of chain-grate stoker and about 50,000 hp. with some kind of overfeed stoker. That is, about 75 per cent of the stokers sold in the United States during the year 1922 were of the underfeed type.

Though these figures throw some light on our subject, they are perhaps as expressive of economic conditions as they are of efficiencies in the different combustion systems. These figures may be surprising, because only a few years ago any of us would have correctly stated that most of the stokers sold in the West were of the chain-grate type. The change has come about slowly. It may have been delayed at times, but we are now at the point where almost as many underfeed stokers are being installed in the West as in the East.

CONFUSE FUEL BURNING WITH CLEANING

We may have been correct in the past in claiming that no stoker handles all grades of coal with the same degree of satisfaction. In that thought, however, we allowed ourselves to consider difficulties in mechanical operation that were in no way a part of the fuel-burning system, but were to a large extent a part of the cleaning process of the fuel bed.

There have always been two types of stoker designers. One had tendencies toward building a machine that would offer the best combustion possibilities, irrespective of the cleaning devices. Others mixed and confused the problem, with the result that stokers have been designed which, though they were not the most efficient in the burning of coal, handled clinkers so satisfactorily that their lack of combustion efficiency was willingly overlooked.

We have heard many times that the underfeed was all right for Middle-west coals, except that when it was used the clinkers gave too much trouble. In many

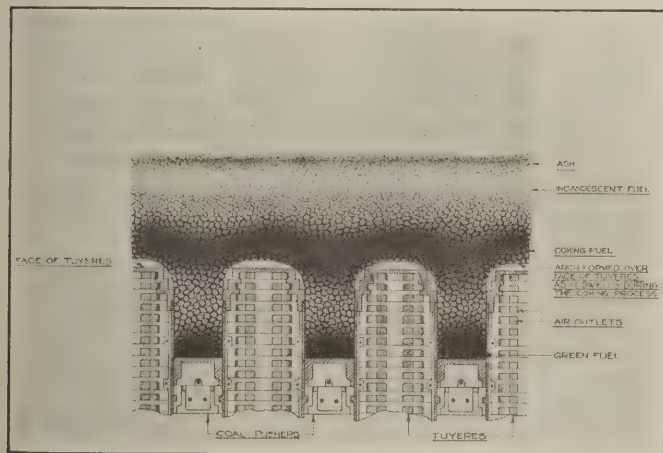


Fig. 1—Fuel Bodies of an Underfeed Fire Bed

During the coking process, the coal swells and forms arches over the tuyeres. The incandescent fuel is on the top and the coking area extends back into the retorts.

the fuel efficiently and rapidly and to obtain as much as 6 kw. of generator capacity per boiler horsepower. Only fifteen years ago, we were obliged to install a boiler horsepower for every 2 kw. generated.

Many types of stokers have assisted in this development. The underfeed stoker has played its part and has figured prominently in this progress. To appreciate the extent to which it is now used to burn Middle-west coals, a survey was made and the following facts were revealed:

A little over 1,000,000 hp. of boilers were sold in the United States during the year 1922, by twenty-eight boiler companies. This includes about 800,000 hp. of all types of mechanical stokers. Of these, 550,000 hp.

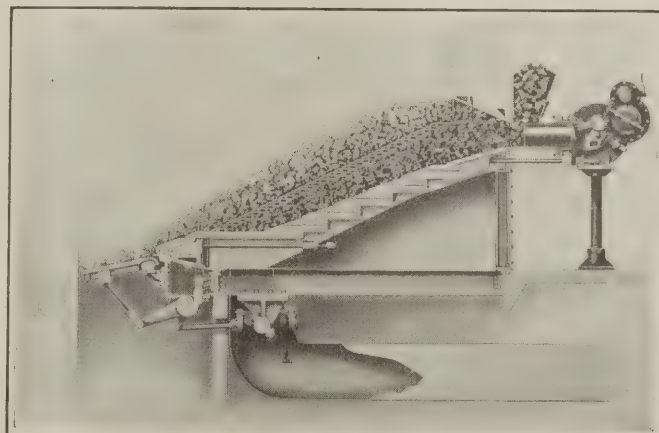


Fig. 2—Taylor Underfeed Fuel Bed

This illustration shows the gravity ash feed. The fine ash floats on the top of the fuel bed and slowly works its way down into the ashpit.

*Abstract of address delivered at Chicago Section, American Society of Mechanical Engineers, Jan. 15.

†President, Stoker Manufacturers' Association.

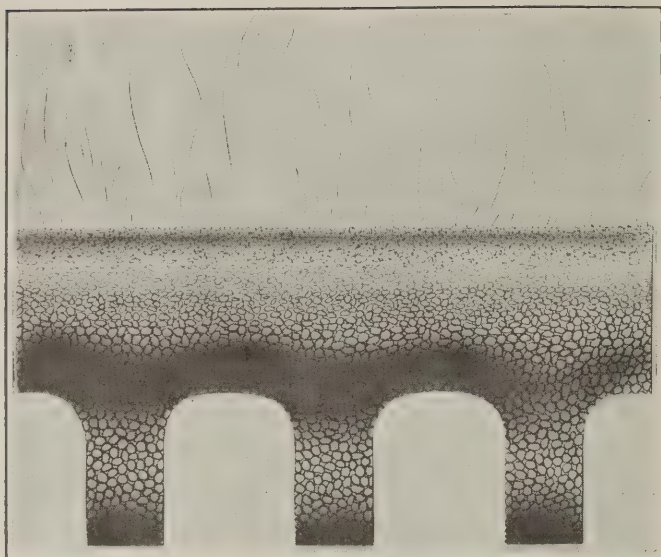


Fig. 3—Section Through Fire Bed

The arched areas correspond to the positions of the tuyeres shown in Fig. 1. The fuel bed is supported by the green coal in the retorts.

instances those who made this statement failed to investigate how this difficulty could be overcome without disturbing the primary combustion system.

Years ago, when the underfeed principle was being developed, some of the power stations of the East had a somewhat similar experience. Some people could not see its virtues, and almost endless discussion resulted. Improvements were made on one part or other of the controlling mechanism, but the underfeed method of burning coal was, probably more than any other single element, the reason for the success of the whole system.

Many new stoker developments were started in the West, but rarely were their problems finally and definitely worked out. If they were, it was when some other part of the country took up the problem. Even then, as the coal conditions in that section were not so severe as in the West, the solution of the difficulty gave such an impetus to the stoker business that no further effort or money was spent in modifying a particular stoker to suit Western coals.

It is important to obtain a clear idea of the principles involved in the burning of a fuel bed on a multiple-retort underfeed stoker. An endeavor has been made to exemplify in Fig. 1 some of the ideas of Elwood Taylor, by whom this type of stoker was invented. The inventor's claim, when he petitioned for patents on this device, explains clearly the movement of the fuel.

UNDERFEED FUEL BED IS NOT AGITATED

Many have the idea that an underfeed fuel bed is agitated and that the fuel is pushed across the supporting structure from the point where it enters the fuel bed to the point where it is discharged as ash; but the inventor stated that in the operation of his stoker, the fuel bodies in the several retorts constituted the legs of a single fuel bed. This bed burned with the incandescent fuel on top and with the coking fuel underneath extending back into the retorts.

Owing to the cohesion and arching properties of the fuel as it swells during the coking process, the fuel bed receives its support from the walls of the retort and is fed outwardly by the retort pushers.

It arches over the tuyere faces and so is kept substantially free from them as shown in the sketch. This illustration also plainly shows the partially coked coal extending into the retorts, an endeavor being made to make plain the way in which the coke arches over the tuyeres. This operating principle and the claim of the inventor has been demonstrated in research work in connection with this stoker. It has also been substantiated by expert engineering testimony.

COKE ARCHES HOLD UP FUEL BED

Few have realized that the coke arches in the underfeed stoker act in the combustion process as the refractory arches do in the chain-grate and other stokers. These underfeed arches are made up of partially burned coal and are continuously being burned up and reformed. Immediately over these arches of partially burned coal is the incandescent and major fuel bed extending across the openings of the retorts.

Finally, it will be noted that the fine ash floats on top of the entire fuel bed, Fig. 2. These particles of ash are small and were originally independent pieces of green fuel. The ash is fed by gravity down the slope of the fuel bed, the movement being induced by the periodical introduction of cartridges of fuel which give a weaving movement to the fuel bed and an outward feed movement across the mouth of the retort.

Often the idea is advanced that the agitation of underfeed fuel beds is undesirable where a high-ash coal is used. A careful analysis of these fuel beds will show, in fact, that the fuel is not agitated or mixed as is generally supposed. The injection of these cartridges of fuel is so slow that the movement at the time the coal is introduced is hardly perceptible to the eye. The arching of the fuel in the retort relieves the pressure on the coal pushers when they retreat for another charge, and consequently the fuel movement is always outward.

ASH ROLLS DOWN SLOPE BY GRAVITY

The operation of the underfeed stoker is thus easily distinguishable from that of forms of mechanical stokers employing inclined grates in which the green fuel is fed by the overfeed principle. No grate or fuel support, such as is employed by overfeed or chain-grate stokers, is used in the underfeed types, the fuel instead being supported from the retorts. This is made clear by Fig. 3, in which all the supporting structure of an underfeed fuel bed has been taken away. This shows how the underfeed fire is supported on legs of coal and the major weight of the fuel bed is transmitted to the retorts.

The formation and progress of the ash of an underfeed fuel bed is generally misunderstood. No pushers or rams compel the ash in an underfeed fuel bed to progress through the fire. It can be proved that the

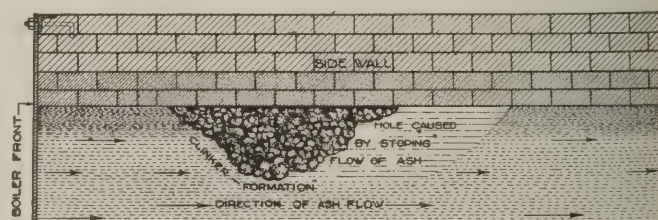


Fig. 4—Formation of Clinker on Side Wall

Unless the ash continues to flow in its natural course a clinker quickly builds up and grows larger until removed.

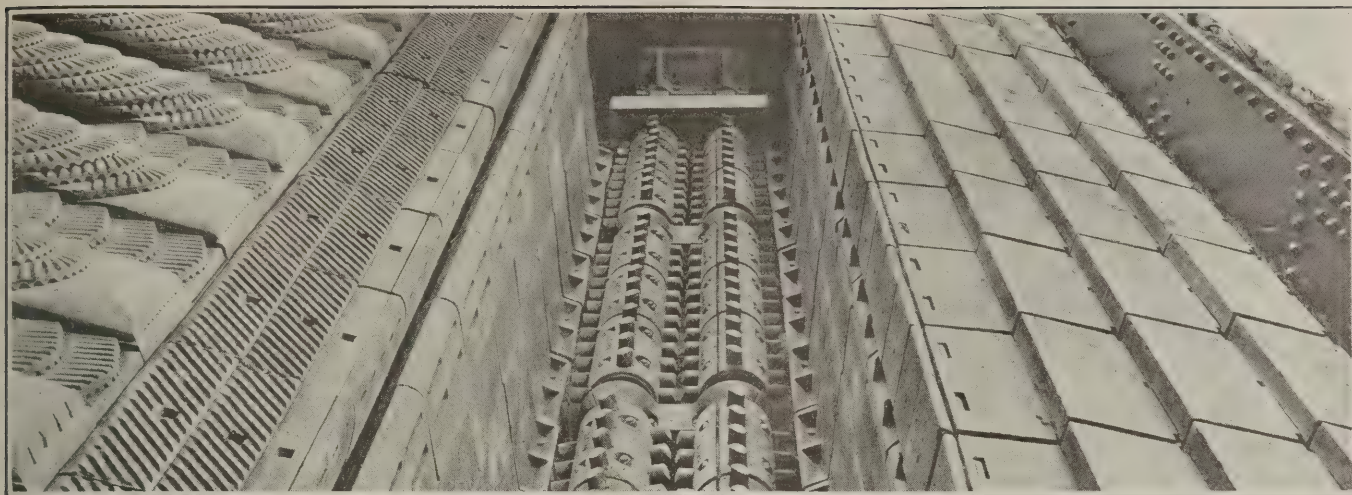


Fig. 5—Rotary Ash Discharger Which Prevents Formation of Clinker

This is one of the latest devices adapted to stokers. The illustration shows a series of air backs and water backs frequently used on the front face of the bridge wall to prevent stoppage of the ash in its course to the clinker grinder. Clinkering coal no longer presents serious difficulties to stoker manufacturers.

feed of green fuel induces the ash to move by gravity down the slope of the fuel bed. A close-up view of the surface of such a bed would show clearly that the fine particles of ash travel down the incline. The inclination of the fuel bed must be such that the ash will move in this manner.

Having developed the principles of a proper fuel-burning process, have we given enough thought to the machinery necessary to allow a fuel bed to function according to its principles? If there were no side walls nor bridge walls or other refractory parts surrounding an underfeed stoker, and nothing to retard the flow of ash from the top of the fuel bed to the bottom, would clinkers form?

A particle of ash in a fuel bed, as shown in Fig. 4, if stopped in its proper course down the slope adheres to the side wall and backs up the oncoming ash, thus commencing the formation of clinker. Unless it is started on its course again, it will gradually grow until it builds out underneath the fuel bed and in some cases down into the retorts.

In developing the furnace construction for underfeed stokers, side-wall air plates, air-cooled crusher plates, water backs, etc., have been devised and constructed, all for the purpose of keeping the ash from stopping in its course down the fuel bed. Side-wall air backs are now quite generally used with underfeed stokers. These plates are working quite satisfactorily and, of course, are much better than the refractory material which they have replaced.

ASHES STOPPED AT BRIDGE WALL AND CLINKERED

If we assume that the ash is not stopped in its descent of the slope of the fuel bed, it will eventually reach the bridge wall. When multiple-retort underfeed stokers were first installed they were equipped with dump grates, and unless this part of the stoker was handled properly, the ashes would stop at the bridge wall and gradually accumulate and back up so that large clinkers would form. These would not only lie on the dump grates but would build up into the fuel bed.

Without disturbing the principles of this fuel bed, the designers tackled the problem of the stoppage and clinkering at the bridge wall and the result was what is commonly termed the rotary-ash discharger shown in Fig. 5. This device is necessary for the continuous

progress of the ash and clinker from underfeed-stoker fires.

It is obvious that under certain conditions of operation, it would not be necessary to actuate continuously the crusher in the ash well. It is therefore only operated to keep in tune with the formation of ash as it proceeds down the slope of the fuel bed. Air backs and water backs are used on the front face of the bridge wall to prevent the ash or clinker from being stopped in its downward course through the ash wells and through the crusher rolls into the ash pit.

The West is now solving some of these clinker problems. No longer are we in fear of what the ash in the coal may do. At least, the clinkering of Western coals is no longer allowed to hinder good engineering progress.

Mechanizing French Coal Mines

In order to meet the increased cost of operation, French coal-mining companies have given special attention to mechanical equipment suited to the conditions in French mines. This has resulted in the increase in the percentage of coal produced by machines in one district from 4.27 per cent in 1913 to 16 per cent in 1922, says Chester Lloyd Jones, Commercial Attache, Paris, in a report to the Department of Commerce.

The character of the deposits is such that certain types of coal mining machinery as used in the United States will not always work with efficiency. Nevertheless in the Pas-de-Calais and in the Nord marked advance has been made in recent years. In the Pas-de-Calais there are two American machines of special type and one bar coal cutter in use or under trial. The most successful type employed is that of the mechanical pick-hammer. Of these there were in use in 1911 only 743, in 1913, 1,392; but in 1922, 2,872 were employed. Perforating hammers of the hand type have also become prominent, the number in use having risen from 1,878 in 1913 to 2,343 in 1922.

In the Nord the coal mined by mechanical means before the war was about 2.5 per cent of the total, but in 1922 this had increased to 10 per cent. Six coal cutting machines were operated during the year, but, because of the nature of the coal deposits, they showed a yield of only some 17,000 tons.

Just How Harmful Is Dust?

Coal Miners Not Immune from Tuberculosis According to Insurance Statistics—No Physiological Trouble from Stone Dusting

“ANY dust insoluble in the fluids of the respiratory passages and in sufficiently finely divided form to float in the air and be breathed by underground workers will ultimately be harmful to health if the dust is in large quantities and is breathed by workers for considerable periods of time,” said D. Harrington, U. S. Bureau of Mines, in his paper at the fourth and final session of the Industrial Relations Committee, American Institute of Mining and Metallurgical Engineers, Feb. 20. “This applies to insoluble non-mineral as well as to mineral dusts or mixtures of them, and includes coal dust or mixtures of coal and other dusts.”

Dr. A. J. Lanza read Mr. Harrington's paper in his absence, and in commenting on it, stated that the latter had said many things that were unquestionably true. It has long been believed that coal miners are immune to tuberculosis, but more recent investigations would indicate that this may be far from true. Insurance statistics do not bear out the miner's immunity, and coal dust does not appear to immunize the lungs to the tubercular bacillus. If the ordinary tubercular risk, so far as an insurance company is concerned, may be regarded as being 100, that of the coal miners would be 475.

B. F. Tillson stated that fine dust seemed to be soluble in the lung fluids. He inquired concerning the relative danger of drilling upper holes and those drilled horizontally, and asked if the dangers from wet drilling are as great as those from dry drilling. Also, he wanted to know if limestone produced a dangerous dust. He called attention to the fact that every one breathed more or less dust and that it is probable that city dwellers take more fine particles of foreign matter into their lungs than do workers in metal mines.

In reply, Dr. Lanza said that in drilling upper holes the dust falls down almost directly upon the driller and gives the worst possible condition. In wet drilling heavy air pressures passing through hollow drill steel force dust back out of the hole in air bubbles. Naturally these burst and release the dust into the air.

IS DUST DRAWN TO DRILLER BY EXHAUST?

Some one then asked if the suction created by the exhaust of the drill might not draw the dust issuing from the mouth of a horizontal hole toward the driller. It was stated that some experiments tended to substantiate this idea. It was also said that ordinary limestone dust might be taken into the body in large quantities without bad effect, it being dissolved and thrown out practically as fast as it was absorbed. It was said also that sulphide dust appears to be no worse than any other dust. In general, the effect produced by any dust upon the human system is in proportion to the exposure to that dust, or, in other words, to the dosage.

The discussion then turned upon the physiological effect produced by stone dusting in the mine. Mr. Rice stated that in England and France, coal dusts were neutralized for explosions with limestone or shale dust, and in Great Britain rock dusting has been made compulsory by law. Experience so far would justify the belief that no ill physiological effects have resulted from this neutralization.

Ordinary wetting of coal dust has proved a failure in preventing dust explosions, but rock dusting appears to set up an efficient barrier to the propagation of the explosion flames. No physiological troubles have been experienced in Great Britain from stone dusting, although the English use a shale dust which contains as much as 30 per cent of silica. It is therefore believed that rock dusting is safe both from the explosive and the physiological standpoint.

ASTHMA DECREASING AMONG COAL MINERS

Mr. Taylor then stated that asthma appears to be on the decrease among miners. It is believed that modern coal-mine ventilation is sufficient to sweep out any dust which may be formed before it has time to act harmfully upon the miners' lungs.

Mr. Tillson said that mining men necessarily must compromise in seeking conditions theoretically correct and must submit to the requirements of practical mining. The ideal would be to allow no dust within a mine, yet stone dust is needed to prevent explosions. Furthermore, practical mining demands that blasting be done throughout the day, whereas the ideal would be to perform blasting only at night or when no men were in the mine. He asked what was the danger point so far as the quantity of dust allowable in mine air was concerned, and stated that this would be valuable knowledge from a practical standpoint.

In reply, Mr. Rice said that the Bureau of Mines has not yet reached any satisfactory conclusions on this point, but that investigations are progressing. Much experimental work already has been done, but the conclusions deducible from it have not yet reached even an approximately final stage.

Mr. Tillson suggested that in view of the importance of the dust hazard in mining a symposium upon it be held at the next annual meeting. It is quite probable that the Institute will take some action upon this point in the near future.

J. T. Ryan addressed the committee on industrial relations in European coal mines, illustrating his talk with a series of excellent lantern slides. He stated that European mine conditions differ greatly from those prevailing in America, but we may nevertheless learn much from Europe's problems in industrial relations and their solution.

European mines are constructed for operation over long periods, sometimes for as much as 400 years. All top works, as well as the miners' houses are built of durable materials and are designed to last for an equal length of time. The French pay more attention to welfare work than the British mine operators, and they have fewer strikes. Mr. Ryan's talk and slides show conclusively that continental mine operators pay far more attention to the human factors in mining and study more carefully than do those of Great Britain what might be termed the human failings and idiosyncracies of their workers.

W. R. Chedsey in the course of his remarks stated that the law of supply and demand cannot be superseded by state or national statutes. The slogan of a living wage for the worker is not all that might be desired. A better one would be a living wage and more for the workers with ample opportunity to earn it. The basis of payment for any person in an industry should be only that of value received, and the living wage should be earned and not gouged out of the public by union power or other means.



Crane Creek Tipple at McComas, W. Va.

Theory and Practice in Air-Table Cleaning and Results Attained in Field Operation*

What Pressure Is Needed to Lift Particles and to Raise a Bed of Coal from the Table—
Screens and Dust Collectors Now Work Without Trouble—Ash
in Some Coal Reduced 64 per Cent

BY RAY W. ARMS†
Chicago, Ill.

DRY cleaning, or pneumatic separation, is not, strictly speaking, a recent discovery. Among the archives of the Patent Office may be found many patents dating back as far as 1850 which cover early attempts to separate materials of varying specific gravity or of different shape by means of air. Hundreds of patents covering this art have been issued, which may be roughly classified into four general groups, as follows:

1. Stationary devices with pulsating air currents. In these the separating surface is usually riffled and air is supplied by bellows or compressors. This group also includes air jigs, which have been used rather extensively.

2. Stationary devices with continuous air currents. These submitted the material to a continuous current of air, either horizontal or vertical. Chaff is blown from wheat by such a device.

3. Reciprocating or vibrating devices with pulsating air. A small group in which the pulsating air is supplied by bellows and some motion provided in the separating surface to move the stratified material to various discharge points.

4. Reciprocating or vibrating devices with continuous air supply. This is by far the most important group,

and all recent developments have been of this description.

All these groups of machinery involve the stratification of material by air and include none of the dry cleaning devices that use other principles, such as the coefficient of friction, magnetism, etc.

In all the groups of air separating devices already mentioned the same phenomena are found as exist in water concentrators; that is, free settling will be found in some and hindered settling in others, with a complex action on the reciprocating tables similar to the wet tables.

The experimental value of the settling ratios of particles in air has never been determined but, following the formulas given in Richards' "Ore Dressing," they can be calculated. The formula for the settling velocity of particles in any medium is as follows:

$$V = C \sqrt{(d - d_1) D}$$

in which V = velocity of the particle; d = density of the particle; d_1 = density of the medium; D = diameter of the particle and C = a constant depending on the shape of the particle and the units used. This constant has never been determined for coal or slate, but in my estimation that for slate will be about 0.85 of that for coal because the slate is usually in tabular form.

To determine the free-settling ratio, which is the relation between diameters of particles settling in a

*Article entitled "Dry Cleaning of Coal," read at the February meeting of the American Institute of Mining & Metallurgical Engineers, New York City, Feb. 18-21.

†Contracting Engineer, Roberts & Schaefer Co.

medium at the same rate, the two velocities are equated and the ratio of the diameters determined. Thus:

$$100\sqrt{D_1(1.3 - 0.00124)} = 85\sqrt{D_2(2.6 - 0.00124)}$$

$$\frac{D_1}{D_2} = \text{free settling ratio of coal and slate in air} =$$

1.4, where D_1 = the diameter of the coal particle and D_2 = that of the particle of the slate.

In wet concentration, it is a known fact that the hindered-settling ratio is much larger than the free-settling ratio, and it is reasonable to suppose that the same holds true with air separation. From experiments that have been made so far, it is reasonable to assume that the hindered-settling ratio is approximately 2.5. This ratio governs the sizing that must precede concentration and will vary in different coals.

The theoretical calculation of the quantity of air that will be required to suspend a bed of raw coal sufficient to cause stratification is indeterminate, owing to the fact that this suspension is accomplished partly by the static pressure and partly by the velocity of the air; but the two limits caused by these factors may be found, and the calculation is determined to that extent. The effects of these two factors may be observed best by considering the extreme cases: first, of a single particle of coal being lifted or suspended by a blast of air; second, of an air-tight bed of particles being lifted by air pressure.

In the first case the lifting power of a blast of air is roughly equal to its velocity pressure. For example, a velocity pressure of 0.1 lb. per sq.in. will have an equal buoyant effect over the surface of the particle. Any particle weighing less than 0.1 lb. per sq.in. of cross-section will be lifted by this velocity and, conversely, a particle of more than this weight will sink. It is assumed in this discussion that the particles are roughly cubical or spherical and that the area subjected to the action of the air is cross-sectional area.

For the particles of any other shape, the minimum cross-sectional area should be used, as the particle will assume a position in a blast of air that will bring its long axis parallel with the direction of the air current. It is manifest that the above theory will be somewhat complicated by the eddying air currents, which vary considerably with the shape of the particles. It is presumable that cubical particles would be easier to support than flat slabs or more or less "stream-lined" shapes. The formulas required to figure the lift on a particle are derived from the elementary physical formula $V^2 = 2gh$; in which V = velocity of air in feet per second; g = force of gravity, and h = head in feet. In this discussion, this formula means that a pressure in pounds per square inch equal to the weight of a column of air 1 sq.in. section and h ft. high will cause air to flow at the rate of V ft. per second. For example, 0.1 lb. per sq.in. pressure at 32 deg. F. and 30 in. of mercury is obtained by a certain height of a column of 1 sq.in. section:

$$\text{Weight of air} = 0.080975 \text{ lb. per cu.ft.}$$

$$\text{Column 1 in.} \times 1 \text{ in.} \times 1 \text{ ft.} = \frac{0.080975}{144} = 0.000562 \text{ lb.}$$

$$0.1 \text{ lb.} = \frac{0.1}{0.000562} = 177 \text{ ft.} = h$$

$$V = \sqrt{2 \times 32 \times 177} = 106 \text{ ft. per second} = 6,360 \text{ ft. per minute.}$$

The size of coal that will be sustained by this velocity can be calculated by determining the size of particle having a weight of 0.1 lb. per square inch of sectional area. Using the cube as the shape:

0.047 lb. = weight of 1 cu.in. coal at 1.3 sp.gr.

Let x = any dimension in inches,

then $0.047x^3$ = weight of the coal particle,

$$\frac{1}{x^2} \text{ number of particles covering 1 sq.in.}$$

$\frac{1}{x^2} \times 0.047x^3$ = weight of 1 sq.in. of particles, but the particles weigh 0.1 lb. per square inch. Therefore, $\frac{1}{x^2} \times 0.047x^3 = 0.1$ and $x = 2.1$ in. Thus the velocity pressure of 0.1 lb. per square inch representing a velocity of 6,360 ft. per minute will support a 2-in. cube of coal.

Conversely, the velocity required to support any size of particle may be calculated as follows: Assume a $\frac{1}{2}$ -in. cube of coal,

$$\text{Weight per square inch} = \frac{0.047}{2} = 0.023 \text{ lb.}$$

$$h = \frac{0.023}{0.000562} = 41 \text{ ft.}$$

$$V = \sqrt{2 \times 32 \times 41} = 51 \text{ ft. per second} = 3,060 \text{ ft. per minute.}$$

Thus air at a velocity of 3,060 ft. per minute will support a $\frac{1}{2}$ in. cube of coal.

The second factor entering into the stratification of coal by air is the static pressure under the bed. If this bed of coal were so closely packed as to be airtight, the total pressure acting upon it would be the maximum pressure the fan or blower could produce. If a centrifugal fan or blower is used, it is possible to maintain a pressure as high as 8 or 10 in. water gage and this entire pressure would be exerted to lift and loosen the bed of coal until a certain air velocity could be obtained. The lifting power of this static pressure is quite high and is found as follows:

$$1\text{-in. water gage} = 5.2 \text{ lb. per square foot}$$

This will balance a solid bed of coal 0.77 in. deep; 8-in. water gage will balance $8 \times 0.77 = 6.16$ in. of coal

A fan of the type generally used, therefore, will provide sufficient static pressure to open up any bed of coal that may be put upon it but usually will not provide sufficient air to support the particles by velocity pressure alone unless the particles are very small.

In the operation of a dry-cleaning table, the air actually used is much less than is required to completely support the particle, and the pressure of the air immediately below the coal bed is low as compared with the maximum pressure the fan will generate. The condition sought is a loosening of the bed so that the refuse will sink and the coal tend to float. To obtain this condition it is necessary to find the balance between the weight of the particles involved and the static and velocity pressures of the air.

As cold air is heavier than hot air, less of it will be required by volume to support the coal, but the velocity pressure will remain the same. More power is required to move equal volumes of cold air but the requirements of cleaning will remain practically constant, as less of the cold air is required. In rarefied atmospheres, fan speeds should be relatively higher.

This discussion of theory leaves much to be desired in the way of a definite basis on which to make calculations but it is hoped that it may suggest some starting points for investigation, which will bear fruit in the form of data and constants which will be useful in the future development of the art of dry cleaning.

A large plant using air cleaning tables is being built and tested at McComas, W. Va. This plant started

TABLE I—TESTS ON DRY-CLEANING TABLES

Kind of Coal	No. of Tests Conducted	Per Cent Ash		Per Cent Reduction
		Raw Coal	Clean Coal	
No. 3 Pocahontas seam.....	18	10.04	5.37	46.51
No. 6 Illinois seam.....	4	13.37	6.93	48.17
No. 4 Indiana seam.....	4	11.15	6.79	38.69
Clinchfield, Va.....	1	11.64	4.63	60.22
No. 5 Ohio.....	1	19.95	8.25	58.70
Penna. Anthracite No. 2 buckwheat.....	1	18.70	8.50	64.30
Coke breeze.....	1	17.37	9.54	46.23

cleaning coal about the first of May, 1923, and has been operating more or less continuously since.* During this time the cleaning tables have operated with entire satisfaction. No structural defects have developed, and the tables have established themselves as efficient coal-cleaning devices. However, there have been unforeseen difficulties at McComas which have delayed the successful operation of this plant as a complete unit.

The collecting system proved to be inadequate for the large volumes of dust created in handling Pocahontas coal by methods of this kind. This problem was submitted to the B. F. Sturtevant Co., which installed a complete new system that is now handling the dust in a satisfactory manner. The failures of the original installation at McComas and at Raton, N. M., were due to the fact that the volumes of air handled through the dust-collector system were too small. The present system uses large volumes, large pipes, and large collectors, with a power consumption only slightly greater than the original system.

The screens originally installed at McComas were of the anti-gravity type with a head motion and details used for the first time on the McComas installation. This type of screen shows certain structural advantages, particularly in its adaptability to use on a level floor, but it had not been sufficiently developed mechanically to withstand the hard usage to which the screens were submitted, and breakage of parts frequently interrupted operation.

The vibrators which enlivened the screen surface also gave trouble and inefficient screening so interfered with the operation of the tables and caused the circulation of so much dust in the air, which should have gone to the undersize, that it was decided to replace the screens with Hum-Mer units, of which the operating characteristics are well known.

A 150-ton per hour dry-cleaning plant is now under construction at Wyco, W. Va. This is being built for the Wyoming Coal Co. This plant is designed and built by the Roberts & Schaefer Co., and uses the same types of pneumatic separators, dust collectors and screens as those mentioned as now being used in the McComas plant.

A dozen or more dry-cleaning tables are in course of development. Some are in the experimental stage, some are being transferred to coal cleaning from the field of ore concentration, and one at least is being included in the equipment of a plant under construction. None, however, has been placed on general sale except the American pneumatic separator.

This separator is capable of cleaning coal as large as 2 in. diameter and as fine as 100-mesh, by using the proper deck for the size treated. The coal is first sized so that the finest particles in the feed are about half the diameter of the largest. This limitation in the variation in size is found to give the best effect. The capacity of the table varies according to the size of the

coal; the table for coal of about 1 in. diameter having the highest capacity, namely, about 25 tons per hour. The power required to operate the table, including fan, head motion and feeder, also varies according to the size of the coal and the capacity and has its maximum at about 25 hp.

The cleaning tables at Raton, N. M., are of a smaller type than the so-called American pneumatic separator, being designed primarily for seeds, grains, and ores, but they are fully as effective, except that they have a lower capacity than the types installed at McComas and also at Wyco.

In all the tests made on this separator, the coal has been prepared for cleaning by a preliminary screening into several sizes. This has been the practice at the Raton and McComas plants, for thereby the best possible cleaning is obtained. Given the advantage of close sizing and middlings return, the pneumatic table will closely approach perfect cleaning on the sizes treated.

By perfect cleaning is meant the complete removal of all material heavier than a certain predetermined specific gravity, with the loss of none of the lighter

TABLE II—DRY CLEANING RESULTS AT RATON, N. M.*

Size of Coal	Per Cent Ash		Waste
	Raw Coal	Clean Coal	
1 in.— $\frac{3}{4}$ in.....	17	11	63
$\frac{3}{4}$ in.— $\frac{1}{2}$ in.....	17	10.5	65
$\frac{1}{2}$ in.— $\frac{3}{8}$ in.....	16	9.5	70
$\frac{3}{8}$ in.— $\frac{1}{4}$ in.....	18	10	66
$\frac{1}{4}$ in.— $\frac{1}{8}$ in.....	22	14	70
$\frac{1}{8}$ in.—60 mesh.....	25	19	70
Total.....	16.83	11.06	64.6

particles into the refuse. This perfect cleaning may not produce a clean coal with as small an ash content as may be desired, but if not, it is the fault of the coal and not of the cleaning.

If this perfection of cleaning is not required, and it is desired merely to remove a portion of the heavy material, it can be done with the dry-cleaning tables without such close sizing. Also, those coals which have small proportions of bone coal and other constituents of intermediate specific gravity will require less attention to sizing than coals with much of this material.

For efficient dry cleaning, therefore, close sizing is essential, but a considerable reduction in ash can be accomplished without it.

For the most efficient screening into the various sizes, the feed should be reasonably dry. Coal that is dampened by moisture other than "inherent" moisture screens with difficulty and carries much of the fine clinging material into the oversize. This is no great detriment to table operation except that it cuts down table capacity by subjecting much material to treatment from which it receives no benefit.

Coals which contained as much as 12 per cent of water have been treated on these tables with good results. It may be said, therefore, that any coal that can be screened can be cleaned. Thus the matter of superficial moisture in the coal becomes purely a screening problem, and even should the coal be screened on

TABLE III—SELECTED DATA ON RESULTS AT McCOMAS

Size of Coal, Inches	Per Cent Ash	
	Raw Coal	Clean Coal
2- $\frac{1}{2}$	15.8	6.5
1 $\frac{1}{2}$ -1.....	18.9	9.3
1- $\frac{1}{2}$	9.0	6.4
$\frac{1}{2}$ -1.....	9.0	6.6
$\frac{1}{4}$ - $\frac{1}{2}$	8.7	6.5
$\frac{1}{8}$ - $\frac{1}{4}$	9.1	7.6

*Written in November, 1923.

*From paper read by Frank Young before Rocky Mountain Coal Mining Institute.

Hydraulic Stowage at Home and Abroad

In European Mines Rock Is Crushed and Flushed into Mine
—When Workings Are Filled Hydraulically as Much as Forty
Feet of Coal Has Been Removed Under a City Without Damage

OF PARTICULAR interest to coal-mining engineers whose properties lie in densely populated regions, or those where the value of the surface is great, was the session of the American Institute of Mining & Metallurgical Engineers devoted to ground movement and subsidence. This meeting which was held in the Engineering Societies Building was presided over by Mr. Moulton. As a preliminary to the meeting proper, he described the methods employed in tunnel driving through sand in building subways in Brooklyn.

This procedure more nearly resembles that of forepoling than any other method normally employed in mining. Cuts about 2 ft. in length are made at a time. A small hole about 2 ft. in depth is driven in the upper right- and left-hand corners of a face and short props inserted. A third hole is then driven in the center of the tunnel at the top and another prop or a forepole inserted. Next, a thin slice is taken between these openings and a plank placed under the roof supported by a prop and the timbers in rear. When the slice has been taken clear across the upper portion of the face, planks are inserted and held up by timbers while the balance of the cut is taken out.

PACK EXCAVATIONS WITH BROKEN ROCK

Following this, George S. Rice presented a paper on ground subsidence and surface support as practiced in European mines. In France, it is considered that subsidence of the surface after mining is inevitable and all excavations made underground are filled. This filling is usually done by hand, the rock being packed with extreme care. Hydraulic filling is, however, employed in certain regions. Both the mine refuse and rock from the surface are employed in building the packs.

In hydraulic filling, where no sand or gravel is available, stone is quarried on the surface and crushed to suitable sizes before being taken into the mine. Hand stowage is done in an extremely careful manner. The ultimate subsidence experienced with careful hand filling is kept down to about 50 per cent of the depth of coal removed.

An excellent example of hydraulic stowage is found in Saxony. Here, about 40 ft. of coal is being removed and more or less destructive subsidence of the surface was present on the outskirts of a somewhat populous city. As a result, the city authorities were loath to grant permission for removal of coal inside the corporation limits. Permission to remove the coal from under the city was finally obtained, however, provided the workings were filled hydraulically. This has been done and the surface subsidence is only 5 to 10 per cent of the thickness of the coal removed. Practically no destructive effects are visible on the surface.

Mr. Rice showed a number of excellent lantern slides illustrating surface subsidence and its effect. Among others was shown a picture of an engine house that had settled about 20 ft., without material damage to the hoist engine. The shaft which this engine served, however, was thrown out of alignment. Another picture showed a beautiful old stone church, probably dating back several hundred years. This also had been subject to a settlement of about 20 ft., without any perceptible damage being done. Some of the other views showed stone dwelling houses in which slight wall cracks had made their appearance but which easily could be repaired. In some of the other illustrations, whole streets of populous towns or small cities had settled, due to the coal being removed from underneath them, yet no cracks had developed in the street pave-



Slush Discharge

This shows the delivery end of the flushing pipe. The silt or other material employed is retained in the rooms or other places to be filled by means of "batteries" or bulkheads so built as to allow the water to drain through them while the flushing material is retained.

ment. In comparison to some of the mine cave-ins and other troubles common in this country, this would appear to be a truly remarkable accomplishment.

Although various kinds of pipe and various pipe materials have been employed for hydraulic stowage, present practice throughout continental Europe seems to have settled upon ordinary cast iron. This pipe is made with flanged connections and long sweep fittings. Such pipe possesses the advantage that when worn from the abrasion of the material which it carries, it may be turned to four separate positions so that the pipe may be practically completely worn through before it is necessary to discard it.

In some mines, large quantities of granular materials are used in stowage. For instance, in some places as much as 5,000 cu.ft. of sand is flushed down a single shaft daily. The pre-war cost of this stowage was about 25c. per ton of coal produced. In some instances, the flushing materials, such as sand and gravel, are dug by steam shovel on the surface and transported several miles before being flushed into the mine.

Another and somewhat peculiar type of stowage was found by Mr. Rice. In one place, all coal is being taken out from under a river of appreciable size and the void space thus made is being filled with a weak concrete. This is being done to shut all river water out of the mine and effectively prevent subsidence of the river bed.

ANTHRACITE REGION THINKS STOWAGE COSTLY

In the discussion of this paper in response to an inquiry from the chair, R. V. Morris stated that the conditions existing throughout the anthracite region were materially different from those described by Mr. Rice. Hydraulic stowage in mines, beyond question, had its origin in the anthracite region, the first work of this kind being performed in the early 70's. Nevertheless, this method of surface support has never been extensively used in anthracite mines. In fact, the material there used for stowage has been confined almost exclusively to mine waste and the grade of fine coal now known as "slush," or that which passes a $\frac{3}{4}$ -in. circular opening.

Enough material to successfully flush the anthracite mines is not available in that region and little hydraulic filling is now being done there for the purpose of coal recovery alone. The principal advantage of this method of mine stowage is the prevention of damage to property on the surface, and many of the upper beds are now being filled in this manner. While the northern anthracite region might contain sufficient surface sand and other drift for flushing material, the cost of utilizing it would be prohibitive under ordinary circumstances.

Mr. Rice then asked Mr. Norris if he did not think that cities in time would demand hydraulic filling and that material would also be flushed under the beds of rivers and large streams to prevent the strata from fracturing through to the surface and flooding the mines.

In reply, Mr. Norris stated that conditions prevailing throughout the anthracite region had undergone a great change during his own recollection. In the past forty years, during which time he had been actively connected with the mines, commercial mining had been carried on in beds from $5\frac{1}{2}$ ft. down to 2 ft. in thickness. In other words, forty years ago, a $5\frac{1}{2}$ -ft. bed was the thinnest that it was considered commercially possible

to mine. Today, a 2-ft. bed is thus treated. It is possible that in the future the price margins realizable for coal may be such as to permit hydraulic stowage of the coal measures, but Mr. Norris did not feel that that time had yet arrived or that it lay in the immediate future.

H. N. Eavenson then stated that a questionnaire bearing on this subject had been sent out to about one hundred coal-mine operators. Approximately two-thirds of these questionnaires had been returned, the majority of them lacking the information most desired. This was probably due to the fact that the management of the ordinary mine does not keep accurate records of the amount of surface subsidence that takes place over its workings. He believed, however, that by the end of the year, all available information would be in hand and ready for presentation at the next annual meeting.

H. Eustace Mitton stated that the paper and discussion had been of particular interest to him. Hydraulic stowage had been attempted in Great Britain only in extremely rare instances. Throughout that country, approximately 90 per cent of the coal was produced by longwall mining. This method of operation permits the withdrawal of coal from under surface structures with little or no damage to them, so long as the faces are kept advancing at a fairly uniform rate. A cessation of operation, however, over any appreciable period of time brings on trouble.

LONGWALL CHEAPER THAN ANY STOWAGE

During the great British coal strike a year or two ago, much damage was done to surface structures at points directly above or near the coal faces. Mr. Mitton stated that it was his opinion that the longwall system of mining would be cheaper than that employed in this country, if the places thus mined had to be stowed in order to prevent destructive subsidence and damage to the surface.

Charles Enzain stated that he had heard of a method of mining and back-filling that consisted of driving rooms, say 25 ft. wide and leaving pillars of approximately the same width or slightly wider between them. After a room had been driven, the bottom was shut up and the top shot down. Next, a narrow entry would



Flushing Pipe Entering Through Borehole

Refuse from picking tables and jigs is crushed at the breaker and flushed immediately into the pipe leading into the mine. This is a bell-and-spigot cast iron pipe the joints of which are made tight by wooden wedges.

be driven through the pillar left between rooms. This would be driven to the end of the pillar, when short crosscuts, either way, would be driven to the rock filling now occupying what had been the original room. These wing pillars would then be drawn back as rapidly as possible, the top being shot down and the bottom shot up meanwhile. If the top could be shot down to a sufficient height, so that the voids in the loose material would equal in volume the coal taken from the bed, it is probable that this system of back-filling would work successfully.

From the paper and the discussion it would appear that a certain quantity of surface subsidence is unavoidable if any large percentage of the coal is to be extracted from a bed. The real problem of the engineer conducting such operations is therefore, not to avoid subsidence, but to control it so as to nullify its destructive effect upon the surface or surface structures.

The Miner's Torch

Everybody's Business

LAST week I chanced into a friend's office (he is a coal-mine superintendent) and noticed the following proverb, neatly framed, hanging over his desk: "Let every man mind his own business and the cows will be well tended." When I entered the office I found my friend away for the day and his secretary, a rather attractive young woman, trying to amuse herself by executing pictures on her typewriter. The pictures were not word pictures but typed illustrations.

"Could you type a cow in that manner?" I asked, and was immediately sorry that I had been so brusque because she instantly looked up at the proverb and appeared to be greatly embarrassed.

Finally, but not without embarrassment to myself, I succeeded in convincing the young lady that I had had no intention of connecting the work she was doing with the precept on the wall; at least, not in the manner which she had assumed.

Then I explained that what I had desired to do was to make a few comments concerning the framed proverb, for the benefit of her boss, who happened to be one of my best friends, and it had occurred to me that a picture of a cow at the top of the sheet which I proposed to use would help to gain his attention quickly.

Of course, womanlike, she was curious to know what I proposed to write. Without further urging on my part, she put a blank sheet in her machine and began to hammer away at the keys; in a very few minutes she handed me a sheet with a creditable looking cow at the top. Seeing that I was pleased with her efforts, she offered to type underneath the comments that I proposed to make. This put the joke back on me because while watching the young lady manipulate the typewriter keys I had entirely forgotten what I had intended to say. Eventually, however, I managed to dictate thusly:

"Following most any cow path leading out of your village into the surrounding country, you will come face to face with a gang of moonshiners who are allowed to attend to their own business simply because you

and the other law-abiding citizens of your community feel that you ought to attend to your own business."

"These moonshiners have probably 'salted' away during the past two years about one-half of the total earnings of a good many of your employees, and today they might buy the controlling interest in your company if their ambitions ran in that direction. That they have been attending to their own business with a vengeance, no one can question. And what have they given your camp in return for all of this money? Poverty! sickness! and death! Sure, every one knows that! But if a man wants to risk his life for a drink or two, of course, that's his business.

"Just a word now about the last clause of the proverb: 'the cows will be well tended.' Some men would starve their families before starving their cows, but even so you can find plenty of instances of cows having been starved because the money that should have purchased feed has been used to purchase whiskey. And consider the cows that have been taken from their stalls and led out to be exchanged for whiskey. Undoubtedly, they are being 'well tended'; most moonshiners are country bred and their preference runs to milk rather than whiskey."

When I arrived home I found a telegram awaiting me. It read as follows: "Who tends the cows on your lot?" It carried two signatures, my friend's, the superintendent, and his secretary.

Car Body Built of Corrugated Sheets

FOR seven or eight years cars have been built in Great Britain at Bolton, Lancashire, with the body composed of corrugated sheets. Where a large area of a flat sheet would be distorted by a blow, a corrugated sheet would be affected only locally. The plate is bent around the car corners in a cold state by patented machinery without the sheets being thinned or stretched in any way and without the corrugations being lost at the angle. In fact, what is a sag on one side of the angle is a high spot on the other side. In consequence the angle stands out well and is quite stiff, not needing any stiffeners inside or outside the body.

Each car body is composed of five sheets, four corner bolts and four binding pins, no rivets whatever being used. Plates can be bundled and shipped insuring a low freight rate. The labor cost of assembling and repairing the plates is low, only a hammer and a wrench being needed for that work. In fact it is claimed that a body can be put together in five minutes single-handed, whereas a wooden or riveted steel body requires two men, one of whom must be skilled, several rivets, a furnace and some hours' work. The sheets are made interchangeable.

The manufacturers claim that the cars thus constructed have a long life and that the maintenance costs are low, that they are dust proof—a condition we are only just beginning to appreciate—that they save in weight of body and so reduce haulage costs and handling effort, that they last at least 100 per cent longer than riveted steel bodies and in general will not need repair for four or five years.

Of course, a car with corrugated sides does not dump as readily as one with smoother surfaces but where rotary dumps are used as in England and in parts of this country, an easy discharge of the coal, slate, sand-rock or clay in the car should be obtained.

Broadcasted Program Received In Depths of Mine

Whole Evening Program Received 400 Ft. Underground
—Possible Developments May Exert Great
Influence on Industry

BY EDGAR GEALY

IN THE early stages of radio experimentation, it was learned that when an oscillatory electrical discharge occurred, part of the stored energy setting up the disturbance was spent at each oscillation. Later it was found that these oscillations caused electro-magnetic strains or stresses in the all-pervading ether. In 1863 Maxwell formulated the theory that these disturbances traveled at the speed of light—186,000 miles per second. Some time later Hertz set up these disturbances, detected them and proved that they possessed many of the properties of light and radiant heat.

We have since learned that radio waves have many qualities much different from these and are not so closely limited in their range. When radio-telegraphy was developed, many of us were astonished to find that our sets could pick up messages on an indoor aerial, and we therefore concluded that the waves were capable of penetrating the walls of buildings. Not long ago we were somewhat surprised to learn that radio messages were picked up by a receiving set located in one of the Hudson River tunnels. This experiment was made under a great depth of water, but not being satisfied with this pioneering work, the men interested in the test decided to try the experiment in a mine. On Feb. 14 the test was successfully made and radio took one more forward step.

Many engineering men interested in radio will attach much importance to the success of this test. Radio engineers have long since believed that radio waves travel through buildings and even mountains, but their vertical penetration into the very bowels of the earth was something not altogether believed possible. The conditions in mines differ greatly from those in buildings or under rivers; they are often hundreds of feet deep and often covered with beds of coal—carbon—which might reasonably be expected to act as an absorbent or shield to all kinds of waves. Nevertheless, the experiment was entirely successful and has consequently opened up great possibilities.

Who knows how great a factor radio may become



Testing the Penetration of Radio Waves

Down where the dusty diamonds are mined, these men found radio waves which carried perfectly both human voice and music.



Music in Mine Air 400 Feet Underground

Here in the mine mules' pantry the party set up their instruments and heard station WQAN—"Willie Quick And Nellie."

in the mining industry; some of us are already cognizant of its possibilities in the homes of miners and mining officials. It is no wild stretch of the imagination to see how easily it may supplant the house organs and bulletins of mining companies and at the same time engender a more intimate contact between the mining officials and the men. It is easy to see a coal-company president sitting at home in the evening talking to his men, telling them how to do their work more safely and efficiently or even refuting the arguments of some Bolshevik who has been sowing seeds of discord at the mines during the day. In times of storms, floods, explosions and other mine accidents, how much more satisfactory and reliable will radio be than the wired telephone. Will those of us who like music with our noonday meal be outdone by our brother, the miner?

Whatever possibilities the future may hold, the men who conducted the test at the Pine Brook mine in Scranton, Pa., all agree that they had a real thrill as they sat in the mule barn in the Baltimore No. 2 vein and heard James Walsh sing "A Kiss in the Dark."

Just a few minutes before the strains of the music echoed through the dark chambers of the mine, Ralph D. Bunnell, vice-president and general manager of the Moon Radio Corp. of Astoria, Long Island, New York, had entered the mine with a standard receiving set and stretched a 25-ft. aerial over some timbers and ledges of coal. After setting up the instrument in several different locations in the Baltimore No. 2 vein, the equipment was removed to the China vein and here, at a level 400 ft. below the surface and about a half mile from the mine shaft, the program was listened to until the operator signed off for the evening.

An interesting feature of the event was the fact that during one of the underground tests the receiving set was located quite close to the power circuits of the mine, but regardless of this, the sounds were received without distortion or disturbance.

We now know that radio waves will penetrate into the mines, and perhaps the day is not far distant when, by means of radio, we may be able to illuminate the mining face of gaseous mines, fire shots more safely or operate drills and cutters.



Everett Drennen

President of the West Virginia Coal & Coke Co.

AFTER much patient experimentation Everett Drennen put into operation the V-system of coal mining described in our issue of Feb. 7, a method the publication of which has caused a veritable sensation among coal-mining men.

Mr. Drennen for years has been a quiet force in coal affairs. He was chairman of the Fair Price Committee of the Northern West Virginia Coal Operators' Association in which capacity he assisted in driving to cover the speculators who had boosted the price of coal to unprecedented heights. After a persistent campaign the price was cut from around \$14 to \$6. The work of the committee was approved by the federal authorities, the results showing that when Mr. Drennen starts out to accomplish something he succeeds.

Mr. Drennen was born in Minneapolis, Minn., about 38 years ago. After graduation from the University of Michigan he obtained employment in the department of maintenance of way and construction of the Pennsylvania R.R., remaining with the company two years, and then entered Cornell University, where he took up civil engineering and was graduated in two years.

His first employment after leaving Cornell was as engineer of road construction of Belmont County, Ohio, where he remained until he joined the forces of the

Consolidation Coal Co., becoming associated with its power and mechanical department. During the first five years of his connection with that company Mr. Drennen must have devoted nearly all of his time to work, as he also was general manager of the Fairmont Mining Machinery Co. and construction engineer of the Monongahela Valley Traction Co. which also has its headquarters at Fairmont, W. Va.

In 1912 Mr. Drennen was transferred to Jenkins, Ky., as manager of the Elkhorn Division of the Consolidation Coal Co. operations, remaining there two years, when he became connected with the Stonega Coke & Coal Co. as vice president and general manager. He left that company in 1917 to become vice president and general manager of the West Virginia Coal & Coke Co. and three years later was made president of the company, which position he still occupies.

The West Virginia Coal & Coke Co. was organized by the First National Bank of New York City to take over the coal holdings and operations of the Coal & Coke Ry. and the Davis Collieries Co. and allied interests of the Henry G. Davis estate and the Stephen B. Elkins estate. The company operates twelve collieries located in West Virginia having an annual output of about 1,500,000 tons.

News Of the Industry

Official Attitude on Trade Statistics Menaces Coal Industry

Data Essential to Intelligent Conduct of the Trade—Deadlock of Departments of Justice and Commerce May Require Intervention of President—Friendly Lawsuit May Be Way Out

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

The uncertain status of trade statistics brought about by the activities of the Department of Justice has affected the coal industry seriously. It has all but disrupted the statistical activities of the National Coal Association. Since statistics are so essential to the intelligent conduct of the coal trade, it is hoped that this industry will be able to bring about a clarification of the situation. Allen H. Willett, director of the Bureau of Coal Economics of the National Coal Association, has called attention to the fact that the Department of Commerce and the Department of Justice are in deadlock and that the President might be induced to force the issue to a conclusion. A suggestion from another quarter is that a test case could be brought in a clear-cut statistical case without the consent of the Department of Justice. It is understood that the Department of Justice has declined to initiate such a proceeding.

Under Sec. 7 of the Sherman Anti-Trust Act, any person injured by any violation of the act is given expressed permission to sue in any Circuit Court in the district where the defendant resides. For example, any consumer of Pocahontas coal who might be convinced that, as a result of the statistical activities of the Pocahontas Operators Association he is being injured, could seek an injunction. A case could be brought equally as well against any other of the local coal associations. While it would be a friendly suit, it is thought essential to the case that the consumer bringing the action should view the matter in much the way as is done by the Department of Justice.

Those who are keeping closely abreast with the trade-statistics situation are convinced that no industry is more dependent on current facts and figures than is coal. It will be recalled that Secretary Hoover pointed out during the last strike that, had figures been available on the rate of consumption, prices would not have mounted as they did. Such figures would have squeezed much of the speculation out of the situation. The need is accentuated by the far-flung character of the business. Conditions in one

field affect, directly or indirectly, the situation in the others.

There never was a time in the history of the coal business of this country when figures were so necessary. The industry is entering upon a three-year armistice. A period of intense competition is ahead. The business situation is uncertain. Drastic curtailment of immigration is having its effect on the labor situation. If there ever was a time when careful and systematic planning was necessary, it is now.

The coal industry has the advantage of a better statistical foundation than have most industries. At this critical time, however, current returns on coal are being so curtailed as to impair their value materially. Many concerns that happen to be in a position to operate to advantage if some of their competitors have no figures to guide them are taking advantage of the Attorney General's activities to decline to make returns.

It happens also that there is a press-

Department of Mines Plan Gets More Indorsements

Indorsement of the Department of Mines bill continue to reach Senator Oddie. John Hays Hammond has gone on record favoring the plan in an unqualified way. The Nevada Senator also is in receipt of an indorsement of the bill from J. E. Spurr, which reads in part as follows:

"I am very strongly in favor of a Department of Mines and consider it absolutely necessary for the welfare of the mining industries and for the proper prolongation of the general business prosperity of the country. I do not think it should be regarded as a sop to the mining industries but should be considered as a help to the other industries that depend upon the proper conduct of mining, one of the greatest and most important of the basic industries of the country. You may be sure of my enthusiastic co-operation."

ing necessity just at this time to call the country's attention to some serious phases of the existing situation. It has been said rather glibly that the three years of peace which stretch ahead will be a good thing for the industry, in that it will eliminate a lot of high-cost mines. Reference to the statistical records of the U. S. Geological Survey will emphasize the fact that this squeezing-out process is going to be a serious one. In addition to all the wagon mines and the country banks, there are 5,000 companies engaged in the production of coal falling in the class with an output of less than 100,000 tons. All of the mines of these companies, which include the higher-cost mines, could be eliminated and still the country would have a capacity in excess of its probable needs during the next three years.

It is certain that these properties can not be relegated to a state of stand-by without trouble. If nothing else, their elimination would give rise to such dissatisfaction on the part of a large body of miners that a strike could not be avoided, many think. The situation is a serious one and one that calls for full facts, yet just at the time when the industry and the country need coal statistics most, the statistical foundation is threatened.

Fail to Agree in Kanawha; Wage Parley Broken Off

Cincinnati, Ohio, March 3.—After two days of negotiations on a wage scale between operators of the Kanawha district whose properties lie north of the Kanawha River and in what is known as the K. & M. territory and representatives of District 17 of the United Mine Workers, deliberations were broken off on Friday afternoon without an agreement having been reached. No statement was offered and it is believed from what little has been said that a parting of the ways has been reached.

No future date was set for resuming the conferences and those operators who attended the meeting say that there seems little likelihood of their continuing after April 1 except on an open-shop basis. The point at issue was the same as in the Tennessee-Kentucky arbitration case recently argued here. The operators believed that they should be allowed a scale which would allow them to compete with non-union fields adjoining. In the Kanawha field operators on the south of the river have been operating open shop for some time past with a wage scale of approximately \$4.68 per day as against \$7.50 to the north of the river.

Illinois Begins Three-Year Acid Test

Mines Are Shutting Down Fast—May Eventually Drop to Number Operating in 1914—Stripping Operations Increasing Rapidly

Shutdowns of many Illinois mines last Saturday night marked the real beginning, in that state, of the great three-year acid test of the coal industry. Ever since the signing at Jacksonville, Fla., Feb. 18 of the three-years continuance of the 1919 wage scale for the Central Competitive Field, Illinois operators have been trying to guess just where the inevitable lightning is going to strike within the state and how much damage it is going to do. The first shutdowns, numbering about a dozen mines, make up the opening touch of the storm. The general opinion is that there will be many flashes before April 1 and that the state has a hard row to hoe during the coming summer. However, nobody expects any collapse of the state's coal industry, but rather a purifying of it by fire.

There are 363 shipping mines in the state, not to mention the 800 locals. Of the shipping operations, less than 300 were producing at the end of 1923, but the number increased a little during January, when several mines got the best run they had had since the winter before. The mines which opened in order to get a slice of January business were sorely afflicted during February, however, and most of them are now down. It is estimated by one of the best-informed Illinois operators that by April 1 the number of properties ready to operate will have been reduced to 254, which was the 1914 total.

Salvation in Cost Cutting

A number of companies whose existence cannot be justified in the face of the conditions of the next three years will silently quit business on or before April 1. But also the big companies with strings of mines are preparing to close up all but the most advantageously situated operations within their ownership. This process, in fact, has been going on for months. Thus every sound company in the state is beginning by trimming down all the mines it can, thus obtaining the best possible working time for the others. The Old Ben Coal Corporation, for instance, is now running four out of twelve mines. Scrupulous care is exercised to reduce the cost of coal to the absolute rock bottom. Therein will lie the salvation of many a company, according to the prevailing sentiment.

Stripping in Illinois also is getting a great deal of close attention. "If I can't stay in business operating a shaft mine, then I'm going to try stripping," said a well-known mine owner, as he went over a sheaf of records on his desk comprising engineers' reports on several sections of possible stripping land in Jackson, Williamson and Fulton counties. Outside the Danville field, more than half the output of which is strip coal, there has never been much shallow mining in the state except a handful of shovel operations in Williamson County. During the autumn

of 1923, however, two great stripping plants and several small ones were opened in Jackson County and the Peoria field.

The Black Servant Coal Co., owned by the Hartshorn interests, of Danville, is operating at Elkville, and the United Electric Coal Co. began an important operation near Cuba. The next big strip put will be opened at once by the Gayle Coal Co.—the Crerar Clinch interests—south of Duquoin. These are expected to be followed into the field by several other companies, who hope to go into stripping on a big scale, get into production quickly, and produce coal for a little over \$1 a ton—if luck breaks their way.

But what effect is the three-year contract going to have on Illinois? The opinion of many operators boiled down produces little except the obvious. The number of mines will be reduced about one-third, but it will take at least eighteen months to accomplish that because of the fact that only a few companies are under pressure of short-term financial obligations and, history repeating itself, many a property will be handed around from owner to owner three or four times before the collapse. The state will see an intense effort of engineering and management to cut the cost of producing coal. Two or three tremendous new mines will turn out a great volume at the low costs which usually prevail in new operations whose haulage is short and ventilation charges small. Margins on coal will be trimmed down to extreme thinness to hold most of the markets the state serves.

And Illinois will go on about the business of producing and selling 60,000,000 or so tons a year with fewer miners than for any 60,000,000 tons it ever produced before. During 1923 nearly 90,000 miners got out the state's approximate 75,000,000 tons, but from now on there will be 50,000 or 60,000 jobs for men who can efficiently serve those Illinois mines whose output the country really needs.

Pays \$800 for Lost Miner

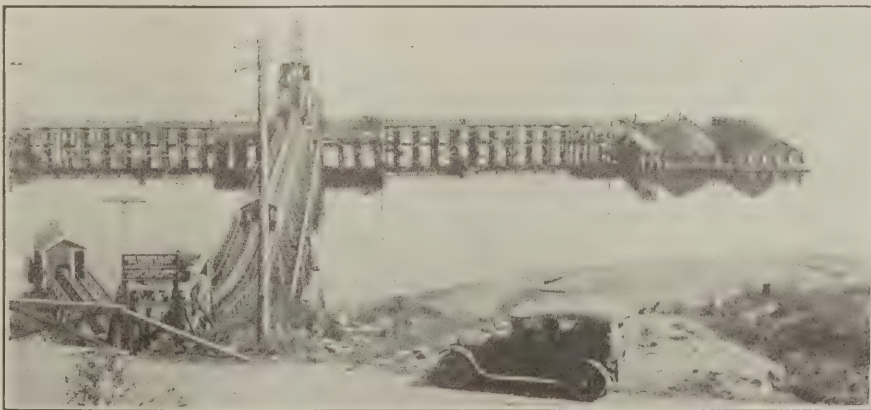
An insurance company has been required to pay the face value of a policy on the life of a miner in southern Illinois even though nobody could prove him dead. Seven years ago George Biondi went below in the Zeigler No. 1 mine, at Zeigler, Ill. At his working place eventually were found his dinner bucket and denim jumper, but he never came out of the mine and has never been found. After prolonged litigation the beneficiaries of Biondi won their case in the Circuit Court at Benton, Ill., last week and the insurance company was ordered to pay them \$800.

Alberta Coal Output Grows

More than 2,000,000 tons of coal produced in the Province of Alberta were sold at Canadian points outside the province last year. This statement is made in the annual report of the Alberta Mines Department recently presented to the legislature. The total output for the year was 6,866,923 tons. Of this 1,382,788 was consumed in Alberta; 1,937,753 tons was disposed of in other provinces and 83,557 tons went to the United States. While there was an increase in Alberta coal exports to the East it is shown that United States coal came into Canada from the Rocky Mountains eastward to Fort William to the extent of 1,151,629 tons in excess of the 1922 importations.

What are termed the domestic coal fields of Alberta produced 3,161,741 tons last year. Much of this came from the vicinity of the City of Edmonton, as is shown by the following details: Tofield, 104,886 tons; Clover Bar, 395,371; Edmonton, 130,112; Strathcona, 5,361; Namao, 13,264; and Cardiff, 72,139.

The production of the bituminous fields was 3,241,614 tons, of which the Crows Nest Pass Mines contributed 1,865,000 tons; the Brazeau Field, 493,378; Jasper Park, 248,659; and Mountain Park, 634,474 tons. The sub-bituminous fields produced 463,461 tons, the greater part of which came from the Yellowhead fields with 377,574 tons.



Loading Docks of the Cassidy Collieries

These collieries, located on Vancouver Island, are subsidiary of the Granby Consolidated Mining, Smelting & Power Co.

I. C. C. Takes Recess in Rate Case Till April 22

Southern operators and the railroads will have until April 22 to prepare their case in the Pittsburgh-Ohio rate controversy, the Interstate Commerce Commission having taken a recess until that date after conducting hearings from Feb. 13 to 21.

The case involves coal-freight rates from the so-called inner crescent territory to Lake Erie ports. It originated from a petition filed by the Pittsburgh Coal Producers Association alleging that rates from western Pennsylvania and eastern Ohio points to the lake ports were unjustly high and that rates from other points of competitive shipments were out of proportion in that they gave operators in these other territories a preferred position in lake coal business. The Northern West Virginia Coal Operators Association filed a similar petition in behalf of its members, directed against the Baltimore & Ohio and other railroads. A number of intervening petitions were filed in opposition.

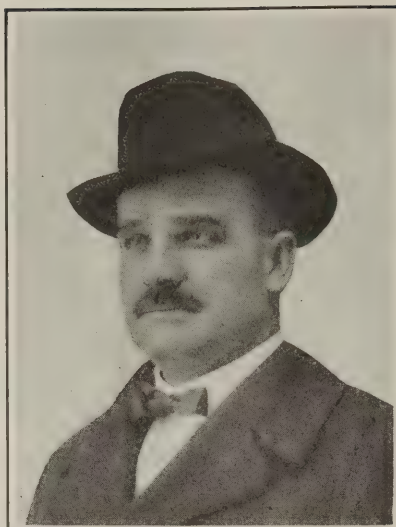
The case was heard before H. C. Hall, chairman of the commission, assisted by Examiner Gerry.

Testimony in behalf of the petitioners was to the effect that differentials of 25c. per ton from the Pittsburgh district, and 28c. from Ohio and northern West Virginia, with 48c. from Kentucky-Tennessee mines, are not sufficient to properly care for the added mileage; therefore the rates from the petitioners' territories should be reduced to widen this differential. Many tables of statistics were introduced to establish that coal shipment to the lakes from distant points, at inadequate freight rates, caused the use of several thousands of cars annually during the lake season in excess of actual needs, because of longer hauls. The petitioners are deprived of the natural advantages of their geographical location because of the alleged preference in rates granted more distant points, it was testified.

The position of the Southern operators is that the case is a "gigantic effort on the part of Pittsburgh and eastern Ohio coal interests to eliminate the competition of Southern coals, thereby monopolizing the Lake and Northwestern trade." James D. Francis, chairman of the joint committee representing the Southern operators, commented on the case as follows:

"Unionized coal fields in the Middle West for several decades are alleged and are believed to have attempted to create a monopoly for their coals by conspiracies with the United Mine Workers, but, having failed, they now attack the existence of Southern producing fields by asking the Interstate Commerce Commission to establish prohibitory freight rates on Southern coals to Lake ports for transshipment to the Northwest.

"Southern operators contend vigorously that existing freight rates already are too high and should be reduced. Coal consumers of the Northwest should have the choice of coals from all coal fields now serving the Northwest. The



Seward Button

Formerly head of the State Department of Mines of Pennsylvania, Mr. Button has just been appointed vice-president and general manager of the Temple Coal Co., Scranton, Pennsylvania.

public should not be denied the only real substitute for anthracite coal nor be compelled to pay the exorbitant freight increases requested in connection with the attempt of Pittsburgh to create a monopoly."

Hoover Hails Renewal Of Old Contract

Agreement by the subcommittees of bituminous coal operators of the Central Competitive Field and of the United Mine Workers to submit for ratification a three-year extension of the present wage agreement was characterized by Secretary of Commerce Hoover at a press conference Feb. 26 as "the most constructive step in the industry in many years."

The effect of the three-year agreement, in the opinion of Secretary Hoover, will be to stabilize the soft-coal industry as to operations and also to stabilize prices.

Instead of a difference of as much as a dollar in the price of soft coal, the Secretary ventured the opinion that the long-term wage contract will result in a spread of only about 15c. in prices at the mines, due to competition. The price of bituminous coal f.o.b. mines probably will settle around from \$2.20 to \$2.40 per ton, Mr. Hoover predicted. The Secretary was speaking only of the effects of the agreement upon unionized mines. He did not touch upon the subject of the possible closing of high-cost mines.

By doing away with periodical strikes and threats of strikes, the agreement also will have a beneficial effect upon the railroads, Secretary Hoover said, by giving the carriers an opportunity to adjust their car supply.

Says Industrial Court Has Not Had Fair Test

As the result of a year's study the National Industrial Conference Board states that the Kansas Industrial Relations Court has not had a fair test of its ability to establish regularity and continuous operation in the face of economic conditions. The Conference Board's findings are set forth in a statement just issued. Released on the eve of the expected decision of the U. S. Supreme Court in the Howat case, the statement points out that many factors associated with the court in the public mind cannot be considered as evidence for or against the court.

"The Kansas Court of Industrial Relations," says the report, "has been a novel experiment, suggestive as a guide for future effort to meet a complex and difficult problem. It demonstrated the ability of such an institution to settle minor differences between employers and workers on the basis of fact and common sense. It furthermore provided a machinery by which larger group conflicts in industry might be systematically adjusted in accord with principles of industrial justice gradually to be developed out of experience. It did not develop its full potentialities of adjustment because three major conditions necessary to the success of such an institution under present circumstances were not fulfilled in it. These conditions are:

"(1) Acceptance by employers and labor unions in essential industries of the dominance of the public welfare and of the necessity for regulation of private action in the public interest. Such an institution as the Kansas court cannot effectively operate unless the public interest in and reasonable regulation of essential industries is sanctioned by public opinion.

"(2) Development of principles of law and rules of practice which will lead to the recognition and utilization by such an institution of the structure and processes of group organization in industry. The conflicts with which it must deal are conflicts of group interest, not disputes between individuals. The work of such an institution as the Kansas court must, therefore, be based upon and built up out of the machinery and processes of voluntary private collective bargaining, developed through effective and representative group organizations.

"(3) Complete removal of such an institution from the influence of partisan politics. Such an institution cannot successfully function as a commission dependent upon political appointment."

A NEWS ITEM appearing in *Coal Age* Feb. 7 bore the headline "Pittsburgh Coal Co. Takes Over Reiss Interests." To make the announcement perfectly clear to our readers perhaps it should be stated that the sale by the Reiss interests to the Pittsburgh Coal Co. consisted only of its mining property. No change in the control of the Reiss dock interest has taken place.

Shutdown Coming in Southwest

Operators Will Demand Wage Cut and Scale Conference Will Be So Delayed No Agreement Seems Possible by April 1—Operation Under Present Contract Pending Settlement Not Likely

A general shut down in the Kansas, Missouri and Oklahoma region is expected April 1 because the operators of the district are setting out to effect a reduction in miners' wages lest they all go broke before autumn. A wage-scale conference for the district is to be held, but probably not until March 25, because the last of the miners' delegates cannot be chosen until then, it developed last week after Charles F. Spencer, president of the Southwest Interstate Coal Operators' Association, and Commissioner W. L. A. Johnson had met Presidents William Bogartz, of the Kansas miners; Arch Helm, of Missouri, and Andrew McGary, of Oklahoma.

It is considered doubtful if, in the five days intervening between the ten-

tatively selected date of March 25 and April 1, when the present contract will expire, an agreement on wages will be reached. Operators declare they will demand such changes in the existing contract as will give substantial relief in the cost of production. They point to the number of mines of the district that were not opened this year, and say only a lessening of production cost can bring about full-time operation.

It is not likely that the two groups will get together in the few days allowed them before the termination of the existing contract. Neither is it considered likely that the mines will be permitted to operate under the present contract pending negotiations. Consequently the Southwest is expecting work to cease April 1.

Miners to Vote March 12 On New Agreement

Union coal miners in the Central Competitive Field will vote Wednesday, March 12, on the action of their International scale committee in regard to the new wage contract provided at the joint conference of miners and operators at Jacksonville, Fla., Feb. 19. Ballots for the referendum have been printed and will be distributed to approximately 5,000 local unions in Indiana, Ohio, Illinois and western Pennsylvania. Officers of the miners' organization believe that the three-year contract will be ratified by the miners by an overwhelming vote.

Annual N. C. A. Convention in Cincinnati May 14-16

Cincinnati has been chosen as the place at which this year's annual meeting of the National Coal Association will be held, May 14, 15 and 16 having been fixed as the dates for the meeting. Some of the committees will be called into session May 13. Arrangements have been made whereby the machinery exhibition of the American Mining Congress will be held in conjunction with this meeting.

The entertainment features of the program will include an evening barbecue on the nearby Kentucky farm where the American Bar Association was entertained recently in similar fashion. There will be a boat ride on the Ohio River during which a vaudeville program will be presented.

Census Data Indispensable to National Betterment

In a statement intended to justify expenditures for census purposes the British Government points out that the information as to the number and composition of populations is not asked "to gratify curiosity or merely to add to the sum total of human knowledge." Continuing the statement says:

"The cost of census taking is far too great to be incurred solely to provide interesting facts. The real necessity for the census is that it provides the only possible method of ascertaining from time to time the true condition, social and economic, of the people. This knowledge is indispensable, not only to enable the people to govern themselves and to carry on their national work but also as a starting point and foundation for all efforts and plans for the betterment of social and national conditions."

Probe Coal Thefts from Federal Reserves

Alleged usurpation and infringement upon government coal reserves in northern Alabama is to be probed, the U. S. Government having begun an investigation at Jasper, Ala., March 1, through the Southern Division of the General Land Office at Jackson, Miss., according to James W. Neal, in charge of the land office at Jackson.

Mr. Neal, who will have supervision of the investigation, stated that the government would investigate charges that millions of dollars worth of coal had been mined and sold from government property by private mine owners during the last few years.

High Finance in Coal

The hopelessness of the strong, legitimate coal man against the general condition of things in the trade is shown in this advertisement by the Western Fuel Co., Salt Lake City, Utah, headed "Somebody Fell Out of Bed": "Because one soft-coal dealer got peeved at another soft coal dealer he cut the price of coal 50c. per ton. Then the second dealer got peeved at the first and cut the price \$1. How can they do it? It can't be done and make any money. The coal dealers, therefore, are in very much the same fix as the lady who bought 'hot dogs' at 5c. each and sold them six for a quarter. When one of her competitors asked her how she could do it, she replied: 'Look at the volume of business I'm getting.' If you want to break the coalmen, buy all the coal you can at these ridiculous prices, and please remember that KING COAL—the best coal mined in Utah—is being sold at these same ridiculous prices, or any other price that will be made."

Rail Coal Consumption Lower During November

Class 1 railroads of the United States consumed 9,080,000 net tons of coal during November, 1923, as charged to account 394, compared with 9,411,000 tons in the preceding month and 9,755,000 tons in November, 1922, according to a report by the Bureau of Statistics of the Interstate Commerce Commission covering 176 steam roads. During the first eleven months of 1923 these roads consumed 100,799,000 tons as compared with 85,915,000 tons in the corresponding period of 1922. The delivered cost per net ton of coal consumed in road service in November last was \$3.27 as against \$3.30 in October and \$3.87 in November, 1922.

Consumption of fuel oil by the roads during November totaled 194,377,000 gallons compared with 198,760,000 gallons in the preceding month and 155,248,000 gallons in November, 1922. During the eleven months ended with November the roads consumed 1,795,283,000 gallons compared with 1,409,545,000 gallons in the corresponding period of 1922.



Entrance to Wilson Tunnel, Coalmont Collieries

The Coalmont Collieries, Ltd., is a British Columbia operation. The body of the mine car is lifted from the frame and carried up the tramway.

Coal Mine Accidents Took 234 Lives in January

Accidents at coal mines throughout the United States killed 234 employees during January, 1924, according to a report by the Bureau of Mines. Included in the fatalities are 68 victims of two explosions during the month at Johnson City, Ill., which caused 32 deaths, and at Shanktown, Pa., which caused 36 deaths. The fatality rate for the month was 3.94 per million tons, based on a production of 59,435,000 tons of coal. In January, 1923, the fatality rate was 3.52, based on 206 deaths and an output of 58,458,000 tons.

Bituminous-coal mines in all states reported 202 fatal accidents, the production being 51,470,000 tons, and the fatality rate being 3.92, as compared with 3.28 for January last year. For the anthracite mines in Pennsylvania, the reports covered 32 fatalities, which, on the month's output of 7,965,000 tons, indicated a fatality rate of 4.02 per million tons, as against 4.89 for January, 1923.

As compared with January, 1923, the reports for January of the present year indicated lower fatality rates per million tons for all of the main causes of accidents except explosions. For falls of roof and coal, the fatality rate per million tons declined from 1.85 in January, 1923, to 1.68 in January, 1924; for haulage accidents the rate declined from 0.62 to 0.42; for explosives, from 0.19 to 0.12; for electricity, from 0.12 to 0.07. The rate for explosions increased from 0.21 to 1.31 per million tons.

Coal Saves Fruit

Frost is one of the banes of the Northwestern fruit grower's life. When the word comes from the weather bureau that a touch of zippy temperature is due Tuesday night, the orchardists put in a busy Tuesday afternoon firing up the smudge pots under the trees. All sorts of fuels have been used with oil prominent among them. Just now a campaign is on in Washington State to induce fruit growers to use Washington coal briquets for the purpose. Thus the market for Northwestern coal is increased and the rest of the country gets more fancy apples—at 15c. each.

Portland Cement Production Lower in January

Production of portland cement during January, according to a report by the U. S. Geological Survey, based partly on estimates, totaled 8,788,000 barrels, compared with nearly 10,000,000 barrels in the preceding month and 7,990,000 in January, 1923. Shipments for the month were 5,210,000 barrels compared with more than 6,000,000 barrels in December and 5,628,000 in January, 1923. Stocks at the end of January amounted to 14,153,000 barrels, compared with 10,575,000 at the close of the preceding month and 11,477,000 barrels at the end of January, 1923.

No Move to Prevent Issuance Of Trade Information

Apparently the Department of Justice has no intention of attempting to call to account any trade association whose only activity is the distribution of unidentified statistical information. It has been suggested that a judicial determination of a case involving such statistics only would be extremely valuable in clearing up existing uncertainty as to the legality of such activities. The Department of Justice, however, never has taken steps against an association engaged in what always has been considered thoroughly proper statistical activities. For that reason there has been no judicial decision covering the legality of such activities. The only way a judicial clarification of the situation can be obtained is through some process initiated by the Attorney General. This he seems disinclined to do, even with the idea of bringing a test case.

E. N. Zern, Invalid, Rescued When Home Burns

E. N. Zern, editor of the *Coal Catalog*, was rescued with difficulty when a \$20,000 fire destroyed his home, at Crafton, Pa., last week. Mr. Zern, who is 65 years old and an invalid, having been confined to his bed for three years, was carried to safety only after four attempts to rescue him had been unsuccessful. Frozen hydrants near the Zern home greatly hampered the firemen in fighting the flames.

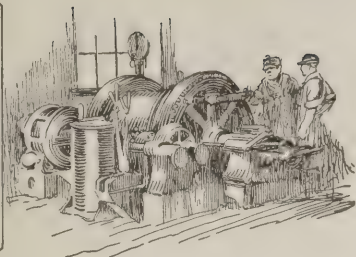
Coal-Mine Fatalities During January, 1924, by Causes and States

(Compiled by Bureau of Mines and Published by *Coal Age*)

State	Underground											Shaft				Surface					Total by States							
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1924	1923	
Alabama	1		1						2				4													4	13	
Alaska																										0	0	
Arkansas	1												1													1	0	
Colorado	1				1								2													2	7	
Illinois	19		4	34						1			58	1					1							59	19	
Indiana	5		1		2								8						1							9	4	
Iowa	2												2													2	3	
Kansas	2												2													2	3	
Kentucky	8		1				1			1			11													11	9	
Maryland																										0	2	
Michigan																										0	0	
Missouri	2												2		1				1							1	0	
Montana	4		1										5													5	3	
New Mexico	1												1													1	2	
North Dakota																										0	0	
Ohio	5		1				1		1				8													8	14	
Oklahoma																										0	0	
Pennsylvania (bituminous)	13	1	4	36			2			1			57						1					1	2	59	39	
South Dakota																										0	2	
Tennessee																										0	0	
Texas																										0	0	
Utah																										0	3	
Virginia	2												2													2	4	
Washington																										0	0	
West Virginia	14	2	6						1				23						1	1				2	3	7	30	34
Wyoming	3		1										4													4	1	
Total (bituminous)	83	3	20	70	3	4		4		3			190	2	1			3	2	1			3	3	9	202	162	
Pennsylvania (anthracite)	10	4	5	5		3							27	1	1			2	1			1	1	3		32	44	
Total, January, 1924	93	7	25	75	3	7		4		3			217	3	2			5	3	1			4	4	12	234		
Total, January, 1923	100	8	36	8	4	11		7	2	3		3	182	4				4	2	1	6		3	8	20		206	



Practical Pointers For Electrical And Mechanical Men



Composition and Corrosive Effect of Mine Water

The U. S. Bureau of Mines, in co-operation with the Carnegie Institute of Technology and officials of the coal mining industry, has been studying the problem of corrosion of metals in the mines and many interesting results have been obtained.

In its broadest sense corrosion has been defined as that process which will cause a metal to revert to a state of more stable chemical equilibrium. This is accomplished by the interaction of the metal with a corroding medium, which may be a gas, a liquid, or a combination of both. The products of such a reaction are salts, hydroxides, or oxides of the metal.

Corrosion is evidenced by the formation of decomposition products such as coatings or precipitates, by a gradual wearing away of the surface, by the formation of pits, or by any or all of these in combination.

figures showing the range in composition for acid water from bituminous coal-mines.

Many factors influence the corrosive action of mine water, principal among them are the following:

- (1) Chemical composition of the metal or alloy.
- (2) Physical condition of the metal or alloy.
- (3) Chemical composition and concentration of the mine water.
- (4) Velocity of flow.
- (5) Temperature of the medium.
- (6) Time period of exposure.
- (7) Solution pressure of the metal or alloy which depends on 1, 2 and 3.
- (8) Electrical conditions of immersion.
- (9) Effect of light.

It is hoped that further study will bring about results that will help materially in the proper selection and care of metals used in mining machinery and equipment. Records of corrosion on rails, pumps, pipes and boilers will be thoroughly covered to ascertain the best means of reducing the present high depreciation.

iron involves many movements of great and small distances during the working day. The two tanks holding the gases, which form the mixture for the production of the high-temperature flame, are heavy and unwieldy, and for that reason a conveyance of some kind must be provided to give portability to the outfit. In many mine shops a two-wheel truck is used for this purpose, but this contrivance cannot be moved any great distance over the rough ground upon which the mine plant is very often built.

LEWIS MINE HAS TANK TRUCK

The Hudson Coal Co., at its Lewis mine, Wolf Summit, W. Va., rigged up a tank truck of lightly fabricated flanged wheels and seamless tubing, the latter being so cut and joined by welding to form a rack for the gas tanks. To two vertical post tubes is attached one stationary iron band which is curved to fit halfway around each tank and another band similarly curved that is hinged to one post and pinned to the other post. These bands form a clamp that may be closed to hold the tanks securely, or opened to permit replacement. The bottoms of the tanks fit in shallow recesses in the floor of the truck, which also is made up of tubes.

A pushbar is attached to the two post tubes furnishing a convenient means for moving the truck by hand wherever mine track is laid.

Mine Truck for Oxyacetylene Welding Outfit

Wide and varied use of oxyacetylene blowpipes at various mines for the duties of cutting and welding steel and



Truck for Making Welding Outfit Portable

This light truck can be easily moved around the mine yard or in the mines to any place where the track has been laid; thus the welding equipment is taken to the job and made more serviceable.

ARIATION IN THE COMPOSITION OF TYPICAL MINE WATER FROM COAL MINES IN PARTS PER MILLION

Constituent	Low Value	High Value
SiO ₂	16	160
Fe ++	Trace	1,216
Fe +++	11	1,303
Al	Trace	1,434
Ca	79	436
Mg	9	197
K	0	373
Na	21	2,286
Cl	0	625
SO ₄	790	12,115
Suspended matter (on unfiltered water) dried at 150 deg. C.	6	91
Acidity due to free sulphuric acid	Trace	3,662
Acidity due to free sulphuric acid plus sulphates of iron and aluminum	2,180	17,200

The composition of mine waters varies according to the locality of the mine. The water from any particular mine will vary according to the season of the year, the age of the mine and other factors. Water which has been allowed to flow through old workings usually is more acid than water from a new opening.

The acidity of mine water is due to the presence of free sulphuric acid. The mine water also will usually contain considerable amounts of sulphates of iron and aluminum, and smaller amounts of sulphates of calcium, magnesium, sodium and potassium. Silica and chlorides usually are present. In some mines the chloride content of the mine water is sufficiently high to be a serious factor. In the table are given

Dynamos and Failure to Excite

When a direct-current dynamo is brought up to speed it should in a few moments commence to build up voltage or, in other words, excite. Failure to do so may be attributable to a variety of causes, the principal ones being broken shunt field circuit, weak residual magnetism, insufficient speed, the brushes not making contact with the commutator and wrong direction of rotation.

The shunt winding of the dynamo being wound with comparatively fine wire must be carefully handled, especially the ends that are brought out for connection to the armature. A break in the shunt winding obviously will rob the machine of its magnetic field and it would be unable to build up any voltage except that due to residual magnetism, which would be of very small value. It sometimes happens that the residual magnetism of a new machine is weak, and great difficulty is experienced in getting the generator to build up voltage. This is not likely to happen with a machine after being in service a short time, but it does occasionally happen with machines when first received from the manufacturer. The difficulty, however, is easily overcome by disconnecting the shunt field from the brushes and connecting it to a number of dry cells, or accumulators, supplying a pressure of from 10 to 12 volts. The machine should then be run up to speed, but the connections of the cells to the shunt field may have to be reversed so as to send the current through in the proper direction.

When the voltage has been built up sufficiently to indicate that the current is passing around the field in the same direction as that which would be supplied from the armature itself when running under ordinary conditions, the dynamo may be stopped, and with the cells still connected to the field the magnet iron may be given a few gentle blows with a hammer, as this assists the set of the magnetic poles. After the cells have been disconnected and the proper connections made to the armature there should be no further trouble in getting the voltage to build up as soon as full speed is reached.

Some machines retain more residual magnetism in their poles than others and will commence to build up voltage before the armature reaches its maximum speed, while on the other hand should the residual magnetism be weak it may be necessary to run the generator for a few moments slightly above full speed, in order to give the field a start in building up. These cases are seldom encountered, but their possibility in actual practice should be borne in mind.

Failure to excite owing to brushes not making contact with the commutator is not common, though it may easily occur on a machine having an eccentric commutator. This causes the brushes to slide to and fro in the brush boxes and when the brush gear is allowed to get dirty and considerable quantities of carbon find their way into the brush boxes, the brushes become stiff and do not readily slide. Thus there is the possibility of their sticking

as the machine slows down, the high part of the commutator lifting the brushes, which then stick up, so that only the high part of the commutator comes in contact with them. To avoid this trouble, brush-holders should always be kept free from carbon dust and other matter, so that the brushes can slide freely in their holders, and follow up any wear which takes place.

Wrong direction of rotation will prevent the building up of a field of a direct-current dynamo because immediately the armature begins to generate current due to residual magnetism. The direction of the E. M. F. generated is such as to send the current round the field coils in the opposite direction to that necessary to increase the residual magnetism, and consequently the one neutralizes the other, and the magnetic field cannot build up.

If the direction of rotation cannot be changed, the shunt-field connections to the armature should be reversed.

ENGINEER.

Proposed Specifications For Trolley Wire

Recent tentative specifications drawn up by the American Society of Testing Materials to cover round and grooved trolley wire may be abstracted as follows:

The material shall be electrolytic or low-resistance lake copper conforming in quality and purity to the requirements of either the specifications for electrolytic copper or lake copper of the society.

Round Wire.—(a) Shall be so drawn that its tensile strength and elongation shall not be less than the following:

VALUES FOR TENSILE STRENGTH AND ELONGATION

Diameter, In.	Area, Circular Mils	Tensile Strength, Lb. per Sq. In.	Elongation in 10 in., Per Cent
0.548.....	300,000	47,000	4.50
0.460.....	211,600	49,000	3.75
0.410.....	168,100	51,000	3.25
0.365.....	133,225	52,800	2.80
0.325.....	105,625	54,500	2.40

The elongation shall be determined as the permanent increase in length due to the breaking of the wire in tension measured between bench marks placed upon the wire originally 10 in. apart. The fracture shall be between the bench marks and not closer than 1 in. to either bench mark.

(b) Tests upon a section of wire containing a braze shall show at least 95 per cent of the tensile strength of the unbrazed wire.

(c) Electric resistivity shall be determined upon fair samples by resistance measurements at a temperature of 20 deg. C. (68 deg. F.). The wire shall not exceed in resistivity 900.77 lb. per mile-ohm.

Grooved Wire.—(a) The physical tests shall be made in the same manner as those upon the round wire. The tensile strength of grooved wire shall be at least 95 per cent of that required for round wire of the same cross-sectional area; the elongation shall be the same as that required for round wire of the same cross-sectional area. The twist test shall be omitted.

(b) Tests upon a section of wire containing a braze shall show at least 95

per cent of the tensile strength of the unbrazed wire. Elongation tests shall not be made on test sections including brazes.

(c) The requirements for resistivity shall be the same as those for round wire of the same cross-sectional area.

For the purpose of calculating weights, cross-sections, etc., the specific gravity of the copper shall be taken as 8.89 at 20 deg. C. (68 deg. F.).

Round Wire.—(a) The size shall be expressed as the diameter of the wire in decimal fractions of an inch, using not more than three places of decimals, expressed in mils.

(b) Wire is expected to be accurate in diameter. Variations of 1 per cent over or under the nominal diameter shall be permitted.

Grooved Wire.—Standard sections of grooved trolley wire shall be those known as the "American Standard Grooved Trolley Wire Sections."

(a) Size shall be expressed as the area of cross-section in circular mils, the standard sizes being as follows:

300,000 cir. mils weighing 4,795 lb. per mile
211,600 cir. mils weighing 3,382 lb. per mile
168,100 cir. mils weighing 2,687 lb. per mile
133,200 cir. mils weighing 2,129 lb. per mile

(b) Grooved trolley wire may vary 4 per cent over and under in weight per unit length from the standard as determined from the nominal cross-section.

Finish.—(a) The wire shall be of uniform size, shape and quality throughout, and shall be free from all scale, flaws, splits and scratches not consistent with the best commercial practice.

(b) Necessary brazes in trolley wire shall be made in accordance with the best commercial practice.

Packing.—All wire shall be shipped on substantial reels, suitable for the weight of the wire handled, and shall be well protected from injury. The length or weight of wire to be wound upon reels shall be agreed upon in placing individual orders.

Inspection and Rejection.—(a) All tests governing the acceptance or rejection of the wire, unless otherwise specified, shall be made at the place of manufacture with apparatus furnished by the manufacturer and in the presence of the purchaser or his representative, who shall be furnished a copy of the tests.

(b) For the purpose of determining and developing defects which may be prejudicial to the life of trolley wire, owing to its peculiar service as compared to that of copper wire for other purposes, the wire shall be subjected to the following twisting test: Three twist tests shall be made upon samples 10 in. in length between the holders of the machine. The twisting machine shall be so constructed that there is a linear motion of the tail stock with respect to the head. The twist shall be applied not faster than 10 turns per minute. All three samples shall be twisted to destruction and shall not reveal under test any seams, pits, slivers or surface imperfections not consistent with the best commercial practice. At the time of fracture the wire shall be twisting with reasonable uniformity. Wire shall not be considered satisfactory which does not withstand at least nine turns before breaking.



Problems In Underground Management



What Should We Do to Cope with the Ever-Present Dangers of Coal Dust?

**Spraying Necessary to Supplement Humidification—Coal Handling
Especially Dumping of Coal in Mine Dangerous—Alabama
Has Many Mining Machines Equipped with Sprays**

BY JOHN WALLS, SR.
Bayview, Ensley, Ala.

HUMIDIFYING mine air by the use of steam has been strongly advocated as a means of rendering coal dust harmless and reducing the danger of a dust explosion in mines. I remember an article that appeared some time ago in *Coal Age*, setting forth in considerable detail a method of humidifying the intake current of a mine that was operated on the exhaust system of ventilation.

Recent disasters in coal mines and our knowledge of the explosive conditions arising from the mining, loading, hauling and sometimes the dumping of coal in mines surely should convince us that these conditions cannot be overcome simply by maintaining a saturated mine atmosphere. In other words, humidification is not all that is necessary to prevent the occurrence of dust explosions in dry and dusty mines.

It is not my desire to discourage the use of steam in the intake current entering a mine but rather to emphasize that this should not be done to the exclusion of other means for the same purpose. In my opinion, the use of steam will not compare economically with a good spraying system installed in the mine and is not as effective in reducing the dust danger.

Who is there that has not noticed the dangerous condition of the atmosphere in a place being mined by an electric chain machine? I have often been unable to recognize the machine runner at a distance of 20 ft., so dense would be the dust floating in the air. There is no question but that such a condition is extremely dangerous owing to the possible short-circuiting of the current at some unprotected point.

The distribution of dust on the haulage road by coal falling from the cars and by the dust being blown from the coal in transportation, particularly in the use of cars that are not dustproof, presents another grave danger. Then, worst of all, arrangements sometimes are made to dump the mine cars into skips at the foot of the slope or a revolving dump is installed and the coal dumped into a hopper to be hoisted from the mine. In many cases an electric motor is in operation at the foot of the slope or shaft, where the danger is in-

creased owing to the high velocity of the air current.

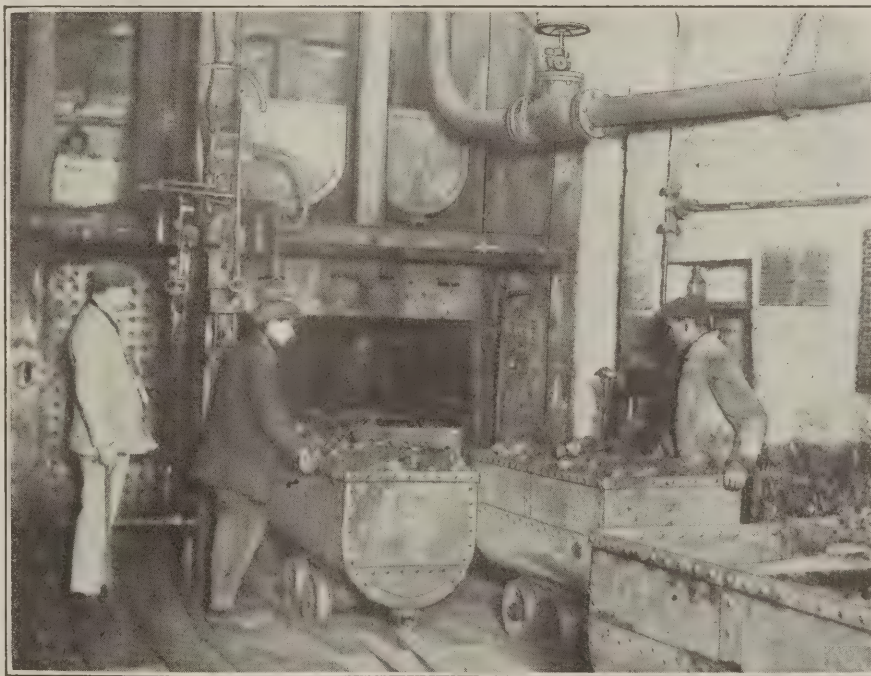
For these reasons a good sprinkling system carried throughout the mine workings is by far the safest plan of reducing the danger from dust. But when all is said it is safer to concentrate our minds and energies on means of preventing dust than on rendering it harmless and non-explosive when it has been formed. The recent recurrence of explosions warns us that this is the reason of greatest danger and calls for the exercise of every possible precaution.

Mention was made some time ago in *Coal Age* of the application of water to the electric chain cutting machine. The device has been successfully used in

several of our Alabama mines. The plan involves the installation of a 1½-in. pipe line on the entries and the carrying of a ½-in. pipe into each working place.

The cutting machine is equipped with a half-inch copper pipe laid in a groove or slot cut in the right-hand rail of the cutter bar and extended so that the end of the pipe is close to the cutting bits. A 50-ft. length of hose is used to connect the machine with the pipe line at the face. The machine is thus enabled to travel easily the length of a 35-ft. breast.

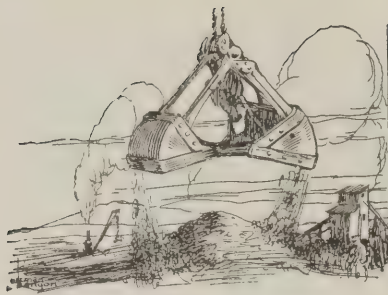
By this arrangement the water is projected into the cut made by the machine and the dust thoroughly wet down by the spray. The water is under a pressure of about 100 lb. per square inch. The use of this device has wholly eliminated all traces of coal dust produced in the cutting of the coal. Moreover, by spraying the loose coal and the face after blasting, the coal can be loaded, hauled and dumped without a perceptible sign of dust floating in the air. Wherever coal-cutting machines are in use this plan of applying the water to the cutting machine when in operation should be adopted with a view to obtaining a maximum degree of safety and avoiding the dust danger.



Wide World Photos

Caging Mine Cars at the Wilhelmina Coal Mine, Holland

It will be noted that the cage is at least a two-decker. Two cars in an upper deck can be seen in the upper part of the illustration, apparently loaded from the other side of the stage. It will be seen that the cars are what we would term "baldies," the coal not being heaped above the sides of the car, doubtless to prevent coal waste and the sprinkling of the roadways with broken coal and coal dust. Coal is hoisted at a speed of 36 ft. per second, or 24½ miles per hour.



Production And the Market



Caution Dominates Bituminous-Coal Market; Consumers Lack Incentive to Purchase

Caution prevails throughout the coal trade. Producers, dealers and consumers seem to be playing a waiting game—the objective not being clearly evident. The government report of reserve stocks having revealed a goodly total sufficient for more than immediate needs in most quarters and the Jacksonville agreement having given an assurance of peace in the Central Competitive Field for three years, the incentive to buy has been removed for most consumers.

Even the trimming of prices here and there has failed to quicken the markets, most consumers being content to rely on their stockpiles where possible, making only necessary purchases from time to time, hopeful perhaps that further cuts will be forthcoming. A spell of mild weather also has played its part in the prevailing condition of inactivity.

Coal Age Index dropped 1 point to 183, as of March 3, the corresponding average price being 2.21. This compares with \$2.23 on Feb. 25.

Mild Weather a Handicap in Midwest

In the Middle West the market became more disheartened with the appearance of moderate temperatures, the melting rays of sunshine bringing to light cancellations and hold-up orders from all directions. Price trimming on coarse coals ensued among some operators, a number of others shutting down their mines and drawing their fires. Conditions are unusually bad in the Duquoin and Jackson County field. A slight improvement is observable in the Mt. Olive situation. Mines in the Standard district are working two and three days a week. Demand for Kentucky is rather dull, many of the larger markets being well supplied for immediate needs. It is considered not unlikely

that there will be a strike over renewal of an expiring wage contract in western Kentucky in April. Kanawha operators and miners' representatives held a two-day session at Cincinnati last week, but failed to reach an agreement. Negotiations were broken off and no date was set for another meeting.

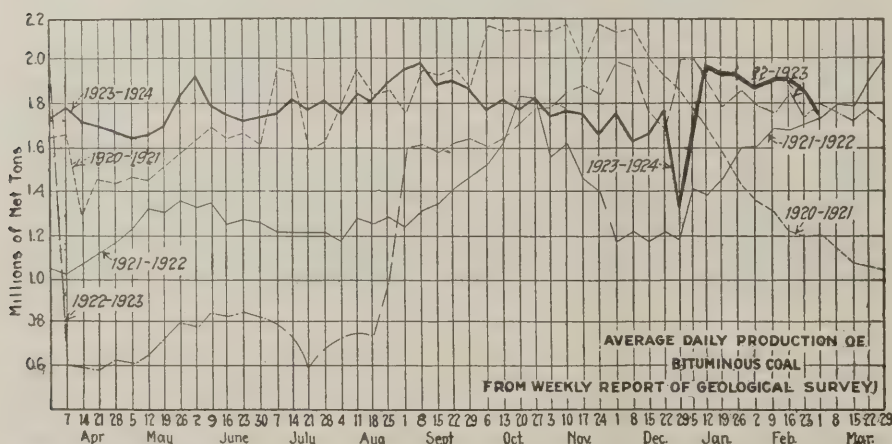
Utilities Buying in Northwest

Most of the coal moving off the Head-of-the-Lakes docks is going to utilities and railroads. Some companies in the Northwest are putting the larger sizes of anthracite through breakers in order to obtain nut and stove sizes to fill contracts. Stocks of free bituminous on the Duluth-Superior docks are estimated at between 1,600,000 and 1,700,000 tons. In the Southwest the surplus of lump is still growing, though screenings move readily. Few "no bills" on industrial coal have come to light. Conditions in the Ohio markets are spotty.

Pittsburgh operators, fully tied up by the Jacksonville agreement, evince considerable interest in the wage situation in non-union Somerset County, where further cuts are said to be contemplated. Demand throughout New England continues weak. Similar conditions obtain in Atlantic seaboard markets.

Output of bituminous coal during the week ended Feb. 23 was 10,337,000 net tons, according to the Geological Survey, a decline of 802,000 tons compared with the previous week. Anthracite production also declined, the output being 1,655,000 net tons, a falling off of 245,000 tons when compared with the preceding week.

The anthracite market has become strictly a weather proposition, consumers showing little disposition to fill



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Feb. 9	10,725,000	11,501,000
Feb. 16 (a)	10,431,000	11,139,000
Feb. 23 (b)	10,324,000	10,337,000
Daily average	1,735,000	1,792,000
Coal year	374,742,000	492,731,000
Daily average coal year	1,356,000	1,770,000

ANTHRACITE

	1922-1923	1923-1924
Feb. 9	2,023,000	1,906,000
Feb. 16 (a)	1,828,000	1,900,000
Feb. 23 (b)	1,838,000	1,655,000
Coal year	46,138,000	83,625,000

COKE

	1922-1923	1923-1924
Feb. 16	378,000	293,000
Feb. 23	371,000	278,000
Calendar year	2,708,000	2,099,000

(a) Revised from last report. (b) Subject to revision.

their bins with spring just around the corner. Dealers show a disposition to be cautious also, most of them trying to so regulate stocks as not to be caught with large tonnages on hand when April rolls around.

Midwest Screenings Strengthen

All over the Middle West the coal market continued to sag during the past week. Domestic trade softened under the warming rays of the sun and cancellations and hold-up orders from buyers came in from all points of the compass. The result is that every group of operators began to trim here and there on coarse-coal prices although new circulars were not issued until the beginning of this week, and these touched little but Indiana coals, which go off from 25 to 50c. on the big sizes. A new southern Illinois list will be out by March 15.

Meantime mines shut down and draw their fires, thus further reducing the production of the Midwest states. Simultaneously screenings strengthen in price as the supply dwindles. The painful thing about this is that a good many screenings contracts are being filled with coal bought by the operator on the open market at 25 or 50c. above the contract price. Central Illinois is particularly afflicted.

Free steam coal is strong at \$1.75 with a good many \$1.20 contracts running to April 1. Southern Illinois screenings are pushing hard against a \$2 price and will ascend soon.

Eastern coals coming into the Midwest do poorly. Good eastern Kentucky lump does well to bring \$3.25 and is on its way down. Pocahontas lump and egg move in small quantities at \$3.50@3.75 and mine-run is sinking from \$2.50 to \$2.25.

Field Activity Dwindles

In the Duquoin and Jackson County field conditions are unusually bad. Operators there are trying to get the prices that the independents are asking in the Carterville field, which range from \$3 up for lump and egg and from \$2.50 up for nut. The association Franklin County operators are still asking their circular but cut when necessary.

The Mt. Olive situation shows a little improvement. There has been a steady demand for the cheaper grades of coal and this domestic tonnage is moving freely and enough steam business is available for the nut and screenings.

In the Standard district cold weather has kept an even flow of tonnage, but some mines have unbilled coal of all sizes on track. Weather does not make any price change now. Everything is sold at about cost of production or less and mines are working two and three days a week.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern	Market Quoted	Mar. 5 1923	Feb. 18 1924	Feb. 25 1924	Mar. 3 1924†
Smokeless lump.....	Columbus.....	\$7.00	\$3.60	\$4.10	\$4.00@ \$4.25
Smokeless mine run.....	Columbus.....	4.50	2.10	2.10	2.00@ 2.25
Smokeless screenings.....	Columbus.....	4.45	1.55	1.55	1.45@ 1.70
Smokeless lump.....	Chicago.....	7.00	3.60	3.60	3.50@ 3.75
Smokeless mine run.....	Chicago.....	4.50	2.50	2.50	2.25@ 2.60
Smokeless lump.....	Cincinnati.....	7.00	3.75	3.75	3.50
Smokeless mine run.....	Cincinnati.....	4.75	2.60	2.60	2.50
Smokeless screenings.....	Cincinnati.....	4.75	1.85	1.85	1.80@ 2.00
*Smokeless mine run.....	Boston.....	6.15	4.75	4.70	4.60@ 4.80
Clearfield mine run.....	Boston.....	3.50	1.95	1.95	1.50@ 2.40
Cambria mine run.....	Boston.....	4.10	2.50	2.60	2.25@ 3.00
Somerset mine run.....	Boston.....	3.75	2.25	2.30	2.00@ 2.60
Pool 1 (Navy Standard).....	New York.....	4.75	3.00	3.00	2.75@ 3.25
Pool 1 (Navy Standard).....	Philadelphia.....	4.65	3.00	3.00	2.75@ 3.25
Pool 1 (Navy Standard).....	Baltimore.....				
Pool 9 (Super. Low Vol.).....	New York.....	3.85	2.25	2.25	2.00@ 2.50
Pool 9 (Super. Low Vol.).....	Philadelphia.....	3.80	2.30	2.30	2.10@ 2.50
Pool 9 (Super. Low Vol.).....	Baltimore.....	4.00	1.85	1.85	2.00@ 2.15
Pool 10 (H.Gr. Low Vol.).....	New York.....	3.35	1.95	2.00	1.75@ 2.25
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	3.45	1.85	1.85	1.70@ 2.00
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	3.00	1.70	1.70	1.75@ 1.85
Pool 11 (Low Vol.).....	New York.....	2.45	1.60	1.60	1.40@ 1.85
Pool 11 (Low Vol.).....	Philadelphia.....	2.90	1.65	1.65	1.55@ 1.75
Pool 11 (Low Vol.).....	Baltimore.....	2.25	1.55	1.55	1.60@ 1.70

High-Volatile, Eastern	Market Quoted	Mar. 5 1923	Feb. 18 1924	Feb. 25 1924	Mar. 3 1924†
Pool 54-64 (Gas and St.).....	New York.....	2.30	1.60	1.60	1.50@ 1.75
Pool 54-64 (Gas and St.).....	Philadelphia.....		1.70	1.70	1.50@ 1.75
Pool 54-64 (Gas and St.).....	Baltimore.....	2.25	1.50	1.50	1.55@ 1.70
Pittsburgh se'd gas.....	Pittsburgh.....	4.10	2.55	2.55	2.50@ 2.65
Pittsburgh gas mine run.....	Pittsburgh.....		2.35	2.30	2.25@ 2.40
Pittsburgh mine run (St.).....	Pittsburgh.....	2.75	2.10	2.10	2.00@ 2.25
Pittsburgh slack (Gas).....	Pittsburgh.....	2.85	1.55	1.50	1.45@ 1.55
Kanawha lump.....	Columbus.....	4.50	2.70	2.60	2.50@ 2.75
Kanawha mine run.....	Columbus.....	2.85	1.60	1.60	1.50@ 1.75
Kanawha screenings.....	Columbus.....	2.50	1.15	1.15	1.05@ 1.15
W. Va. lump.....	Cincinnati.....	4.00	3.10	3.00	2.75@ 3.00
W. Va. gas mine run.....	Cincinnati.....	2.75	1.75	1.60	1.50@ 1.65
W. Va. steam mine run.....	Cincinnati.....	2.75	1.75	1.60	1.50@ 1.65
W. Va. screenings.....	Cincinnati.....	2.35	1.25	1.20	1.00@ 1.15
Hooking lump.....	Columbus.....	4.15	2.75	2.60	2.50@ 2.75
Hooking mine run.....	Columbus.....	2.60	1.85	1.85	1.75@ 2.00
Hooking screenings.....	Columbus.....	2.15	1.15	1.10	1.05@ 1.15
Pitts. No. 8 lump.....	Cleveland.....	4.05	2.40	2.10	2.00@ 2.75
Pitts. No. 8 mine run.....	Cleveland.....	3.00	1.80	1.80	1.80@ 1.85
Pitts. No. 8 screenings.....	Cleveland.....	2.90	1.45	1.35	1.30@ 1.40

Midwest	Market Quoted	Mar. 5 1923	Feb. 18 1924	Feb. 25 1924	Mar. 3 1924†
Franklin, Ill. lump.....	Chicago.....	\$4.60	\$3.50	\$3.50	\$3.00@ \$3.75
Franklin, Ill. mine run.....	Chicago.....	3.35	2.35	2.35	2.25@ 2.50
Franklin, Ill. screenings.....	Chicago.....	2.35	1.95	1.95	1.90@ 2.00
Central, Ill. lump.....	Chicago.....	3.35	3.10	3.10	2.75@ 3.00
Central, Ill. mine run.....	Chicago.....	2.60	2.10	2.10	2.00@ 2.25
Central, Ill. screenings.....	Chicago.....	1.30	1.50	1.50	1.65@ 1.80
Ind. 4th Vein lump.....	Chicago.....	4.35	3.10	3.10	2.75@ 3.00
Ind. 4th Vein mine run.....	Chicago.....	3.10	2.60	2.60	2.25@ 2.60
Ind. 4th Vein screenings.....	Chicago.....	2.10	1.70	1.70	1.75@ 2.00
Ind. 5th Vein lump.....	Chicago.....	3.60	2.60	2.60	2.50@ 2.75
Ind. 5th Vein mine run.....	Chicago.....	2.60	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings.....	Chicago.....	1.80	1.45	1.45	1.50@ 1.75
Mt. Olive lump.....	St. Louis.....		3.10	3.10	3.00@ 3.25
Mt. Olive mine run.....	St. Louis.....		2.50	2.50	2.50
Mt. Olive screenings.....	St. Louis.....		1.35	1.35	1.25@ 1.50
Standard lump.....	St. Louis.....	3.10	2.75	2.75	2.65@ 2.90
Standard mine run.....	St. Louis.....	2.25	1.95	1.95	1.90@ 2.00
Standard screenings.....	St. Louis.....	1.35	80	1.15	1.15
West Ky. lump.....	Louisville.....	3.35	2.85	2.85	2.75@ 3.00
West Ky. mine run.....	Louisville.....	2.05	1.70	1.70	1.50@ 1.90
West Ky. screenings.....	Louisville.....	1.85	1.20	1.30	1.10@ 1.50
West Ky. lump.....	Chicago.....	3.60	2.85	2.85	2.60@ 2.75
West Ky. mine run.....	Chicago.....	1.80	1.60	1.60	1.50@ 1.75

South and Southwest

Big Seam lump.....	Birmingham.....		3.85	3.85	3.75@ 4.00
Big Seam mine run.....	Birmingham.....	2.10	1.75	1.80	1.75@ 1.85
Big Seam (washed).....	Birmingham.....	2.60	2.10	2.10	2.00@ 2.25
S. E. Ky. lump.....	Chicago.....	4.60	3.10	3.10	3.00@ 3.25
S. E. Ky. mine run.....	Chicago.....	2.85	1.85	1.85	1.75@ 2.00
S. E. Ky. lump.....	Louisville.....	5.00	3.25	3.25	3.00@ 3.50
S. E. Ky. mine run.....	Louisville.....	2.60	1.80	1.80	1.60@ 2.00
S. E. Ky. screenings.....	Louisville.....	2.20	1.40	1.30	1.15@ 1.50
S. E. Ky. lump.....	Cincinnati.....	3.75	3.05	2.85	2.75@ 3.25
S. E. Ky. mine run.....	Cincinnati.....	2.50	1.75	1.75	1.60@ 1.75
S. E. Ky. screenings.....	Cincinnati.....	2.15	1.25	1.10	1.00
Kansas lump.....	Kansas City.....	5.00	5.00	5.00	5.00
Kansas mine run.....	Kansas City.....	3.50	3.50	3.50	3.50
Kansas screenings.....	Kansas City.....	2.60	2.25	2.25	2.25

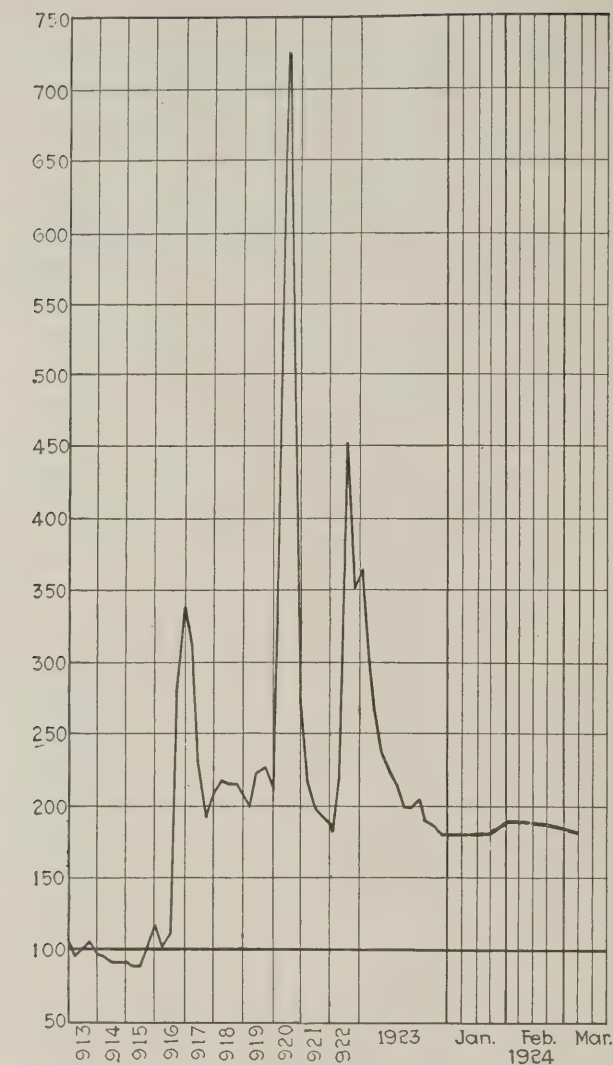
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Mar. 5, 1923	Feb. 25, 1924	March 3, 1924†
Broken.....	New York.....	\$2.34	Independent \$9.00	Company \$7.75@ \$8.25	Independent \$8.00@ \$8.50
Broken.....	Philadelphia.....	2.39		7.90@ 8.10	Company \$8.00@ \$9.25
Egg.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	8.00@ 8.75
Egg.....	Philadelphia.....	2.39	9.25@ 11.00	8.10@ 8.35	8.75@ 9.25
Egg.....	Chicago.....	5.06	12.00@ 12.50	7.20@ 8.25	8.00@ 8.35
Stove.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.25@ 10.25
Stove.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	8.75@ 9.25
Stove.....	Chicago.....	5.06	12.00@ 12.50	7.35@ 8.25	7.95@ 9.25
Chestnut.....	New York.....	2.34	9.25@ 12.00	8.00@ 8.35	9.25@ 10.25
Chestnut.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35	8.75@ 9.25
Chestnut.....	Chicago.....	5.06	12.00@ 12.50	7.35@ 8.35	7.95@ 9.25
Range.....	New York.....	2.34		8.25	8.00@ 8.35
Pea.....	New York.....	2.22	7.50@ 11.00	6.15@ 6.30	6.15@ 6.65
Pea.....	Philadelphia.....	2.14	7.00@ 9.00	6.15@ 6.20	4.75@ 6.50
Pea.....	Chicago.....	4.79	7.00@ 8.00	5.49@ 6.03	4.50@ 6.05
Buckwheat No. 1.....	New York.....	2.22	4.50@ 5.00	4.00@ 4.10	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	4.00@ 5.00	4.00	2.25@ 3.50
Rice.....	New York.....	2.22	2.50@ 3.00	2.75@ 3.00	1.75@ 2.50
Rice.....	Philadelphia.....	2.14	2.75@ 3.00	2.75@ 3.00	1.75@ 2.50
Barley.....	New York.....	2.22	1.50@ 2.00	1.50@ 2.00	1.50@ 1.75
Barley.....	Philadelphia.....	2.14	1.40@ 2.00	2.00	1.25@ 1.50
Birdseye.....	New York.....	2.22		2.10	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924	1923
March 3	183	279
Feb. 25	184	279
Feb. 18	186	279
March 5	183	279
Weighted average price	\$2.21	\$2.23
	\$2.25	\$3.38

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

St. Louis Is Still Alive

While cold weather continued dealers found an active market for small quantities of the middle and cheaper priced coals. The local trade is fairly well satisfied as to the domestic movement on cheaper coals. There is a good supply of anthracite, smokeless and coke, with just a small demand. Wagonload steam continues good. The demand locally for screenings is fair, but the outside demand is better, especially from Chicago and the Northwest. Adjacent territory on steam is slow. Country domestic shows a little activity, but in minimum amounts.

Kentucky Does Little

With many of the larger markets well supplied with Kentucky coal for immediate use, and no special need of stocking far in advance, the coal jobbers and brokers are finding things dull. Mines are offering coal more freely, as short bookings have been fairly well filled, and many companies haven't much business. Car supply is good, labor in good supply, and loadings are really a question of sales and nothing else. Prices at the mines are being well maintained, as they are so low as to leave little chance for reduction.

Things are slow in western Kentucky, demand for prepared sizes having slumped somewhat, resulting in smaller production of screenings and slightly stiffer prices on pea and slack. Many mines are expected to shut down soon. There probably will be a strike in one section of the western Kentucky field in April over renewal of an expiring wage scale agreement. Indications are that there will be more mines welcoming contract business this year than usual, especially mine-run tonnage. Prices show practically no change, starting at around \$1@\$.1.10 for the cheapest of screenings and going to \$3 for best block coal.

Northwest Trade Lulls

Throughout the Northwest, markets quieted down during the past week. Coal continues to move off the docks, but the softness of the weather will surely cut down buying, especially since water power will begin coming back into its own and steam plants will let down. Most of the coal moving off the Head-of-the-Lakes docks goes to public utilities, which must keep their bins full, and to railroads. The only change in prices during the past week was a slight stiffening of Pocahontas screenings.

The situation for anthracite stove and nut has become serious. Some of the companies are putting egg through breakers to make it smaller, so as to fill out contracts. It is still possible to find stove in isolated cases, but others than "steady customers" must content themselves with egg, pea and buckwheat. It is hoped that the breaking will help. The weather is very mild at present and many have let their fires go out. Surveys made by two of the dock companies show that sales of anthracite this year were only one-third those of 1922.

Coal men estimate that stocks on Duluth-Superior docks March 1 will total between 1,600,000 tons and 1,700,000 tons of free bituminous. The larger figure is set as the possible maximum if many of those who have made contracts endeavor to backslide.

In Milwaukee heavy users of coal are holding off in expectation of a shading of prices in the near future. It is said that reductions in the cheaper bituminous grades are being secretly made now in an effort to reduce stocks before spring sets in. Stocks on the docks are heavy and a large tonnage undoubtedly will be carried over into next season. Several cargoes remain afloat. These will have to be unloaded soon in order to permit vessels to make necessary repairs.

Western Business Dull

Mines through the Southwest are working only three or four days a week, while the surplus of lump continues to grow. Screenings are moving readily. Few "no bills" of industrial coal are reported. As the demand falls off, price shading increases, but there has been no change in circular prices. Kansas coal still is quoted at \$5 for lump; \$4.25 for nut; \$3.50 for mine-run and \$2.25 for screenings.

Operators and dealers in Utah describe business as rotten. Production for the state is down to less than two days a week. Nothing seems to be moving but slack, and that is getting very scarce. Prices are unchanged.

The Colorado coal market has again slowed down slightly as compared with the past few weeks. The mines worked only on a three day average last week. This is attributed to the warm weather throughout the regions where Colorado coal is marketed. This being the case, it is expected that business will be stimulated considerably by the seasonable weather now prevailing for the past few days throughout Kansas and Nebraska. Prices are unchanged except on Colorado nut, which has been lowered to \$4.

Business Spotty in Ohio

Business in the Ohio markets is spotty. The course of the market at Cincinnati during the past week showed a downward tendency, production having risen to the point where the market finds trouble in digesting and absorbing what the brokers and wholesalers have to offer. Slack was the main point of attack during the week. The makers of prepared coal again misjudged the amount that could be taken by the retailers, who came in howling for coal during the cold snaps to the north. With everybody and his brother, seemingly, in southeastern Kentucky and southern West Virginia turning fuel over the screens, the residue had to be moved at concessions. There was no change in the price of specialized coals except that one or two of the

top-notch grades were being offered at \$3.75 for the block. The Cleveland market is in the doldrums. Operators and jobbers say that inquiries are lacking, but despite the lack of demand, spot prices have held pretty firm and no reductions are noted. As a matter of fact, "distress" coal has practically disappeared from the market. Steam buyers generally are now resting on reserves accumulated in anticipation of possible labor difficulties, and these will no doubt have to be depleted before they enter the market to any significant extent. Public utilities are doing likewise.

Domestic buying at Columbus has fallen off because of higher temperatures and the steam trade is dull. Buying is for immediate needs mostly, as there now is no disposition to stock up for the future, since the wage scale has been settled. Reserves in the hands of steam users are still large, although they have not been increased recently. Buying is slow along certain lines, especially public utilities, where reserves are extra heavy. Railroad demand is quiet, as roads are not doing much contracting at present. A good demand for smokeless is apparent on all sides.

The Southern Ohio Coal Exchange reported for the week ending Feb. 16 from 440 mines an output of 195,920 tons out of a full-time capacity of 570,459 tons, leaving a loss of 374,539 tons. In the eastern Ohio field during the same week 12,218 cars were ordered, of which 12,170 were placed and 9,228 cars were loaded.

Pittsburgh reports that demand for coal in the spot market, which had been extremely light for about three weeks, has shown a further decrease since the Jacksonville conference. The light demand has not affected prices to any appreciable extent, operators holding onto former prices with considerable tenacity. The only competition seems to be in the non-union districts, where further wage reductions are said to be contemplated. In the past few months about half of Somerset County has been at lower wages than the other half, and the latter is now beginning to come down. Additional wage reductions are not unlikely in the Connells-ville region. Thus far the coal produced for coking has been at the full scale, reductions being by producers of coal for steam purposes.

Central Pennsylvania operators probably will hold a conference with the miners March 15, at the conclusion of the miners' convention which will begin at Altoona March 11. The Jacksonville agreement is expected to have a strong influence on the conference.

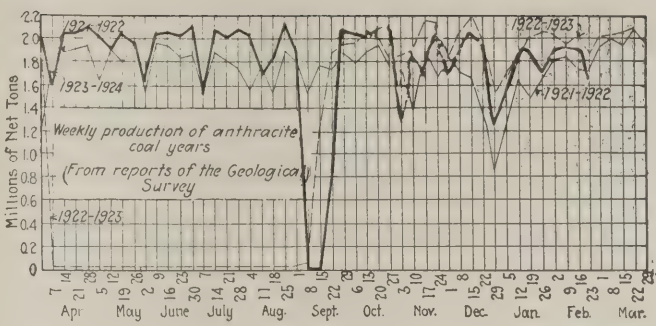
Trade at Buffalo is as dull as ever. Operators and jobbers alike are grumbling.

New England in Grip of Doldrums

In New England the market continues dull with no relieving feature. Buying is only for scattering amounts and is pretty much restricted to Southern coals. Practically all the larger consumers are eating into their reserves for current consumption, there being no inducement now to add to present stocks. In no direction is there any demand for spot coal, and the trade as a whole looks forward to a long druggy season.

In spite of light demand the Southern agencies are able to hold prices with reasonable firmness at about \$4.75 per gross ton f.o.b. vessel. There is enough Western business at around \$2 per net ton at the mines to hold the tidewater basis, but it is possible that a reduction in wages in certain districts will at any time lead to naming lower figures. Coastwise there is a fair amount of tonnage moving on contract, but offshore cargoes are few and far between.

At this end prices are rather demoralized. Not only is Pocahontas and New River an easy purchase at \$6 per



gross ton cars Boston or Providence but retail prices are on an equally low plane. The open price is \$7.50 per net ton delivered by truck, but it is freely said that \$6.50 is the actual figure on close business.

All-rail there is next to no new business. Most of the central Pennsylvania operators realize that there is little opening for their product in New England under present conditions and that the Hampton Roads shippers are to have the call.

Seaboard Markets Show Little Change

Activity still is of low visibility in the Atlantic seaboard markets. New York dealers are glum. Coal shipped to New York without order is kept moving, but the tonnage is not large and prices are low. Contract coals are taken in good volume, but consumers with large reserves are beginning to hedge. Contracting is reported in some quarters as progressing favorably while other shippers say consumers are holding off, preferring to take chances in the open market. Philadelphia consumers keep buying to about the same degree as during the past two or three weeks. No heavy orders are recorded, but business seems to come along steadily, with just the least sign of increase in buying. The April contract business is growing more active, producers showing a desire to get tonnage under agreement.

The Baltimore market continues to mark time, as there is little real interest in the situation other than purchases for fill in necessities. A record for the number of export coal ships cleared during any single day of this year, as well as the largest amount loaded on foreign consignment, was made on Feb. 21, when cargoes amounting to 16,829 tons were loaded into four steamers at local piers. Baltimore dealers report selling a fair amount in small lots to householders who have not enough fuel to carry through the months of March and April, but the trend of the market is toward decreasing volume. Dealers here are waiting word as to conditions after April 1, and there will be little ordering in the meantime.

Anthracite Output Easily Absorbed

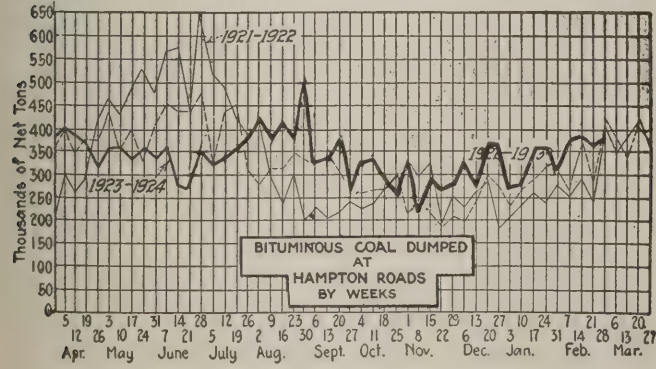
Weather conditions are affecting the anthracite situation at New York to such an extent that independent producers are having difficulty in placing their tonnage. There is a fair movement, however, and production is being easily absorbed. Egg and pea coals are the hardest to move while the demand for stove and chestnut is such that the best grades of independent product are quoted at from 50c. to 75c. above company circular. Some of the companies continue to store pea coal. The steam coals are in fair shape. Buckwheat No. 1 is the easiest, with rice a close second. Demand for barley and birdseye is strong, some shippers claiming a scarcity of both sizes.

It has been a good week at Philadelphia from the retailers' standpoint, as moderate winter weather has prevailed. The sizes in greatest demand continue to be stove and nut, with a leaning toward stove.

Car Loadings, Surpluses and Shortages

Week ended Feb. 16, 1924	Cars Loaded	
	All Cars	Coal Cars
Previous week	935,109	194,295
Same week in 1923	906,489	199,791
	816,646	183,241

Feb. 14, 1924	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
Previous week	127,415	46,293	7,397
Same date in 1923	138,017	53,758	6,998
	27,172	7,094	



Foreign Market And Export News

British Coal Production Gains Steadily; Shipments Irregular

Production by the collieries of Great Britain during the week ended Feb. 16, according to official reports, totaled 5,821,000 tons, a special cable to *Coal Age* states. This was an increase of 17,000 tons compared with the output for the previous week.

The Welsh steam-coal trade shows marked firmness, all the collieries being well booked for the first half of the month. In some cases, in fact, they are oversold. The possibility of a strike of coal miners in the spring, following in the wake of the recent railway and dock strikes, is tending to make prices hold firmly and no doubt plays a part in the brisk inquiry for early supplies. Prompt shipments are hampered by the scarcity of ready tonnage, but conditions are rapidly improving. Concessions are being allowed to buyers who are able to take immediate deliveries.

The demand from the Continent is steady and there is fair business with South America. The foreign demand for Welsh anthracite is slow, though domestic inquiry has improved.

The Newcastle market is still very active. The business in steams, smalls and gas coals is especially good. Inquiries are circulating from the United States and South America for April shipment. Gothenburg gas works has taken 10,000 tons of gas coals for shipment before the end of March, and various other European gas works have contracted for smaller amounts for around 30s. per ton c.i.f.

Outlook Bright at Hampton Roads

Business at Hampton Roads shows little change in volume, although several foreign contracts have been reported and overseas trade appears on the increase. Coastwise business has been deterred somewhat by bad weather, as has bunkers.

Prices remain about the same. Con-

tracts with dealers in South America and Italy were on the basis of about \$4.85 at the piers, and an increase in movement was regarded as temporary. The general outlook in the trade, however, is brighter, and the tone of the market firmer.

French Market Dull in Domestic Coal; Industrials Better

The French market shows little animation as far as house coals are concerned, the demand having slackened with the approach of spring. Trade in industrial coals is better, however. Output of French collieries is scarcely sufficient to fill requirements and some complaints are still being made of irregularity in supply of cars at the mines for every-day shipments.

The new tariff accepted agreed to by the French companies on Feb. 1 will be in full force by April, when contracts are renewed; some of the coal now coming to the Paris area takes the new reduction of 3 fr. per ton. As a result of the cut, French coals, formerly the most expensive in the world, will actually be the cheapest.

The Belgian Cabinet also has asked its collieries to reduce their prices 10 to 15 fr. per ton. The proposal has been accepted, but the companies are trying to effect a reduction of 8 per cent in miners' wages. Settlement of the matter is expected soon, and the outcome is awaited with considerable interest.

With the settlement of the railway and dock workers' strikes shipments from Great Britain have increased markedly.

The S. C. O. F. supplies from the Ruhr for the whole month of January were 283,076 tons of coke, a daily average of 9,130 tons. This represents the highest average reached since the Ruhr occupation.

United States Domestic Coal Exports During January

	(In Gross Tons)	
	1923	1924
Anthracite.....	356,016	272,005
Value.....	\$4,014,699	\$3,112,042
Bituminous.....	1,092,084	1,045,587
Value.....	\$6,906,672	\$5,465,269
Coke.....	77,759	53,117
Value.....	\$923,691	\$499,248

Export Clearances, Week Ended March 1, 1924

FROM BALTIMORE		Tons
For Italy		
Am. SS. El Mar.....		1,803
Am. SS. Sherman.....		5,492
For Argentina		
Br. SS. Kambale.....		5,532
For France		
Br. SS. Lord Ormonde.....		4,002

FROM HAMPTON ROADS		Tons
For France		
Fr. SS. Alaska.....		3,297
Amer. Schr. Rosa Ferlita, for St. Georges		977
For Brazil		
Br. SS. Turkestan, for Rio de Janeiro		5,925
Swed. SS. Luossa, for Rio de Janeiro		7,419
Br. SS. Avonmede, for Rio de Janeiro		5,741
Ital. SS. Emanuele Accame, for Porto Ferrajo		11,111
Jap. SS. Portland Maru, for Porto Ferrajo		7,973
Du. SS. Berk, for Pernambuco.....		4,391
For Canada		
Amer. Schr. Wyoming for St. John..		5,395
Amer. Schr. Velma L. Hamlin, for Halifax		1,597
Nor. SS. Bratland, for Bridgetown.		2,961
For Cuba		
Br. SS. Penolver, for Havana.....		5,624
Br. SS. Berwindvale for Havana.....		1,542
For Porto Rico		
Amer. Schr. Peter H. Crowell, for San Juan		4,208
For Argentina		
Br. SS. Saint Andrew, for Buenos Aires		6,832
Ital. SS. Ansaldo II, for Buenos Aires		6,082
For Italy		
Ital. SS. Matanzas for Cagliari....		2,870

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.: Feb. 21		Feb. 28
Cars on hand.....	847	1,236
Tons on hand.....	55,982	80,705
Tons dumped for week.....	151,875	145,514
Tonnage waiting.....	10,000	20,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	865	1,006
Tons on hand.....	58,450	71,200
Tons dumped for week.....	105,017	95,587
Tonnage waiting.....	33,877	8,226
C. & O. piers, Newport News:		
Cars on hand.....	1,460	1,226
Tons on hand.....	72,940	69,200
Tons dumped for week.....	64,975	93,694
Tonnage waiting.....	5,800	9,400

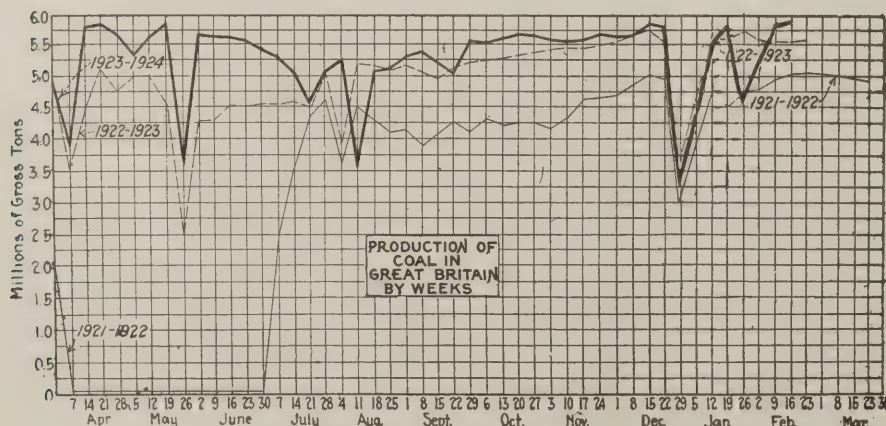
Pier and Bunker Prices, Gross Tons

PIERS		Feb. 23	March 1†
Pool 9, New York.....	\$5.00@	\$5.25	\$5.00@ \$5.25
Pool 10, New York.....	4.75@	5.00	4.75@ 5.00
Pool 11, New York.....	4.50@	4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@	5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@	4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@	4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.85@	4.90	4.75@ 4.85
Pools 5-6-7 Hamp. Rds....	4.25@	4.35	4.25@ 4.35
Pool 2, Hamp. Roads.....	4.60@	4.75	4.50@ 4.60
BUNKERS			
Pool 9, New York.....	5.30@	5.55	5.30@ 5.55
Pool 10, New York.....	5.05@	5.30	5.05@ 5.30
Pool 11, New York.....	4.80@	5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@	5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@	5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@	5.10	4.65@ 5.10
Pool 1, Hamp. Roads.....	4.90		4.86
Pool 2, Hamp. Roads.....	4.75		4.60
Pools 5-6-7 Hamp. Rds....			4.35

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to <i>Coal Age</i>		Feb. 23	March 1†
Cardiff:			
Admiralty, large	30s. @	31s.	28s. 6d.
Steam smalls....	22s. 6d.		20s.
Newcastle:			
Best steams....	24s. 9d. @	25s. 6d.	25s. 6d. @ 27s. 6d.
Best gas.....	25s.		25s. 6d.
Best bunkers....	23s. 6d. @	24s.	25s.

† Advances over previous week shown in heavy type declines in italics.



Traffic News

Lignite Rate Hearings Held

The hearings in the Dakotas on the proposed revision of the freight rates on lignite were held last week and the week before, in Aberdeen, S. D., and Bismarck, N. D. The Northern Pacific Ry. started the matter with a proposed revision of lignite rates to bring them into the same general distance schedule as those from the docks. The change is opposed by the lignite operators, the railroad commissions of Minnesota and both Dakotas and various other bodies. The railroads contend that the low rates, considerably lower than the rates on dock coal, were made during the war, to encourage the use of the nearest fuel and to save transportation. They seek to bring them into harmony with the other rates.

Larger Share of Through Rate Denied Sewell Valley R.R.

The effort on the part of the Sewell Valley R.R. to obtain a larger proportion of the through rate on coal moving over its line and that of the Chesapeake & Ohio has failed, as a result of a decision handed down by the Interstate Commerce Commission.

Eastern Rate Probe Ends

The Interstate Commerce Commission brought to a close on Feb. 29 its investigation of rates on anthracite and bituminous coal from points in Pennsylvania and other Eastern coal-producing states to New York and New England destinations. Briefs in the case must be filed not later than April 1, it was announced. Oral arguments probably will be made before the commission before the case is finally submitted for decision.

Attacks Coal Rates from Illinois To Indiana

The Old Ben Coal Corporation has filed complaint with the Interstate Commerce Commission, attacking rates of the C. C. C. & St. L. Ry., the C. & E. I. R.R. and the Illinois Central R.R. on bituminous coal from West Frankfort, West Frankfort Mine No. 18, Christopher, Christopher Mine No. 20, Johnson City and Buckner, all in Illinois and in the "Southern Illinois" rate group, to all points in Indiana, on the C. C. C. & St. L. on and north of the line of that road extending from and including Sanford, via Terra Haute, Indianapolis, Greensburg and Shirley, Ind., to and including Crete, Ind.

The complaint alleges that rates from said points of origin to all points in Indiana on the line of said railway extending from and including Martinsville to and including Fairland, Ind., and extending from and including Columbus to and including Greensburg, Ind., are unjust, unreasonable and unduly discriminatory.

The complaint is based on the fact

that the rates complained of exceed the rates on bituminous coal contemporaneously maintained to said destinations on shipments from coal mines in the so-called Group No. 1 (Harrisburg, Ill.) district as defined in C. C. C. & St. L. Tariff L. C. 139 F, I. C. C. No. 7836.

Rate Cuts on Coal Held Up By Illinois Judge

An order of the Illinois Commerce Commission reducing rates on coal from Springfield, Ill., to Bloomington, Ill., and from Lincoln, Ill., to Bloomington, Ill., has been held up in a ruling by Judge E. S. Smith in the Circuit Court at Springfield, Ill. The Chicago & Aiton contested the rate reduction and obtained the stay pending an appeal from the order of the commission. The lower rates were obtained through the action of the Bloomington Association of Commerce. Under the new rate fixed by the commission the tariff on coal from Springfield to Bloomington is cut from \$1.42 to 80c. a ton.

Association Activities

Twenty-five wholesale coal dealers in Norfolk have begun the formation of the **Hampton Roads Coal Association**, to be composed of wholesalers and shippers exclusively, and organized for the purpose of creating a better spirit of co-operation among the members. The organization has in its membership the great majority of the leading coal dealers of the port. The organization is now being perfected.

W. E. Koeppler, of Bluefield, chairman of the Convention Committee of the National Coal Association; C. C. Crowe, assistant secretary of the National Coal Association, and E. C. Porter, in charge of the exhibition of the American Mining Congress, were guests of honor at the first meeting and luncheon of the **Cincinnati Coal Exchange** held this year. They accepted the invitation extended by the exchange to hold the convention and show at Cincinnati, May 14-18, subject to the usual ratification. Because of the fact that the meeting of the American Mining Congress is to be held on the Pacific coast it was felt that their exhibit would be far more advantageously held at the time of the coal convention. In addition it is proposed to hold a Fuel Economy show at the same time. Talks for the Exchange were made by President E. F. Bardin, Colonel Charles Moriarity, Jim Layne and A. A. Liggett.

The tenth annual meeting of the **Logan County Coal Operators Association**, held in Logan late in February, was attended by operators representing nearly every company in the region. In electing officers to serve during 1924, the association named as its head M. E. Kent, president of the Cleveland Cliffs Coal Co., with headquarters at Ethel; C. W. Jones, of the Merrill Coal Co., of Henlawson, as vice president, and H. A. McAllister, of the Logan Mining Co., as treasurer. Elected to membership on the executive committee were M. E. Kent, chairman; T. F. Downing, of the Monitor Coal & Coke Co.; J. A. Kelly, of the Main Island Creek Coal Co.; A. R. Beisel, of the Island Creek Coal Co.; W. R. Thurmond, of the Thurmond Coal Co.; A. J. King, of the Aracoma Coal Co.; R. R. Smith, of the R. R. Smith Coal Co., and C. H. Jenkins, of the Logan Mining Co. The bulk of the session was devoted to various phases of the lake freight-rate case. President Kent stated that "When recognition of the great importance of this issue is brought home to the people who buy coal, we believe that there will be widespread protest against action which would shut our coal out of

the markets of such a large section of the country as is served by Great Lake shipments from the lower lake ports. Widening of the differential as between West Virginia coal and that produced in the Pittsburgh and northern Ohio districts would bring ruinous consequences not only to the operators and miners of southern West Virginia but to the entire community, which depends so largely upon the coal industry for its prosperity."

Industrial Notes

The Fort Smith Spadra Coal & Mining Co., of Clarksville, Ark., is installing new equipment at its mine near Hartman, Ark. This plant will have automatic weighing pan, breaker and steel pan conveyor to screens; is putting in two sets of shaker screens, which give exceptional preparation and also will have picking tables and loading booms. When completed the plant will have jig washers for the small sizes. The United Iron Works, Inc., of Kansas City, Mo., is doing the engineering work and furnishing the equipment.

Howard MacNeal, formerly of the Philadelphia plant of the **Link-Belt Co.**, has been transferred to the Chicago works of that organization, where he will bend his efforts in the promotion of portable loaders, portable belt conveyors and electric hoists.

Edward F. Wickwire was elected a vice-president of the Ohio Brass Co., of Mansfield, Ohio, at the annual election of officers held Feb. 15. He joined the company in 1903 and has been secretary for several years.

Directors of the **Sullivan Machinery Co.** have declared a dividend of \$1 a share, payable April 15 to stock of record March 31.

Obituary

Death removed one of the well-known coal men of southern West Virginia and eastern Kentucky when **E. E. Lane**, of Louisa, Ky., aged 48, president of the Royal Pocahontas Coal Co. succumbed to an attack of acute indigestion at the office of Dr. W. W. Mackey at Iaeger on Feb. 23. Mr. Lane was a native of Sagamore, Mich., but for a number of years had resided at Louisa, Ky., on the edge of the Pocahontas field of West Virginia. He became interested in southern West Virginia mining properties and spent much of his time in that section of the state.

Mr. Lane leaves a wife and three children. Funeral services were held early in the last week of February at Pennington Gap, Va.

Major General James B. Coryell, of Philadelphia, died in that city on Feb. 7, age 69 years. He was president of the Fuel Corporation of America and a well-known figure in the Pennsylvania National Guard.

Alex W. Patton, treasurer of the Patton Coal Co., of Fairmont, died at a hospital there, Feb. 25, following an operation for a sinus affection. Blood poisoning developed. He leaves his wife, his mother, who resides in Parkersburg, and a brother, F. J. Patton, of Fairmont, head of the Patton Coal Co. His former home was in Grafton and later he resided in Newark, Ohio, coming from the latter city to Fairmont three years ago.

Coming Meetings

New England Coal Dealers' Association Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

American Institute of Electrical Engineers, Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

American Welding Society, Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

International Railway Fuel Association, Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers, Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

News Items From Field and Trade

CALIFORNIA

The Falk Corporation, of Milwaukee, has appointed E. C. Myers its San Francisco representative at 320 Rialto Bldg., to handle Falk herringbone gears and Falk-Bibby couplings.

COLORADO

The local land office at Pueblo has been directed by the Secretary of the Interior to offer for lease a tract of public coal land in Colorado comprising 240 acres. The land is in Huerfano County, about 11 miles northwest of Walsenburg, in Townships 27 and 28 South, Range 68 W. Lease for this tract will be at a government royalty of 10c. per ton of coal mined, a minimum investment in mining operations of \$15,000 and a minimum production of \$7,000 tons of coal a year, beginning with the fourth year of the lease. It will be offered at auction to the highest bidder, the exact date for the sale to be announced later by the local land office at Pueblo.

The Peerless Coal Mining Co. has been incorporated in Denver, with a capital of \$200,000, by E. Corbett, S. R. Robinson and T. V. Spacy.

A stiff wage cut is proposed at the Sunshine mine of the Sunshine Coal Co., near Durango. The company has given notice of its intention to reduce on March 31 the wages of miners from \$1.14 to 90c. a ton and drivers from \$7.82 to \$6.50 per day. The Industrial Commission will notify the men of the proposed cut and when their protest comes in hearings will be held to determine whether the reductions are justifiable.

The Colorado Fuel & Iron Co., reports surplus of \$732,029 after fixed charges, depreciation and taxes, for the year ended Dec. 31, 1923, which is equivalent to \$1.68 a share earned on \$14,235,500 of common stock outstanding, after allowing for preferred dividends, compared with a deficit of \$654,944 in 1922. Net earnings, after expenses, amounted to \$4,550,642, compared with \$3,361,327 in 1922.

ILLINOIS

Options on 3,000 acres of coal lands lying between Thompsonville and West End, Franklin County, have been acquired by the W. P. McMillan Co., of Chicago, and it is said that the tract will be fully developed. W. P. McMillan put down the two famous mines of the Old Ben Coal Corporation known as the "Old North" and the "New North," selling them to the Old Ben Corporation later, and has been desirous of getting into the Franklin county fields again.

As a result of a long drawn out wrangle over a question of transfer of coal rights, the Jay Coal Co., of Bethalto, has been placed into the hands of a receiver, Judge Gillham, of Edwardsville, named Harry Kelsey, cashier of the Bethalto State Bank, as receiver for the company.

A. M. Neilson, of Milwaukee, recently paid \$72,000 for the property and equipment of the Illinois & Indiana Coal Co., located at Georgetown. The company owned 550 acres of land near that place and incorporated a holding company in 1920 for \$300,000, which amount was later doubled. Shortly after a \$150,000 bond issue had been authorized, the property went into the hands of a receiver, F. N. Cloyd being named receiver. According to announcements made public, bond holders will receive 50c. on the dollar invested.

The Shed Coal Co. of Marion, a large stripping operation, was thrown into receivership recently and F. D. Borah of Marion, was appointed receiver in the Federal court, to attempt to raise funds and operate the property.

KENTUCKY

Good news was received from Frankfort, Feb. 26, the Kentucky House having defeated the Vaughan coal-tax bill, which originally called for a tonnage tax of 2½ per cent of sales value of all coal produced in the state. This amount had been amended to 1 per cent, but even this figure

didn't attract, and the bill was killed, the House refusing to call it from committee for first reading, the vote having been 43-43, whereas a vote of 51 was needed to bring it out. There are a number of other coal tax bills, but defeat of this one probably will prevent any others from coming out, while the Senate bills are not considered as dangerous.

NEW YORK

The coal corporation of Montgomery & Rodgers, Buffalo, has changed hands. Wesley P. Montgomery will continue under his own name and Elbert Rodgers has opened a new office under the name of Montgomery & Rodgers, having bought the stock of that corporation.

W. H. Bowater, Inc., have removed from 66 Broadway and opened an office in the Cunard Building, 25 Broadway, New York City, the telephone numbers being unchanged.

Camp-Osgood-Sleppy, Inc., have opened an office in New York City. J. G. Allspach, Jr., is in charge as New York sales manager, and Howard W. Ticknor has been appointed New York State representative. Mr. Allspach was associated with the company in its Scranton (Pa.) office.

OHIO

W. E. McEvoy, of the M. A. Hanna Co., Fred Heitzman, of Castner, Curran & Bullitt, and William E. Donnelly, of the Logan & Kanawha Coal Co., have been appointed trustees to liquidate the affairs of the Merrimac Coal Co., of the Dixie Terminal Building, Cincinnati. This company was started over a year ago by M. P. McDermott and his associates with a branch office in Cleveland, which later was closed and McDermott's associates left him one by one. Some lawsuits and other forms of assets are hoped to reduce the total indebtedness which McDermott intends to secure to the creditors through notes, thus taking the burden of the company's losses himself.

Eaton Rhodes & Co., who purpose the erection of large coke ovens and retorts in the Riverside section of Cincinnati, have been brought to a temporary halt in their plans through the interference of the City Planning Commission, which has summoned various members of the firm and others to discover just how much of a "nuisance" can be expected and what plans are made for safeguarding other property adjacent.

The J. P. Burton Coal Co., Cleveland, has opened a new stripping operation at Magnolia, on the Baltimore & Ohio R.R. New equipment has been installed and production will be ten cars a day.

With the resignation of F. A. Binder and F. U. Fisher from the Three States Coal Co., the election of officers has changed its personnel to C. A. Clyborn, president; Frank T. Beazley, vice-president, and J. Coy Pearce, secretary. Its headquarters is in Bluefield with main selling offices in Cincinnati.

PENNSYLVANIA

A state charter has been issued to the Kohut Coal Co., of Homestead, with a capital stock of \$20,000. John Kohut, Homestead, is treasurer, and with J. M. Honse, and Paul Kohut, Homestead, incorporated the company. The purpose of the company is mining, producing, buying and selling coal and its byproducts.

Seward E. Button, former head of the Pennsylvania State Department of Mines, has been made vice president and general manager of the Temple Coal Co., with offices in the Board of Trade Building, Scranton. He was a district superintendent with the Temple company when Governor Martin G. Brumbaugh, in seeking a capable man to head the state bureau of mines in 1918, selected Mr. Button, who was reappointed by Governor William Sproul. He retired from the state position a year ago and returned to the Temple company as general superintendent. For several years he was president of the Pittston Mining Institute. He is also a member of the Engineers' Club of northeastern Pennsylvania.

The sum of \$125,000 will be paid the widows, orphans and other dependents of the thirty-six miners who lost their lives in the explosion of the Barnes and Tucker mines at Shanktown, Jan. 26. The dependents of each of the miners will receive on the average a payment of \$4,096, according to reports filed with the Workmen's Compensation Board by the insurance company with which the mine company carried its protection.

A preliminary report on bituminous coal production in the 2,500 soft coal operations in Pennsylvania in 1923, just issued by the State Department of Mines, shows that approximately 135,000,000 tons was mined as compared with 108,310,000 in 1922. The production averaged 342,000 tons per fatality reported, 405 lives being lost last year as compared with 424 in 1922. None of the fatalities was caused by gas or dust explosions, a record unequalled in the past quarter of a century, according to Joseph J. Walsh, State Secretary of Mines. Fayette county led in production with Westmoreland second, Washington third and Cambria fourth. Three hundred and sixty-eight of the deaths were classed as inside and 37 outside fatalities, rock causing the majority of the inside fatalities. The days worked in more than one-half of the mines were below 180 while the days worked in all of the mines ranged from 115 to 276. Secretary Walsh says that the comparatively few number of days the miners worked was due to over-production not only in Pennsylvania but in all the bituminous states. Only 1912 approaches the record of 1923 in the matter of deaths from gas explosions, for in that year but one miner died from gas. The largest number of deaths caused from gas since 1899 was in 1907, when 277 men were killed or fatally injured by gas explosions. In 1919 there were eight fatalities from explosions; in 1920, nineteen; in 1921, two, and in 1922, 108.

Several distinguished foreign industrial observers and engineers were personally conducted to the Gould Mine, of the Bertha Consumers Co., near Finleyville, while on a recent inspection tour of Pittsburgh industries, by Marshall J. H. Jones, mining engineer and vice-president of the company. One party consisted of five Chinese industrial observers—T. C. Hsi, secretary of the Chinese Chamber of Commerce; Alexander Lee, W. Chang, C. F. Hsu and Dr. Chang Chien, Jr., the last named being the son of the greatest industrialist of China. Another visitor was Leon Rucquoi, a mining engineer of Belgium and a nephew of General Rucquoi. The visitors were much impressed with the simplicity and thoroughness of American mining methods as exemplified at the Gould Mine.

State charters have been issued at Harrisburg to the following: Redstone Limestone & Coal Co., Star Junction, mining and preparing for the market coal and limestone; capital, \$80,000; incorporators, John Branick, treasurer; John Ficik and Mike Branick, all of Star Junction; Westmont Coal & Sand Co., Johnstown, mining, digging and selling coal and sand; capital, \$25,000; incorporators, G. W. Griffith, 109 Barron Avenue, Johnstown, treasurer; L. L. Faust, Windber, and J. B. Huckins, Johnstown.

Bids were opened at the U. S. Engineer Office, Philadelphia, Feb. 27, for furnishing and delivering 15,000 tons of semi-bituminous coal, approximately 12,000 tons to be delivered directly to vessels at coal piers and approximately 3,000 tons to be bunkered into vessels in midstream. For delivery at piers the bids varied from \$4.81 to \$6.23 per ton, and for bunkering into vessels in midstream the prices quoted were from \$5.31 to \$6.58.

In the Sixth Anthracite district 4,372,726 tons of coal was produced in 1923, compared with 2,172,992 tons in 1922, according to the report of Mine Inspector David T. Williams. The services of 7,859 men and boys were required to accomplish the task. There were an even hundred non-fatal accidents and twenty-four fatal accidents.

The Lehigh Coal & Navigation Co., in its annual report for 1923 just issued, showed an increase in revenues of more than \$8,000 over 1922, while operating expenses increased by a shade less than \$6,000,000. Net income for the year was reported at \$3,473,507, after charges and taxes, against \$1,587,024 the year before, or equivalent in 1923 to \$5.93 a share on stock of \$50 par value, against \$2.71 the year before. Revenues in 1923 amounted to \$27,098,022, against \$18,786,431 the year before; expenses \$18,540,690, against \$13,554,734; net revenue after depreciation, depletion and other reserves, \$6,327,707, against \$3,788,207; general expenses, \$221,456, against \$201,887. After dividends,

which in both years amounted to \$2,339,472, there was left in 1923 a surplus of \$1,134,035, against a deficit the year before of \$752,448.

W. W. Gillett having resigned as purchasing agent of the company to engage in other business, **J. E. Nieser has been appointed purchasing agent of the Hillman Coal & Coke Co.** and its subsidiary and affiliated companies, effective March 1, 1924.

The Peabody Coal Co., of Chicago, has completed 100 new miners' houses in the village it is building at its mines near Cramer, and is expected to build as many more during the present year.

Coal companies of Scranton who have announced their intentions of fighting the new valuation of \$800 per foot acre placed on coal for 1924, may have to pay a penalty unless their city taxes, or at least some portion of them, is forthcoming before the appeal is decided in court. It was announced that the coal companies can be penalized under the law if they fail to pay their taxes before the penalty date is reached. City authorities, it is said, are preparing to enforce the law in this respect and regardless of the outcome of the court cases, intend to have the coal companies make a substantial payment on their taxes. According to John H. Jordan, chairman of the Board of City Assessors, there will be no appeals from the coal companies heard by the Board of Assessors. The courts will have to dispose of whatever claims are to be put up by the coal men against the \$800 valuation.

SOUTH DAKOTA

The Scranton Coal Mining Co. has been incorporated for \$150,000 by T. Finnsers and F. E. Oelker of Scranton, Edward K. Mather of Mitchell, S. D., David Hanna, of Wood Lake, Nebr., Frank Schrimpton of Ainsworth, J. F. Schmidt of Scotland, and James Richards of Scranton.

VIRGINIA

The Virginia Iron, Coal & Coke Co., for 1923 reports gross earnings of \$7,918,766 against \$4,354,846 in 1922, and net income, after all expenses and charges for interest and taxes, of \$456,664 against \$575,393. After allowing for regular dividends on the preferred stock, the company last year reported a balance equal to \$2.06 a share on the \$10,000,000 common capital stock outstanding against \$3.25 a share earned on the common stock outstanding at the close of 1922. After payment of dividends last year there was reported a deficit of \$143,146 against a surplus after dividends of \$325,583 in 1922. The balance sheet on Dec. 31, 1923, showed a profit and loss surplus of \$628,890 against \$772,012 in 1922. Inventories were valued at \$1,416,854 against \$1,636,161, cash of \$150,693 against \$194,511, and bills and accounts receivable of \$508,882 against \$196,455. Accounts payable totaled \$8,696, against \$10,278, and unpaid payrolls \$288,801, against \$300,934.

WASHINGTON STATE

The Church Mountain Coal Co. has been incorporated for \$450,000, at Bellingham, by M. T. Hurst, James J. Brady and Charles B. Sampley. The company holds coal lands which may be developed later.

The Cedar River Coal Co., a co-operative concern, has started operating at Landsburg, near Ravensdale.

The 1923 output of coal in Washington totaled 2,946,000 tons, according to the annual report of William R. Reese, chief mine inspector. More than 4,000 men were employed in the industry, producing an average of 3.18 tons per man. The value of the coal at the mine ranged from \$1.41 to \$5.44 per ton. Kittitas County, containing the Roslyn and Cle Elum fields and employing about half the state's total number of miners, produced 1,358,350 tons. King County was second with 663,000 tons, followed by Pierce County, 355,715 tons; Thurston County, 268,000 tons; Whatcom County, 187,000 tons; Lewis County, 113,000. Pierce County produced the only coke of the state—37,600 tons at Wilkeson and Fairfax.

WEST VIRGINIA

In connection with the session of heads of the U. S. Bureau of Mines at Pittsburgh lasting a week, beginning Feb. 28, attended by British mining experts, R. M. Lambie, chief of the Department of Mines of West Virginia, has extended an invitation to the visitors to make an inspection of the mines

of West Virginia during their stay in the United States. The British experts include Henry Walker, C. B. E., chief inspector of mines of Great Britain; Prof. R. V. Wheeler, D. Sc. and W. R. Chapman, M. S. They were sent by the British Government for a conference on mining conditions with mining men in the United States and for the purpose of discussing additional safety measures.

Demonstration of mine-rescue equipment of the Mine Safety Appliance Co., of Pittsburgh, Pa., was held for the benefit of a number of employees of the Pocahontas Fuel Co. at Pocahontas late in February and at the same time employees were instructed in the use of the equipment by Henry Theas, special representative of the company, and by officials of the fuel company. A large number of the men from the different plants of the company went through the gas chamber and put the apparatus to a test. A number of officials of the company were present for the test.

The Sullivan Pocahontas Coal Co. has issued \$1,200,000 first mortgage and collateral trust 6½ per cent serial gold bonds, dated Jan. 1 last, and due serially on Jan. 1, 1925, to 1944 inclusive. The company was organized to consolidate the properties and operations of seven producing companies in the Pocahontas-New River fields. The company owns approximately 2,640 acres of land and its subsidiaries hold leaseholds covering an additional 6,150 acres.

The Gulf Smokeless Coal Co., of which W. P. Tams, of Tams, is president and general manager, has completed the work of installing a complete plant for the removal of slate and dirt from coal by air at the Wyco mine of the company in Wyoming County.

Construction work has been completed on one of the largest tipples in the New River district, to be operated by the Maryland-New River Coal Co. It was placed in operation late in February and will be used in lieu of the two old tipples used by the company at its Rothwell and Smokeless mines the output of both mines being dumped over the one tippie, which is of wood construction and which cost with all equipment for the loading and preparation of coal about \$100,000. The company estimates that it will effect a saving of about \$100 a day through the use of the new tippie.

W. Clark Robbie, general superintendent of the Jamison Coal & Coke Co., in the Fairmont field, will be able to return to his headquarters at Fairmont soon, following an operation at a Baltimore hospital about the middle of February.

The Circuit Court of Monongalia County has granted the application of the Chaplin Collieries Co. for an injunction to restrain the Purslove Mining Co. from mining and removing Pittsburgh coal from the seam underlying the Sewickley vein, owned by the plaintiff "in such a manner and in such a way as to unnecessarily injure the plaintiff and destroy its mine and endanger the lives of employees." Under the terms of the injunction the defendant company is required to "so mine and remove coal underlying the coal and mine of the plaintiff as will not deprive the plaintiff of any substantial support to which it is entitled and not endanger the workings of the plaintiff's mine and the safety and lives of its employees." The injunction will not have the effect of forcing the defendant to suspend its mining activities but it will require the defendant to leave all supports, props and posts standing instead of drawing them, as is usually done when a section of a mine has been worked out.

In changing its name to the **Nuriva Smokeless Coal Co.**, the Trace Fork Coal Co. also announces a change in the name of the post office and railroad station, which will hereafter be known as Nuriva. Officers of the company are H. R. Tribout, president, Tams; W. H. Ruby, vice-president and general manager, Mullens, W. Va.; George A. Butman, secretary and treasurer and R. F. Wildey, assistant secretary and treasurer, Nuriva W. Va.

In order to remove any doubt as to its title to coal lands recently acquired from the Lasher estate in Wyoming and McDowell Counties, the Fordson Coal Co. brought suit in the Circuit Court of McDowell County and that Court has confirmed in a decree the sale of 5,532 acres of the estate to the coal company, the purchase price of \$511,710 to be divided among the heirs.

Adopting the recommendations of the West Virginia Department of Mines, made by R. M. Lambie, chief of the department, after an inspection of the property, the **A. L. Black Coal Co.**, operating in the vicinity of Maldsville, in Monongalia

County, will take steps to flood its mine, cork all means of air entrance and cut out a path behind the mine fire, which threatens to destroy all the coal company acreage, in meeting of representatives of the company, officials of the Department of Mines and representatives of the Warner Collieries Co., of Cleveland, which owns the coal property adjacent to the Black holdings. Water will be pumped from the river through a 6-in. line, the pump to be used having been delivered at the mine. It also is proposed to cut away the earth from the surface down through the Sewickley vein to the Pittsburgh vein with a view to stopping the spread of the fire, even though such a method will destroy considerable coal. In other words it is proposed to strip the coal for some distance in the rear of the burning area. The mine will be closed down entirely until the fire is under control. This fire has been raging since November, 1920.

The Comfort Coal Co. has reduced its total authorized capital stock from \$50,000 to \$5,000. The Westmoreland Coal Company of the State of Pennsylvania and with headquarters at 223 South Third Street, Philadelphia, has been authorized to transact business in West Virginia.

WASHINGTON, D. C.

The U. S. Supreme Court March 3 refused a writ of certiorari which would have caused it to review the suit of the **Braddock Coal Co.**, of Maryland, against David J. Sheehan, of Massachusetts. The verdict of the lower courts awarding \$6,112 to the coal company therefore stands. The suit involved alleged breach of contract for the purchase of 1,000 tons of coal by Sheehan from the coal company.

Official instructions have been issued by the acting director of the Bureau of Mines to all members of its technical staff calling attention to the necessity of exercising great care to confine work to those problems which do not encroach on the field of the professional engineer.

The U. S. Supreme Court on Feb. 18 denied a writ of certiorari sought by the **Piedmont Coal Co.**, of Pennsylvania, and the Ayrshire Corporation to appeal from decisions of the lower courts which had dismissed injunction proceedings to restrain certain creditors of the bankrupt estate of Josiah Van Kirk Thompson from prosecuting suits and exercising liens on several thousands of acres of coal lands in Marshall and Ohio counties, West Virginia. The decision of the lower courts, so far as the injunction is concerned, stands. The Piedmont company, through the Ayrshire Corporation, bought the coal lands from the trustees of the Thompson estate. They contended that the sale was free from liens. When various litigation involving the estate was renewed they sought an injunction to separate the land they had bought from the suits.

A new petition for abolishment of the **Government Fuel Yard** and turning over of all government coal business to local retail dealers will be presented to Secretary of the Interior Work soon. Dissatisfied with rejection of their original petition, presented to the Secretary of the Interior on Dec. 14, local dealers have prepared a new proposal, replying to various questions brought up by Secretary Work's advisers, which they hope will result in securing the government business.

CANADA

Representatives of a number of municipalities of Western Ontario held a conference at London on Feb. 26 to consider the coal situation. A resolution was adopted calling on the Dominion government and the Railway Board to take action without delay to provide cheaper freight rates on coal shipped from Alberta into the Province. Attention was directed to the fact that wheat is hauled at \$7 per ton and it was contended that coal should receive equally favorable rates.

The coal production of British Columbia for January totaled 243,018 tons, an increase of 34,590 tons over that of the previous month. The output of every district was better than that of December, Vancouver Island advancing by 19,653 tons, Nicola-Princeton by 5,174 tons and the Crows Nest Pass district by 9,763 tons. Colliery managers do not pretend to explain the improvement but put it down to vagaries of the trade which cannot always be traced to their precise cause.

William Hart, electrical engineer of the Valier Coal Co., at Valier, has resigned effective Feb. 1. No successor has been appointed.

New Equipment

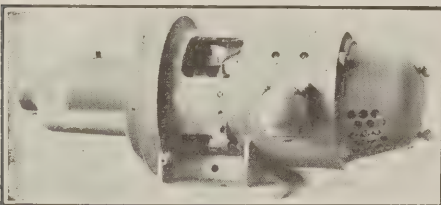
Steam Turbine-Generator Lighting Unit

A small non-condensing, steam turbine-generator lighting set of unusual simplicity and ruggedness has been developed recently by the Westinghouse Electric & Manufacturing Company for use in oil well rigs, steam shovels, isolated pumping plants, and general outdoor construction work. It is equally applicable for service around the mines, for the generator coils are specially impregnated and parts needing protection are heavily sherardized.

The unit, which is capable of generating 1,500 watts at 115 volts direct current, consists of a single wheel, of the Westinghouse impulse re-entry type, and a specially designed direct-current generator. It is unusually simple in design and substantial in construction, with only five castings and five moving parts. The moving parts are the shaft carrying the generator armature and turbine rotor, two governor weights, the governor spindle, and the valve stem.

NO BEDPLATE IS REQUIRED

The outfit requires no bedplate or foundations, the whole unit being supported



Small Steam-Driven Generator

Automatic speed control makes this outfit particularly suitable for lighting service around coal mines.

ported by feet on the middle casting, which contains the generator inboard bearing. These feet can be secured to any substantial horizontal support with four small bolts, studs, or lag screws. This construction prevents distortion from bolting down or from the expansion of the parts due to heating.

The generator consists of a forged steel frame ring, two cast iron brackets and the usual internal construction as to field, armature and brush rigging. The commutator end is provided with a protective drip-proof pressed-steel cover, which is held in place by two wing screws. The field windings of the generator have the shunt and series windings wound together as one coil, but inside the coil itself, the two windings are entirely separate and thoroughly insulated from each other.

A ventilating fan is mounted on the shaft outside of the rear bearing between the turbine and generator. The air is drawn in through the front cover, through the generator and out through a number of openings in the rear bracket. This fan is guarded to prevent injury to the fan or the operator.

The unit complete is 32½ in. long, 14½ in. wide, and 12½ in. high. Its net weight is 250 lb.

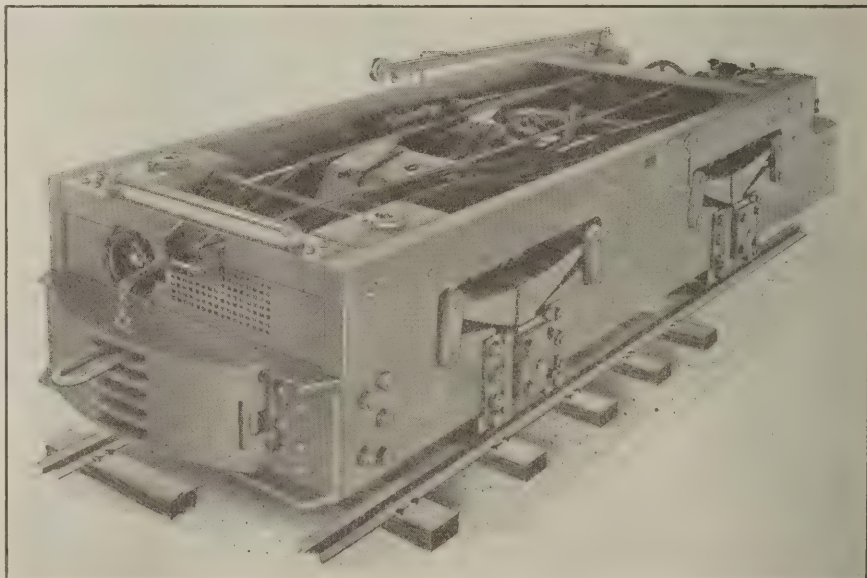
Newly Designed Trolley Locomotive

The Morgan-Gardner Electric Co., of Chicago, Ill., has recently announced its new type trolley locomotive for mining service. The motors in this locomotive are equipped with roller-bearings with heavy overload capacity permitting the slippage of the wheels under all conditions of load. Interpole construction insures sparkless commutation with low brush and commutator maintenance.

The reduction gears are of the single unit type, accurately machined and heat-treated, and possessing the "Wisdom" tooth designed by the Cincinnati Tool Steel Gear & Pinion Co. These gears and pinions are inclosed in a close-fitting gear case and run in transmission oil. The main journal springs are of the semi-elliptical leaf spring type, which gives the locomotive easy-riding and good tracking characteristics. The spring arrangement is also such that all the wheels rest solidly on the track and distribute the weight of the locomotive uniformly.

The brakes are of unusually rugged construction in every detail, overcoming much of the difficulty experienced with the ordinary type of brake. Angle guides hold the shoes in place on the wheels and cause a uniform pressure of the whole shoe upon the tire.

The clearance under the locomotive is unusually large, making operation possible where the track conditions are poor.

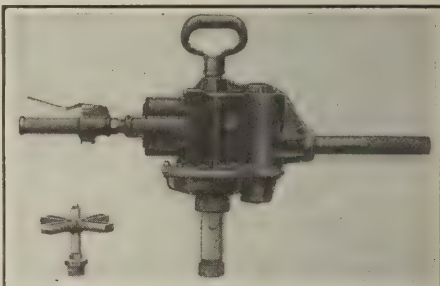


A Modern Trolley Locomotive

The designer of this machine has endeavored to incorporate every worth-while feature into the equipment. A detailed

survey of the locomotive shows how successfully this has been accomplished without disturbing the balance.

The valves are of the balance piston type, balanced in all directions and re-



No. 36 Red Giant Drill

This little air drill can be handled by one man for down or side hole reaming and drilling.

quire no pressure to hold them in their seats. Moving but 1/20 of their length and not requiring rocker arms or gears, they take no appreciable power to operate them. The valves are located between the cylinders with very short ports, thus providing air control as close to the cylinders as possible.

It is claimed that the lubrication system is quite economical, the motor being double acting and provided with packing glands, which prevent leakage of air into the crank case. Splash lubrication is used.

COAL AGE

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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

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Doctoring a Sick Industry

FROM a retailer comes a suggestion for satisfying the complaints of the public about the anthracite industry. He may not understand his subject completely. In fact he shows that in some ways he does not by saying in his opening paragraphs "What's wrong? Too many mines. Too many miners. Too much seasonal variation in consumption. Too much railway politics."

Every one knows that there are not any too many mines or too many miners in the anthracite industry. No recognized authority has ever said so. That is true no matter what may be said and rightly about the bituminous-coal situation. As for seasonal variation, every one knows that has not been true for years, though it may come about if peace reigns in the anthracite mines for a few seasons. As for railroad politics, that has not restricted coal production in the anthracite region for years; in fact every one knows the relation between railroads and mines, now nearing an end, has fostered the delivery of coal as fast as it can be mined.

* * *

But sometimes this retailer does not get "beyond his last." As representing the Hackensack Coal & Lumber Co., H. B. Blauvelt doubtless knows the retail trade. He is to be believed when he says in *Printers' Ink*:

Much of the present public discontent arises from poor coal—abominable, unburnable stuff which in times of stress is shipped at outrageous prices by 'snowbird' producers. These are disreputable, illegitimate companies or individuals who ship anything they can scrape together regardless of its grade, and it is this class of 'independents' more than any other who have given the coal industry its blackest eye.

Believe this expert; he knows. "Its blackest eye," mark that! We agree with him.

He suggests that the bulk of the anthracite companies should assess themselves two cents per ton and form an association "for administration, research and advertising purposes" and let the public know that they are selling good coal with a certain maximum impurity. Then he tells the anthracite industry that the fruit growers have similarly combined and have been successful. The public now insists on receiving the trade-marked product of the fruit growers' associations.

* * *

But the fruit growers are of the farmer class and what they can do would raise a revolution if done with coal. A bill is even now proposed to guarantee the farmer \$1.59 a bushel for his wheat and to seize the elevators and mills that will not pay it. That farmers, so far as legislation is concerned, can "get away with murder" is generally conceded.

Coal companies cannot attempt even the most harmless of combinations. Note the relation with the railroads which was fostered by legislation in earlier years

and was popular with legislators and which is now a crime not to be contemplated. But suppose it could be done, there is still the retailer. If coal were sacked and sold in sacks, as fruit is boxed and sold in boxes, the trick might be turned, but coal is shipped in bulk and mixed by the retailer with the "abominable, unburnable stuff" which Mr. Blauvelt excoriates.

The retailer, in short, is the more general offender, for he, it is, who makes the clean product dirty. He even, in some cases, seeks out, aids and abets the "snowbird" operator for his own advantage. It is bold indeed for a retailer to put the blame on the producing end of the industry. True, Mr. Blauvelt may be, and probably is, ethical; some retailers are, but they are not justified in selling "abominable, unburnable stuff" to the consumer.

* * *

Still the problem remains. Rejecting Mr. Blauvelt's plan solves nothing. Let us look at other plans. The public probably would not approve of the companies retailing their own coal. It is easy to realize that the retailers would not like it and they would work effectually on the feelings of the consumer unless they were bought out and well recompensed. And the public would view retailing of coal by anthracite companies as they view transporting of coal by them.

No! if the hard-coal producers are to clear their skirts of selling this "abominable, unburnable stuff," they must have some consumer inspection of coal and then they must have some authority see that coal thus inspected is sold without subsequent mixing with uninspected coal. That is work for independent inspectors, for the public must have full faith in them.

* * *

As for his advocacy of advertising, we would say, "Nothing but true statements in advertising can make it pay." See that good coal gets to the consumer and then advertise the fact. Let the operator be able to say in his advertisement that his coal is inspected, at least in sample, by disinterested parties or by men interested only in protecting the public, that only inspected coal is used in making the retailer's mixture, or that each coal is marketed separately. Then the advertising will do a 100-per cent job, but not till then.

We believe firmly that an advertising job remains to be done, but the product must first be right, and the retailer is perhaps more to be censured than any one for the present "black eye" which is worn conspicuously by all branches of the industry. A campaign just now might be successful, because the coal coming to the market is at its best, but if a strike occurred and a shortage resulted, conditions of earlier years, if not met by inspection, would destroy the effect of the advertising and leave only a sore, disgruntled public.

Black Sheep in Good Families

NOT all the mines of any big company are destined to survive this period of low prices and restricted demand. Some will be closed so that the others can be run steadily. Which should shut down is often quite a puzzle. The high-cost mine may be among those kept running if the coal that it produces is expensive only because of certain inherent difficulties which still will have to be met if the mine is closed down. In most regions if a shaft mine is not pumped it will flood, and sometime or other it will have to be pumped dry. On the other hand, a drift mine in general will drain itself, and it will not be necessary to remove the rail or wire because it will not be submerged.

Still, by and large, the high-cost mines of any large corporation should be closed down, and money should be spent to reduce the cost of the rest. As such mines will run steadily, it will be possible to install the best and most efficient machines. What would be too costly to provide for all the mines can be purchased without excessive strain for the few.

An attempt will be made to get from a few mechanically excellent mines the whole tonnage desired. The best talent in the employ of the company will be gathered at these operations, and we shall see some unusual developments. If under the present stress too many irons are kept in the fire, they all unquestionably will be burned. Every company has its black sheep mines. Now is the time to start weeding them out for the benefit of those that are white.

From the Particular to the General

NO SWALLOW makes a summer but the presence of one such bird sometimes convinces the public that summer is at hand. One dishonest man in a cabinet does not prove that cabinet officers are crooks, but if one be found the public will be sure that there are many more, and good men will suffer with the rest. A charge against one is a charge against all. Because one man has been accused we may be years before we again believe in the integrity of the executive heads of the Government. The probity of no man defends him against suspicion if others with whom he is associated seem guilty of wrongdoing.

Many of us can remember when the Senate was regarded almost with veneration. Today that regard has gone. A few black sheep destroyed it.

A few scandals ruined the railroad business. It is slowly coming back to public esteem. Condescendingly and apologetically some of the large consumers of transportation are supporting the position of the railroad industry, but everything they say has the weakness of defense. No longer is the approval carried by acclamation. Yet in the nineties we boasted of our railroads and they were not as excellent or as mindful of public interest as today.

But that is not strange for the public makes almost everything unanimous. When anything is regarded as praiseworthy it is dangerous to attack it. When the majority swings the other way it no longer can be defended. The public never paints its pictures in subdued colors. Consequently care must be taken lest a few flagrant examples upset public confidence.

The coal industry, like other industries, has had its crooks, men who used it for a while to make money and left it when it ceased to promise excessive profits

and when the market once more became discriminating. A handful of wilful men spoiled our foreign coal trade and now foreigners are not anxious to take the risk of buying American coal. We cannot afford to leave such matters to chance. Good business principles demand that something be done to prevent the sale of coal that has been adulterated with slate or has been sold from a dirt pile without first being washed.

Now, in this time of a decline in public interest in coal, can be found a chance to clean house. It might be presumptuous to insist that any particular make of broom should be used for that purpose. It might be the U. S. Bureau of Mines but perhaps the U. S. Chamber of Commerce or the American Engineering Council would be better, but whatever it is, a broom is needed to sweep the industry clean at all times, especially in times of stress, of those concerns who load down the railroads with rubbish and give the consumer coal he cannot burn or can burn only with difficulty.

We Have Some Heroes

AND so far, after all, the world's heavyweight knock-down, drag-out champion is not going into coal operating. Mr. Dempsey has decided not to invest his money in the Great Western Coal Mines Co., will not help develop several thousand acres of Carbon County, Utah, coal and have a new mining town named after him n'everything. How disappointing! Here we were, all set comfortably in ringside seats waiting for the gong. We wanted to see if the human pile driver could "take it." Nobody knows yet. Mr. Dempsey never met anything or anybody who could administer "it."

When the go with Battle Ax Coal was scheduled and duly advertised by Manager Jack Kearns with a care-free announcement that "me and the champ" had decided to invest in Utah coal and become great operators, there was some assurance that Mr. Dempsey really was a fighter. He wasn't afraid of old Battle Ax, the greatest meat chopper of them all. He really was willing to go in there and show the world that he could "take it." We crunched our peanuts and whistled and stamped our feet and bought another bottle expectantly. But now the Roman holiday is off. And we still don't know whether Dempsey can "take it."

But we know a lot of coal operators who can. Old Battle Ax Coal has mauled hundreds to a pulp and has draped thousands over the ropes, broken in spirit and bank account. But in every coal-mining field in this country are men who can "take it." Old Battle Ax hasn't maneuvered *them* into operating properties that have no economic excuse for existence. Their footwork is too good for that. His clever feints haven't tricked *them* into operating and marketing practices that look good for today but which take no heed for the future. His horrible grimaces haven't frightened *them* into spinelessness in their dealings with labor.

Although old Battle Ax has landed many a vicious jab to the wind, these men are always in mental and physical fighting trim and they saved their money when they made it. They are the men who know how in a bad round, to trim their mine costs with good management and machinery and "cover up" during a period like the summer of 1924, when the Battle Ax will do his worst—hitting only their elbows and shoulders. They can "take it." And the time will come when they will make old Battle Ax "take it" too.



Men Who Recovered Alden Mine

Fire, Largely Isolated by a Fault, Is Successfully Sealed by Men in Oxygen Breathing Apparatus

Sickness of Workmen and Near Fatalities Lead Company to Suspect Fire in Abandoned Workings—Tests Showed Increasing Percentage of Carbon Monoxide—Difficulties Encountered in Sealing Off the Fire

MOST dreaded of all mine disasters is a fire, particularly in the underground workings. No two mine fires are alike either in their development or in the extent of area covered. Fire can be fought more readily in the live workings of a mine than in an abandoned section, because in the former case the firefighters are better acquainted with the controlling conditions than they are likely to be in the latter. Fortunately, circumstances frequently favor the isolation of a fire and prevent its spreading to other sections of the mine. Physical conditions in anthracite mines often make it necessary to lay out a mine in separate and isolated sections or districts, and in this case a defense is prepared almost without intention against the spread of a mine fire. Nevertheless in the planning of a mine, due thought must be given to the possible occurrence of fire in the workings, particularly if the coal is relatively free-burning and friable or gas is present.

BAD AIR NOTED WITHOUT ANTICIPATION OF FIRE

A well-designed mine plan will take into consideration the ready isolation of each section of the workings, will guard against possible danger and prevent the destruction of the entire mine if an accident occurs in any one section. The failure to do this has often proved a great handicap in the handling of a fire in the

workings, and necessitated the flooding of the entire mine where this might have been avoided with proper care in the planning of the mine.

During the latter part of December, 1922, some men engaged in putting in an engine foundation in a certain section of the Alden Coal Company's mine, at Alden, Pa., came out several times complaining that the air made them sick. This happened at infrequent intervals every three or four days. The occurrence, however, caused little suspicion of fire in the mine and no one suspected any such misfortune until mine inspector Joseph J. Walsh detected traces of carbon monoxide in samples of the air he had taken.

About the same time two men at work in that section repairing stoppings, building mine doors and timbering, were overcome and nearly lost their lives. Knowing the air was bad, the inside foreman had cautioned the men to be careful. His anxiety for their welfare led him frequently to the place, and this proved the means of saving their lives. On such a visit the foreman found one of the men lying at the side of the road in a seeming stupor. The gas had rendered him delirious, and when the foreman roused him with, "Get up and get out of here," the fellow replied, "Take those rails off my legs so that I can get up."

The other man was found with his hammer raised in the air, in readiness to nail up a board. So strong

and firm was the man's grip on the hammer that it could not be removed from his hand till he had been taken to the outside of the mine and sent to his home. Both the men owe their lives to the watchfulness of the foreman, and the incident shows the speedy and fatal effects of carbon-monoxide gas when men are exposed to air containing only traces of it.

Inspector Walsh sent the air samples that he had taken in the mine to the U. S. Bureau of Mines where his results were corroborated. The question now was, whence did the gas come? The gangway in which the men were laying an engine foundation was a return airway from a slope that had been idle for nearly two years, for owing to a heavy squeeze, the workings from it had been made inaccessible.

A gasoline motor was operating in a tunnel from which this gangway had been driven. Naturally, the first thought was that the carbon monoxide in the air was generated by the exhaust from this locomotive. The result was that the machine was promptly taken out and replaced by a storage-battery locomotive. Work was discontinued in the gangway, the men withdrawn, and the place temporarily barricaded. The circulation of air in that section was increased "to sweeten up the workings," as Jack Morris, the foreman, expressed it.

The place was then left standing for about ten days when several more air samples were taken for analysis. These and others taken several days later showed that the percentage of carbon monoxide was increasing rather than decreasing as had been expected. It was then definitely decided that coal was on fire somewhere within that section of the mine and the problem was to locate and extinguish it with as little delay as possible.

This conclusion was made certain by the fact that tests taken in the several intakes gave no indication of the presence of gas either by the use of the carbon-monoxide detector or by the analyses made of the air samples taken at those points. On the other hand, both the carbon-monoxide detector and the analyses of air samples taken in all the returns from that section showed the presence of the gas. Furthermore, the tests also showed a low oxygen content in the return air. Indeed, at times, it was impossible to work in that airway without the use of breathing apparatus, and the Koehler lamps refused to burn.

DID NOT ATTEMPT TO USE FAULTY APPARATUS

The rescue apparatus at the colliery consisted of five sets of breathing apparatus, one high-pressure oxygen pump, a number of oxygen cylinders and nearly 100 lb. of caustic soda. This equipment was supplemented by fourteen sets of more modern breathing apparatus, eight sets of which were purchased by the company, as the apparatus on hand was old and unreliable.

For the work in hand, twelve trusty and experienced mine workers were chosen and given training for three or four days in the use of the breathing apparatus. This was done under the direction of Jesse Hensen, whose services were kindly placed at the disposal of the company by the Bureau of Mines. The twelve men were divided into two working crews, one being placed in charge of Mr. Hensen and the other in that of James Jeffries, the company's fireboss.

In Fig. 1 is shown the larger portion of the mine operated by the Alden Coal Co., which adjoins on the west the property of the Susquehenna Collieries Co. The map shows the location of No. 2 shaft of the Alden



Fig. 1—Fire Area at Alden Coal Co.'s Mine, Alden Station, Pa., Was Confined to Slope in Cooper Bed

Recovery was made by first sealing up the intakes at points marked S and T followed by the placing of seals on the return at A, B, C and D. Water was directed into the sealed area and thus the temperature was lowered, though when the seals were being placed the return was at a temperature of 156 deg. F.

The roadway from No. 2 shaft to shaft No. 1 is not straight but takes a right-angled turn near No. 1 shaft just as it does near No. 2. In consequence No. 2 shaft is almost exactly north of No. 1. This fact will aid in allocating the cross-section shown in Fig. 2.

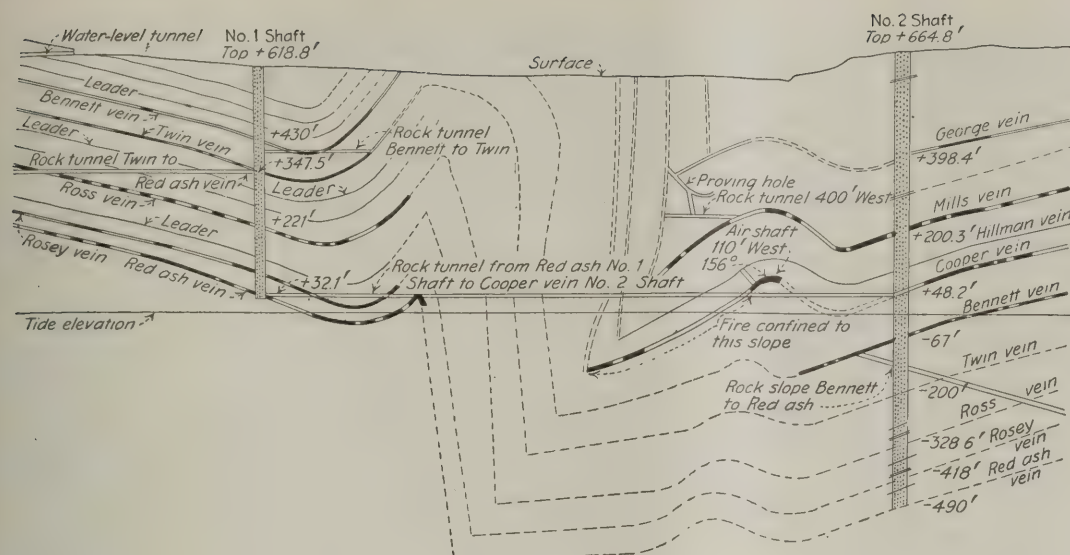


FIG. 2

Cross-Section

This shows how a heavy roll makes the bed almost vertical adjacent to the fire area. In fact the bed has been overthrown or lifted through an angle of over 90 deg. This fault, or should it not rather be termed "fold," aided in preventing the fire from spreading toward the South. Note the rock tunnel from the Red Ash bed at No. 1 shaft to the Cooper bed at No. 2 shaft. The tunnel is that shown in Fig. 1 as the tunnel to No. 1 shaft.

Coal Co., and the position of the tunnel projected from the old No. 1 shaft on the south. It also shows approximately the section of old workings in which the fire was assumed to be located.

START SEALING FIRE IN INTAKE OPENINGS

The intake current circulating through these old workings is indicated by the arrows shown in the gangway driven to the west of this tunnel. Following the intake air, the workers first started the building of a number of substantial stoppings to close the intake end of the section containing the fire. On the map these stoppings are indicated by S. All the stoppings were thus closed but one, which contained a trapdoor marked T, by which the quantity of air entering the section could be controlled, thus avoiding the formation of an explosive atmosphere within the inclosed area.

At the extreme west end of the fire section, it will be observed that a large door was erected in a tunnel which cut through an anticlinal in the Cooper seam. The purpose of this door was for the further regulation of the air entering that section. Much time had been consumed in investigation and preparation for the work, and the building of the intake stoppings was only started April 20, 1923. It was slow and tedious work. Boards, bags of sand, cement, ashes and water had to be carried from the base of supplies, marked X on the map, a distance averaging more than half a mile, much of the way being through old workings that were well nigh impassable.

The physical features in the Cooper seam were such that this section of the mine was cut off on all sides by two faults that isolated the section from other workings, a condition that greatly assisted the work of isolating the fire. Moreover, a large barrier pillar of virgin coal had been left for the protection of the two properties adjoining.

Although the work of building the intake seals was arduous, it was not performed under as trying conditions as that of building the seals on the return end of the section. As indicated on the map, there were but four of these openings to be closed. These are marked A, B, C and D. The approach to the last two openings on the east side of the tunnel is indicated by a line of crosses. The advance was made in face of difficulties more trying than any yet encountered. It called for the exercise of the highest degree of courage and devotion to duty, but the men were not found wanting.

At times the temperature in the return reached 156 deg. F. Tests of the mine air showed 8 per cent of methane and an oxygen content of 3.7 per cent. Under these conditions, it was necessary to carry compressed air along the passageways to cool and dilute the atmosphere and make it possible for the men to work. The way led up an old chamber, over an anticlinal and down another chamber dipping 45 deg. to a gangway in old workings made twenty-six years previous. The fireclay roof and the rotten timbers were enough to tax the endurance of the bravest workers, but no one asked to be relieved, though many were gaunt and thin by reason of their experience.

The last opening, at D, was reached Sept. 8 and the

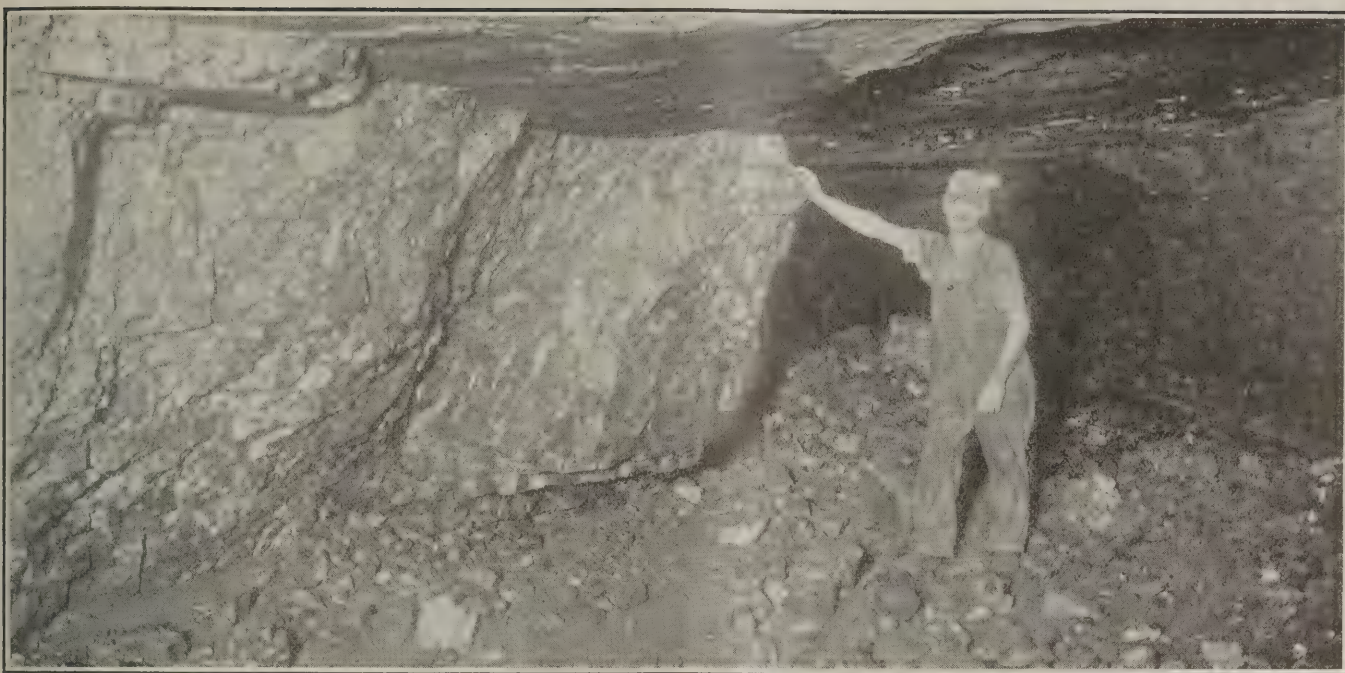


Fig. 3—Some of the Fire Fighters

Heavy grades, bad conditions such as are found in abandoned places, absence of track and finally bad air and intense heat made the work of recovery almost insuperably difficult, but the men knew neither fear nor weariness and the work was successfully performed.

sealing completed six days later. The loyalty of the men reflected the confidence they had in their foreman, Jack Morris, who was always ready with a word of encouragement and appreciation throughout the nine months required to complete the work.

The tables herewith show the analyses of air samples taken in the current returning from openings C and D. The samples taken previous to Sept. 11, from the opening marked D were from a broadcast return. This was owing to the difficulty of near approach to that opening, as will be understood from the account given of the work of sealing that opening, which was started Sept. 8, but practically finished Sept. 11, the work being finally



Where the Miner Waits for Cars—and More Often Doesn't Wait

How Miner and Manager, Each with His Immediate Ends in View, Hamper Coal Production

Loaders Without Cars and Managers With Their Men Hurrying Home Early Make a Mine a Place of Deplorable Inefficiency—
Miner's Other Duties Lighten the Monotony of Shoveling

AS A RULE the miner does not confine his efforts exclusively to shoveling coal. While he should be an adept in the use of the shovel, necessity demands that between filling successive cars, he vary his labor. Thus he drills holes, charges them with explosive, picks down coal, sets props and gobs refuse. This variation in employment materially relieves his muscles and gives him a diversity of occupation to vary the monotony of shoveling.

The miner and the management in most mines—and this applies to company or daymen as well as to those working on tonnage—co-operate less effectively than in most other industries. The miner fails to receive the necessary cars in which to load his coal. The men upon whose labor the miner depends fail to co-ordinate their work with his. Supplies are not furnished him as needed. No instructions are given him to assist him in performing his work, nor—and this is of even greater importance—is any analysis made of conditions and methods to find out how his work can be made as easy as possible. Left thus without support the miner is rendered irritable. Beyond question this lack of co-ordination is one of the major reasons why the miner is habitually dissatisfied with his life. As has been shown in previous issues of this report a miner may readily lose from one-fifth to one-third of his daily earnings through failure of the management to supply a needed mine car. Even supposing that this failure

occurs only occasionally, the depressing effect upon the man is inevitable. When he sustains financial loss also because of inferior supervision, the aggravation arising therefrom is equally great.

The actual time spent by miners within the workings and also the hours of quitting work are shown for two different days in two mines in Figs. 1 and 2. These are presented merely as illustrations and are not intended to represent average conditions. Similar records made in other mines where, as will be noted, relatively full time is shown, are fairly representative of operations that are working only a few days a week, and where consequently miners are anxious to earn all they can each day.

Fig. 2 is more nearly representative of either full-time production or particularly good physical conditions where tonnage rates permit large earnings. This chart is the result of observations taken where a thick bed of coal with good roof and opportunity to make good pay prevailed. In this mine, for example, the miners were loading, on the average, at the rate of about 15 tons per day with a union rate of 84c. per ton. They are accustomed to earning therefore, on days when they work, about \$12.60.

In Fig. 2, the time of the loaders and machine cutters leaving the mine is given separately. It will be noted that not only about half the miners left the mine before the end of the 8-hr. day, but that the cutters remained in the workings a much shorter period. This indicates an extremely uneven apportionment of work between the two groups of men. It is interesting and valuable in this connection, to state what reasons were given

Seventh installment of report on "Underground Management in Bituminous Mines" made by Sanford E. Thompson and associates to the U. S. Coal Commission. Previous installments may be found in Vol. 24, pp. 691, 733, 773, 811 and 845 and Vol. 25, p. 137. Other sections of this interesting report will appear later.

by the miners for leaving their places early. Though it was, of course, impossible to verify the truth of the miners' statements, the fact that 29 cutters left the mine before the end of the day because there was no cutting to be done and 80 miners left during the same period because their places were not cut is a specific example of the failure of the management to correlate the work of these men. In many instances, this lack of co-ordination is greatly augmented by local rules or customs limiting the number of working places assignable to each machine.

The record of more than 63 men leaving the mine because they had earned all they wished to earn that day represents a condition existing in various degrees in most of the mines visited. It arises in large measure from the fact that existing piece rates for coal mining have been based upon the consideration that the mines only operate part of the year and that when they do work conditions are not such that the miner can work steadily throughout the day. In periods of steady work at the mine the miner is not anxious to earn maximum pay. Consequently, if able to work continuously throughout the morning, the miner can earn a wage which will satisfy him in far less than the 8-hr. standard day, and he will leave the mine when this is accomplished.

Fig. 3 is from the records of a day's work in a mine where 39 miners were employed. This diagram shows the time at which each miner entered or left the operation. In the upper portion of the chart also will be found the length of time that each miner worked. This time, in general, is longer than is the case in most operations, this mine being on a profit-sharing basis.

Elimination of some of the high-cost mines, provision of a more regular car supply and storage of coal by the consumer might reduce intermittent shutdowns of the mine and level out the seasonal demand, to such a degree that the miner being able to earn enough in a few hours would so shorten his working day as to interfere seriously with the proper management of the mine. The operation of the mine cannot be planned so as to give the men an opportunity to work continuously while in the mine unless the miners show a spirit of co-operation. This, however, is a matter of education, not only of the miner, but of the management also, and not until both parties realize that their prosperity and success are interdependent, will it be fully accomplished.

Although lack of time prevented an analysis that would give data of statistical value, the detailed reports charted in Fig. 4 of a day's work performed by three loaders in three different mines located in different fields, is of interest from the standpoint of mine management. It shows the kinds of delays and changes in work that with many variations in detail and degree

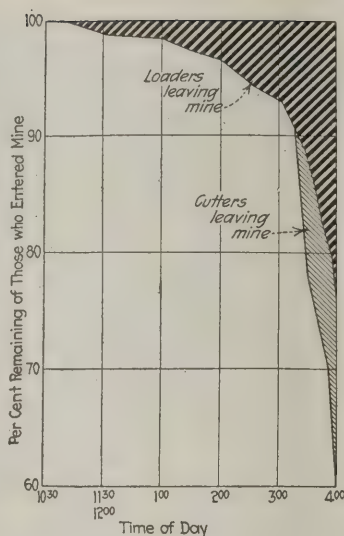


Fig. 1—How They Run Home

Percentage of loaders and cutters left in a mine at certain hours of the working day. Some loaders hastened back to lunch apparently and some of the cutters went home so early in the afternoon that they had to wait for their afternoon tea.

are common to all bituminous mines. This will be evident from a study of this chart.

Each division in the vertical columns represents not a sequence of operations, but the sum of all the periods throughout the day devoted to the same operation. Thus, for example, the lower section is an accumulation of all the time spent in shoveling, while those designated as "waiting" are the summation of all the short delays occurring throughout the entire day.

These data were made up from complete stop-watch observations taken in each working place. The two left-hand columns represent a complete cycle of work from clean-up to clean-up in each mine, in a place where two loaders were working together with two rooms available. The right-hand column represents pick mining; that is, none of the coal was cut by machine. The time lost during the day noted in the right-hand column, where the unnecessary time lost was more closely analyzed than in the other two, should be carefully inspected.

The time actually spent in loading appears relatively short, but this does not represent the total time necessary to the filling of cars, because some picking was done while the car was being loaded. Furthermore, the time lost while waiting for cars would not all have been devoted to loading, had cars been available.

Being based on observations of the work of three men, each for one day, these diagrams are not intended to illustrate average or even representative conditions, neither do they portray any particular part of the miner's work in its proper proportion to the others. These diagrams are given simply as illustrations of the nature of the work a loader has to do and the time spent on the individual operation in the three cases noted. The studies depicted were made with the co-operation of the miners themselves, who assisted the observer by furnishing information concerning the various operations.

In studying the variation in time spent by miners in loading their cars after they have been received, Fig. 1 in the article of Nov. 29, 1923, p. 811, is instructive. A miner will frequently stop loading and perform other work which more wisely might be done after he has

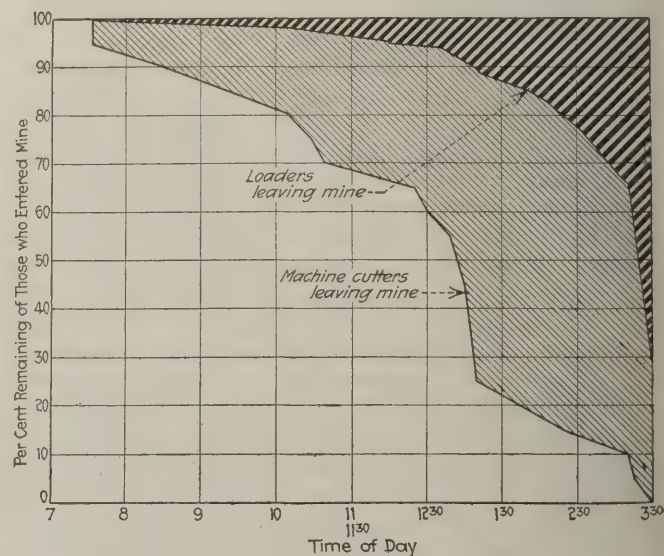


Fig. 2—Record of Return Home at Another Mine

Here some cutters and loaders left quite early. One cannot but surmise that the loaders found places uncut and the cutters' places not cleaned up. Twenty-nine cutters at this mine said they left it because no cutting remained to be done, and eighty loaders said they went home because no places had been cut for them.

finished his car. If a miner was accustomed to seeing cars delivered on a schedule he would begin to realize that he is a cog in a smoothly running machine and that failing to fulfill his part, will throw the whole mechanism out of adjustment.

Every hand operation performed in the industry can be executed in either a difficult or in a comparatively easy manner. Certain miners were observed who, under fairly difficult conditions, were handling their shovels with remarkable ease and deftness. One man, working in one of the seams visited, who, because of the thinness of the bed, could not stand erect and who had a comparatively small space above the side of the car, was shoveling with apparent ease and actually faster than any other man observed. This miner threw shovelful

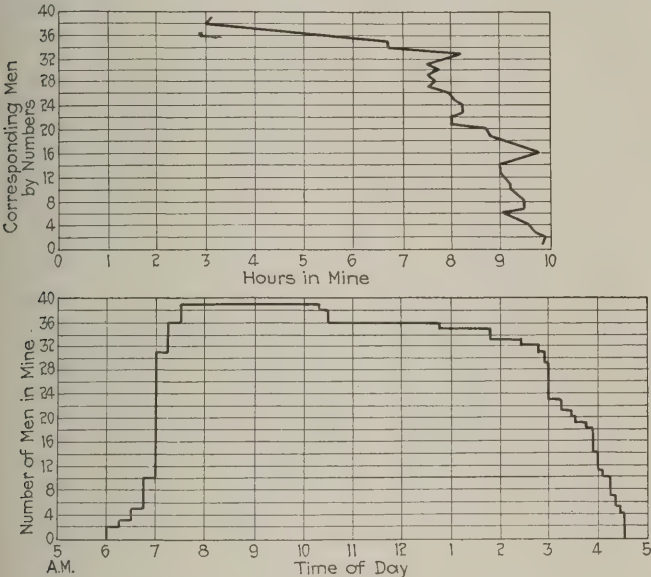


Fig. 3—Time in Mine of Thirty-nine Men
The upper chart shows the time in the mine and the lower chart the entering and leaving time of each individual.

after shovelful of coal against the roof from whence it caromed into the car.

One of the major functions of industrial management is now recognized to be the training of operatives to do their work in the best and easiest manner. It has been determined, for example, that if the shovel is handled in a certain manner the most favorable leverage and the easiest action will be attained.

In coal mining, therefore, there is opportunity for an analysis of the miner's work which will determine such details, among others as the best and most economical height and length of throw, the manner of handling the shovel, the procedure that should be followed in filling a car, the arrangement of the track and the proper location of the car in the working place. After standard practices have been established, the loader should be instructed in them and taught to do his work in the easiest manner. Similar analyses will be found of practical value for the operations of drilling, setting props and performing various other tasks of a more or less routine nature.

Operators may object that such studies will accrue solely to the benefit of the miner and that consequently they cannot afford the expense needed to establish the best method of working. This, however, is a narrow viewpoint, and experience has shown that it is not only good policy to aid a fellow man, but that such studies as have been outlined redound to greater harmony in the relations between employer and employee and result

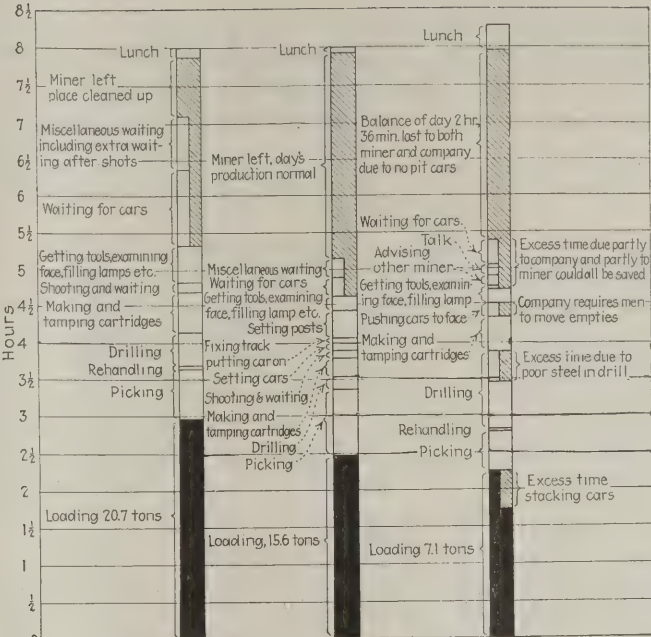


Fig. 4—Record of Three Loaders in Three Mines
What a short time is given to loading is made quite clear by the black portion of the three columns. The hatched portion shows the time lost unnecessarily; either the miner was waiting or had gone home, or was delayed by moving empties, or by poor tools, the waiting period being hatched narrowly where the fault was lack of co-ordination rather than absence from the mine. Note also the loss of time due to building up the sides of cars with lump coal.

in a reduction in the actual unit cost of production. Many mines are working two eight-hour shifts daily and they have thereby effected an appreciable reduction in the cost of mining coal. The change has saved overhead and much dead work. In one of these instances, it is true, the double shift temporarily has been discontinued because an insufficient area had been developed and the operation could not be maintained without pushing the development work more hours than the rest of the mine. Cutting machines are run during a second shift in some mines in which the loaders and company men are on single shift only.

The effect of two-shift work should be carefully studied in every mine from the standpoint of economical management, equipment, development and personnel.



Fig. 5—Lots of Coal Ready and No Car in Which to Put It
The relation between miner and operator is a loose one. The price per ton loaded is about the only tie. The miner loads if he wants to and goes home if he doesn't want to load. The operator provides him with cars on a somewhat similar basis. Neither miner nor operator puts himself out to accommodate the other.

Wetting Down Colorado Mines Is a Real Problem

Low Humidity in That High and Dry Region Makes Dust a Serious Menace—C. F. & I. Co. Humidifies with Both Live and Exhaust Steam and Sprinkles Lavishly

IN THE high and dry region on the eastern side of the Rocky Mountains, many a mine makes no water at all. The result is that at such mines air humidification and other methods of protecting against dust troubles are given most careful attention by operating men. The methods used in such instances by the Colorado Fuel & Iron Co. were explained Feb. 14 to the Rocky Mountain Coal Mining Institute at Denver by R. L. Hair, the company's division engineer at Trinidad, Colo.

Mr. Hair showed how live steam is used both to heat intake air by the use of banks of pipe coils in the mouth of the incast and for further humidification by discharging it into the air stream through perforations in the pipe line 100 ft. inby. Low-pressure steam in great quantities is exhausted into the air stream about 225 ft. in. Atomizing sprinkler heads every 500 ft. leading from water pipes running through all entries carry the humidification deep into the mine.

ROOF, WALLS AND ROADWAYS WETTED FREQUENTLY

At 125 ft. intervals there are hose connections on the water pipes and a man with a piece of hose frequently washes down roof, walls and roadways. Empties are sprinkled on their way into the slope and loads on their way out. And to make certain that the quantity of loose fine coal through the mine is kept down to a minimum, the night shifts load it out frequently. Mr. Hair's paper was as follows:

"Though the annual rainfall in Las Animas County, Colorado—that part of the state with which my paper deals—in 1923 was 26.85 in., the normal yearly rainfall is only about 17 in. The moist warm air which leaves the Pacific Ocean headed in our direction deposits its vapor in the mountains as rain or snow, and when it reaches us in the foothills on the east side of the range,

it is descending and its temperature increasing. In consequence, it is prepared to take up moisture rather than to deposit it. So for our precipitation, we must depend principally on the moisture in the winds from the Atlantic and the Gulf of Mexico.

"Temperature and humidity readings taken at the surface at several of our company's properties last month by Robert McAllister, the company's mine inspector, are as in Table I.

TABLE I—TEMPERATURES AND HUMIDITIES IN LAS ANIMAS COUNTY, COLORADO, IN JANUARY

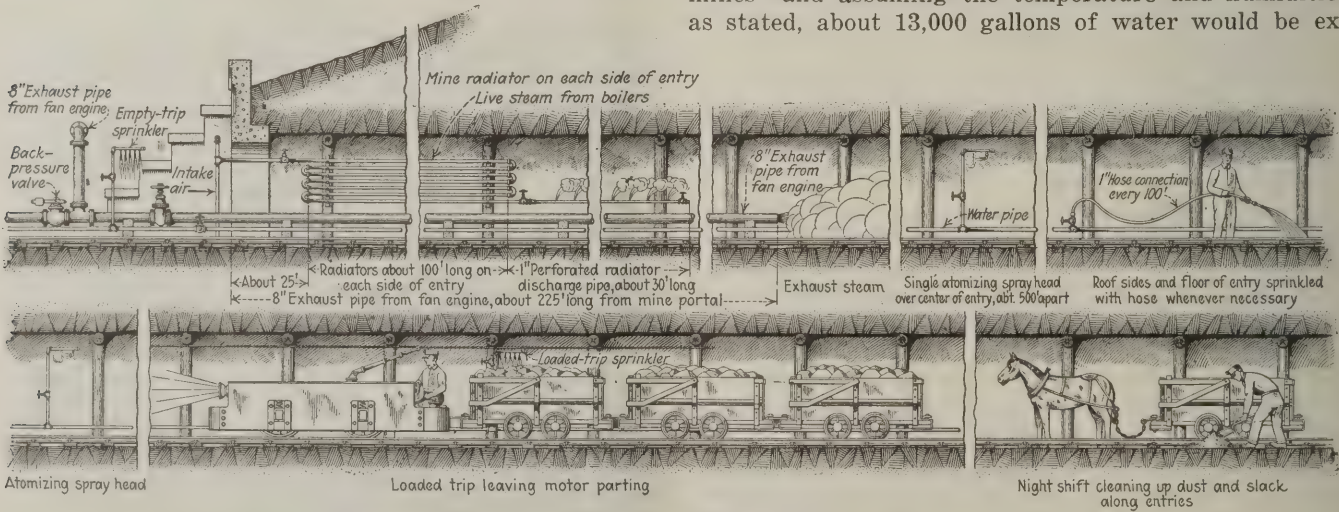
January	Temperature Degrees F.	Humidity Relative Per Cent
3	37	53
7	40	43
8	39	21
9	36	60
11	37	46
21	35	83
22	44	30

"The average temperature for the seven days was 38 deg. F., and the humidity 48 per cent. This means about two gallons of water was contained in each 100,000 cu.ft. of air. Readings in the return air during the same periods were as in Table II.

TABLE II—TEMPERATURES AND HUMIDITIES OF RETURN AIR FROM MINE

January	Temperature, Degrees F.	Humidity Relative Per Cent
3	65	100
7	62	100
8	61	100
9	65	100
11	65	100
21	66	100
22	60	100
Average	63 F.	

"At this temperature and humidity, about eleven gallons of water are contained in every 100,000 cubic feet of air. Assuming that this quantity passes per minute—about the average quantity at each of our mines—and assuming the temperature and humidities as stated, about 13,000 gallons of water would be ex-



Absence of Water in a Mine Is as Distressing as an Excess of It

These drawings represent what is done in Colorado Fuel & Iron Co.'s mines from slope mouth to side entry to reduce the ever-present danger of dust explosion. An even temperature of intake air is maintained by coils through which live steam

passes to be vented into the air stream 100 ft. inby from the air intake. Low-pressure steam from the fan engine exhausts into the air stream about 125 ft. further in. The mine is watered on the entries by atomizing sprays every 500 ft.

Roof, ribs and roadways are washed down frequently from hose connections every 100 ft. Loads are sprinkled on the way out and empties on the way in. Lastly, night men clean up slack dropped along haulage ways.

tracted from the mine each 24 hours. If no vapor is applied artificially, the under-saturated intake air must get its moisture from the dust on the walls, roof and floor of the mine, and the drier the dust is, the more it is to be feared.

“What we try to do is to heat the air at the mouth of the mine to the required temperature and give it all the moisture it can carry, before it proceeds on its way through the mine. In many cases, we raise it to a temperature higher than the mean temperature of the workings, so that its moisture will be deposited on the walls, roof and floor. By the application of plenty of water under a strong pressure on the roof, sides and roadways, the dust is moistened so that it will ball in the hand. We believe that dust thus thoroughly wetted will not propagate an explosion.

AIR PREHEATED BEFORE IT IS HUMIDIFIED

“The system practiced by the Colorado Fuel and Iron Co. for wetting the mines and humidifying the air begins by a method of preheating the air to the mine temperature and humidifying it. Radiators consisting of 1-, 2- or, even in rare cases, 4-in. pipes are lined along each side of the intake air course. Coils are oftentimes placed along the roof also. These are from 75 to 125 ft. long, according to the radiation desired. They are usually heated by live steam.

“The exhaust steam from the fan engine is carried into the intake air course, preferably a short distance beyond the radiators. This not only supplies vapor to the air but assists in raising its temperature. This steam is supplemented by fine sprays placed along the entry at intervals from 25 to 500 ft. depending upon conditions.

“The second precaution we take is to load up fine slack and dust along the roadways, and the third is to sprinkle profusely. Different types of cars distribute fine slack along the roadways, which is ground up by the traffic of men, mules and cars. This coal is loaded out at convenient times and the entire entry sprinkled by hose under a water pressure of 50 to 75 lb. With valves every 125 ft. one man, carrying 25 ft. of hose, can sprinkle 4,500 ft. of entry in an 8-hour shift.

“Each string of empty cars is thoroughly sprinkled by a heavy spray on each inbound trip from the tippie. This prevents the dust from the cars being picked up by the air current or sifting out through the cracks onto the roadway. Every trip of loaded cars is likewise sprinkled when leaving the partings.

“The average quantity of water applied per day, at each mine exclusive of exhaust steam is shown in Table III.

TABLE III—WATER SUPPLIED FOR HUMIDIFICATION OF MINE	
	Gallons
7 hours sprinkling by hose at 25 gallons per minute.....	10,500
20 fine sprays working 4 hours per day at 3 gallons per minute.....	14,400
Water sprayed on trips at partings.....	500
Total.....	25,400

“Our company installed during 1922, over 72,000 ft. of sprinkling lines of 1-, 2-, and 4-in. diameter in seven coking-coal mines of Las Animas County. The extensions for the year 1923 were: 20,980 ft. of 1-in., 27,279 ft. of 2-in., 120 ft. of 3-in., 5,665 ft. of 4-in. pipe; besides 1,749 ft. of ½-in. and 1,444 ft. of ¾-in. pipe, making a total of 57,237 ft. of pipe of all sizes.

“The cost of labor and supplies for humidification and sprinkling for the year 1923 at seven plants totaled \$34,400 or 0.021 cents per ton of coal mined.”

The Miner’s Torch

Oh, Doctor! Doctor!

A COMPANY attorney finds in trying a case that the testimony of a company physician has little weight with a jury, and he warns all of the operating officials to profit by the experience and not let the company officials get too close to the doctor.

A camp physician who has the reputation among the men of rushing all of his patients back on the job, especially when these men are drawing sick benefits, moves yearly if his job happens to be one where an annual election is the basis of his contract.

Occasionally, we find camp physicians who could qualify as politicians of the first rank; if they would confine their efforts to keeping the men lined up for the yearly election, all would be well but unfortunately, they are sometimes induced to exert leadership that conflicts with the authority of company officials, and then things begin to happen.

We have considered a few of the “hands off” arguments about the company doctor. Now forget these and look at the matter from another angle.

If an employee is injured, and for lack of proper medical attention, loses two months’ work when he should have been back on the job in two weeks, his employers may have suffered a greater financial loss than the employee’s family, even though he did not receive accident insurance or any other kind of compensation. All well regulated companies keep a stock of repair parts on hand to take care of breakdown jobs and for the same reason have understudies, as it were, to take the places of men disabled by accident. But keeping a stock of repair parts up to date is quite a simple matter in contrast to having efficient trained men on hand—men ready to take the place of anyone suddenly disabled.

The contrast can be carried still farther. A piece of machinery generally has its maximum value the day it is put to work, and beginning with that day, it deteriorates in value daily until it is finally discarded. A human machine renders minimum service to a company the day it is put on the job and if it is a normal human it becomes more and more efficient day by day and does not reach its maximum for many years.

Some of our mining companies have been slow to realize the advisability of co-operating with the camp physician; the facilities offered some of these physicians in comparison with the facilities possessed by the average cross roads veterinarian. I have seen offices designated “Doctor’s Office” that would inventory something like this: one cot, three chairs, one water bucket, one first-aid cabinet, size 2 ft. by 1 ft. by 6 in. I almost overlooked the “Safety First” calendar.

DOWNWARD TREND UNDER SOVIET RULE.—In 1917, the Donetz District in Russia produced 27,365,000 tons of coal. In 1918, the production under the chaotic conditions fell to 9,765,000 tons. In 1920 under Sovietism, the output had fallen to 5,017,000 tons, but in 1921, a slight improvement was noted, the production being 6,408,000 tons.

Accidents Add Four per Cent To Operating Cost*

To Losses for Compensation Must Be Added Those for
Delay in Operation, Decline of Morale
and Labor Turnover

BY SUB-COMMITTEE ON EDUCATION

Industrial Relations Committee
American Institute of Mining and Metallurgical Engineers†

TAKEN solely as a matter of dollars, the cost of accidents in mining in the United States, and, therefore, the cost to the individual mining company, is larger than any item on the books excepting direct labor payroll. Practically every mining state, within the past eight years, has introduced some form of workmen's compensation insurance. Of these states, the recent report of the U. S. Coal Commission says, "Competitive insurance under state control, as in Pennsylvania, with schedule and experience rating to evaluate individual mine hazards has given the best results from a safety viewpoint. Furthermore, Pennsylvania, of all the mining states, has the most complete information and analysis of its mine accidents. Therefore, the accident experience of Pennsylvania will be taken as a basis for the statements in this report.

The present basis of rates for compensation insurance under the Act, in the bituminous mines of Pennsylvania is \$2.35 per \$100 of payroll. Estimating payroll as 70 per cent of the total cost of operation, 1.65 per cent of the cost of operation is for accident insurance. In cases of substandard conditions at a mine, the rate may be as high as \$3 per \$100 of payroll and thus 2.1 per cent of the total cost of operation. In cases where most of the substandard conditions have been removed and the accident frequency reduced, the rate has been as low as \$1.30 per \$100 of payroll, or 0.91 per cent of the total cost of operation. The difference in cost between these extremes at a mine employing 500 men would be about \$17,000 per year.

LOWEST ACCIDENT RATE IS IN PENNSYLVANIA

The bituminous mines of Pennsylvania have the lowest accident rate of any group of coal mines in the United States, and probably lower than any group of metal mines. In consequence, the direct cost of compensation insurance is higher in most other districts. The insurance covers, however, only deaths by accident, and injuries where the man is disabled for more than ten days.

Statistically, of 151,022 full-time 2,000-hr. workers employed in the bituminous industry of Pennsylvania, taking an average of the years 1918 to 1922, inclusive, 414 per year were killed and approximately 10,446 injured severely enough to receive compensation. The average time lost by these temporary compensable accidents was 86.2 days, or a loss per year of 899,958 man-days. This means 3,600 men supported constantly who are doing no work.

Non-compensable cases reported are 14,833 per year with an average time loss of 4½ days or a total loss of 66,749 man-days, or 267 men supported constantly from this cause who are doing no work. The medical

fees alone for these non-compensable cases amount to \$9 per case, or a total of \$133,000 per year. Summarized briefly, one out of every five men in the industry is disabled through accident for some time during the year, and each accident is a potential fatality.

When a man is injured at a mine the work, invariably stops. If the man is killed, work usually stops for the day, and oftentimes for the day of the funeral. In any and every case hoisting and output is delayed until the injured man is out of the mine. Every company or contract man underground stops to discuss the affair with his neighbor, and the morale of the mine is broken for that day. Not less than one three-hundred and sixty-fifth part of the total yearly overhead of the mine must therefore be charged to any accident that interrupts production for a day, or with a proportionate amount for interference with production for part of a day. This is a minimum estimate because it is often several days before the direct thought of the accident has worn off and the fellow workers are back to their usual efficiency.

EFFECT OF MINE ACCIDENTS IS GENERAL

Every accident means breaking a new man into the job. Our efficiency friends have estimated variously this direct cost to the industry. It depends, of course, on the importance of the job. For example, if the man injured is a motorman, it is several days before trips are coming out of his section of the mine with the speed and regularity attained by him before injury. Oft times, the new man derails cars or burns out motors, and is directly responsible for additional accidents. Thus the chain of interference may reach to every part of the mine. Even in cases of accident to the contract miner, the effect underground is more general than first thought would indicate.

The indirect effects of accidents are important. They cause discontent among the men and strain the relations between them and the company officials. These are a real though intangible part of the cost. The high accident rate at mines is an important factor in causing employees to demand a high wage rate.

We believe that the indirect costs of any accident to the mining company are at least equal to the direct cost of compensation insurance itself, making the total cost of an accident at least twice the compensation insurance rate. Roughly then, between 4 and 5 per cent. of the costs of running a mine are due to injuries and fatalities.

Surely, with accidents in English coal mines, that have greater natural hazards than we ordinarily find in this country, only about one-third as frequent as in American coal mines, there is opportunity for constructive prevention work and education in this country. The details to be applied to an average mine are yet to be devised. A saving of 2c. of operating costs per dollar on accidents is as real an engineering feat and as necessary as the saving of a like amount through proper haulage, hoisting or other ordinary conditions demanding engineering skill.

Up to the present time in this country, accident prevention at most mines has been a matter for the attention of officials too burdened with operating details to take the time and study necessary to build up a technique of accident-prevention work. No prescription can be made for the average mine in the matter of mine accidents until the accident experience for large groups of similar mines has been tabulated and diagnosed.

*Report of Sub-Committee on Education at Annual Meeting of American Institute of Mining and Metallurgical Engineers held Feb. 18, 1924, in New York City.

†Sub-committee consists of E. A. Holbrook, chairman; W. R. Chedsey, Rush N. Hosler, C. R. Hook and H. M. Wolfkin.

Investigation Determines Best Furnace for the Burning of Small Sizes of Anthracite*

Tests Made on Furnace Fired by Chain-Grate Stokers—Ignition Improved by Increasing Incandescent Surface of Brickwork—High Boiler Settings Provide More Time for Completion of Combustion

By A. R. MUMFORD†
New York City

TO ASCERTAIN how different features of furnace design influence the combustion efficiency of small size anthracite, a series of tests was recently conducted by our company on a four-drum water-tube boiler, twenty-nine and thirty tubes wide and sixteen tubes high, having 10,000 sq.ft. of heating surface, and fired by two chain-grate stokers. In this boiler the gases cross the tubes three times and are deflected by baffles of the usual type.

A section through the center line of one of the stokers is shown as a background in all figures. Beneath the grate are four separate air chambers to which air is supplied through three wind boxes from a main air duct. For our purposes we will consider the grates divided into four sections, one over each air chamber. Each wind box is equipped with slide dampers to control the air pressure under the section of the grate above the corresponding air chamber.

The fourth chamber is divided by two vertical partitions into three compartments, each controlled by a damper, so that if a hole appears in the fuel bed, the damper to the lateral compartment under the hole can be closed to prevent too much air from entering the furnace.

Two Coxe chain-grate stokers under each boiler are placed side by side and operated by means of separate controls. A center wall separates the stokers and extends to within two-thirds of the distance from the front of the furnace to the bridge wall. This center wall is racked back from the bottom, near the bridge wall, to a curtain wall at the front. The curtain wall extends from the top of the front arch to the bottom of the front water leg.

IDEAL STOKER BURNS ALL COMBUSTIBLE MATTER

The front arch is a sprung arch 10 ft. long, extending from the ignition arch to about 8 ft. from the bridge wall. The bridge wall rises vertically from the floor level to the boiler tubes and is joined to the first baffle. Coal is fed to each stoker through separate chutes, and the initial thickness of the fuel bed is controlled by the ordinary coal gates.

The function of the stoker is to carry coal into the furnace, remove the refuse from the furnace, and supply air to the fuel. By adjusting the pressures in the separate air chambers, air is furnished to the fuel in the required quantity so that, with the ideal stoker, all of the combustible matter in the fuel is gasified and only the incombustible matter passes over the end of the stoker to the ashpit.

The function of the furnace is to raise the temperature of the green coal entering on the grate to the igni-

tion point and to mix the gases, rich in combustible, from one section of the stoker with oxygen from another section so that the gases may be burnt completely before they reach the boiler. If a furnace does not afford means for completely burning the gases with a reasonable quantity of air before they reach the boiler, its design is imperfect. The quantity of combustible gas and excess air present in the gases as they reach the boiler shows how well the furnace performs the mixing function; and the ability to maintain ignition at different ratings shows how well the furnace ignites the gases.

LOSSES APPARENT WITH ORDINARY OPERATION

Observation of the ordinary operation of the boiler, furnaces, and stokers in the plant on which the studies were made indicated that losses existed because of the large quantity of combustible in the ash, because of high flue-gas temperature, and because of the presence of carbon monoxide in the flue gases. The loss due to combustible in the ash was high, partly because it was necessary to carry long fires to attain the required steam output and partly because particles of solid combustible were blown from the front of the grate and carried in suspension by the gases until the end of the stoker was reached, when the particles settled out of the gases and fell to the ashpit.

The high flue-gas temperature was due to the combustion of carbon monoxide in the boiler. It is evident that any combustion which occurs after the gases have reached the boiler will result in a higher flue-gas temperature, because the further away from the furnace that combustion takes place, the less the boiler heating

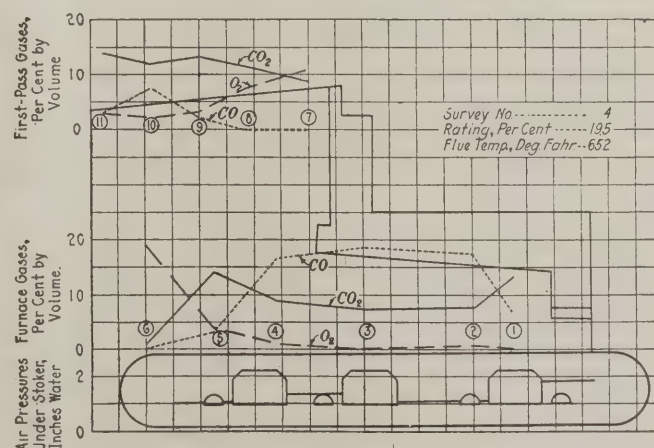


Fig. 1—Normal Operation with Low Arch

Immediately over the fuel bed at the front of the furnace there is little or no oxygen but much combustible gas. The fuel is being divested of its water vapor, and is ignited only near the surface. Consequently the air is not in contact with incandescent carbon long enough to use up all the oxygen.

*Paper presented at meeting of the American Society of Mechanical Engineers, Jan. 15, New York City.

†Fuel engineer, New York Steam Corporation.

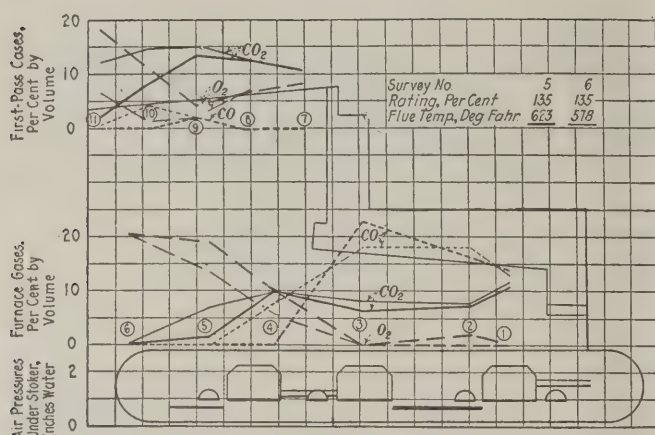


Fig. 2—Effect of Increasing Air Pressure in Last Air Chamber

At the rear of the furnace the oxygen is much higher with the increased pressure. At the entrance to the front pass the effect of increased air supply is quite evident. The gas composition did not change materially at the front of the furnace.

surface available for the absorption of the heat thus generated. The loss due to carbon monoxide in the flue gases and that due to high flue temperatures evidently were caused by the imperfect mixing of the gases in the furnace. Thus, to improve the operation of the plant, it was necessary to decrease the loss due to solid combustible carried in suspension by the gases, to burn out the refuse on the grates more completely, and to mix air with the combustible gases so that they would be completely burned in the furnace and away from the boiler.

In order to learn how the mixing action of the furnace might be improved and to outline accurately the path of the gases through the furnace, simultaneous samples of the gases in the furnace were collected at eleven points. Six of these points were on a horizontal line about 6 in. above the fuel bed and five on a horizontal line just below the boiler tubes. The flue gases were sampled simultaneously by means of a special sampling tube which drew gas from the whole width of the uptake.

The temperature of the flue gases was measured by copper-constantan thermocouples inserted in the openings between the drums just below the uptake. In order to eliminate any error from momentary changes in the fuel bed, the gas samples were collected over a period of twenty minutes. During this interval the flue-gas temperatures and the air pressures under the stokers were noted every five minutes.

COMBUSTION UNDER NORMAL CONDITIONS

The results of some of the studies of the furnace gases are plotted on charts, Figs. 1 to 7, inclusive. The holes through which the sampling tubes were inserted into the furnace are indicated by small circles inclosing identifying numbers. The composition of the gases at each point is plotted on the vertical line immediately above each sampling hole. The pressure of air in each of the four air chambers is represented by a horizontal line drawn across each section. In some diagrams, for the purpose of ready comparison, two sets of analyses are reported on the same chart and a heavier line is used for one of the sets in order to distinguish between them. The background of each chart is an outline drawing of the furnace and stoker during the study shown.

Fig. 1 shows the composition of the furnace gases under normal operating conditions. A study of the curves in this figure shows that immediately over the

fuel bed at the front half of the furnace, little or no oxygen is present and much combustible gas. At the rear half of the furnace much oxygen is present and little or no combustible gas. In the first pass more oxygen is present near the curtain wall than near the bridge wall, and conversely no combustible gas is present near the curtain wall although a rather large quantity is present near the bridge wall. A study of these and other analyses enables us to trace the progress of combustion on the grates and in the furnace.

As the coal falls on the moving grate it is brought slowly forward and exposed to radiation from the furnace brickwork, and at nearly the same time it passes over the first air chamber in which the greatest air pressure is carried. The radiation evaporates the surface moisture in the coal, and the air forced through the fuel bed by the pressure in the first air chamber carries the water vapor into the furnace. After the coal is dried, its temperature is raised to the point of ignition by further radiation. Ignition occurs first of all at the upper surface of the fuel bed, and the air passing through the layer of coal unites with the ignited coal and combustion begins. The rise in temperature caused by this combustion at the surface is communicated to the lower layers of the coal by conduction, and these lower layers then ignite and burn. After the coal is completely ignited in this manner, combustion of the whole fuel bed continues until no combustible is left on the grates. From the point in the travel of the grate where ignition is complete to the point of dumping, the combustible content of the fuel bed decreases steadily and the proportion of incombustible matter increases correspondingly. The influence of these changes in the combustion of the fuel bed on the products of combustion is exceedingly important in the design of a furnace.

EVAPORATION OF MOISTURE AND ITS REMOVAL

The first change in the fuel bed is the evaporation and removal of the surface moisture, and as this change is not a chemical reaction it has no influence on the oxygen content of the air. The second change is the distillation of the volatile matter and the ignition and combustion of the surface layer of the fuel bed. At this point some free oxygen is present above the fuel bed and little or no combustible gas, because the layer of burning coal is so thin that the air is not in contact with incandescent carbon long enough to use up all the oxygen.

As the fuel bed becomes fully ignited the oxygen in the air passing through the fuel is completely used up in the lower layers where it gasifies carbon and forms carbon dioxide. As this dioxide passes through the upper layers of incandescent fuel some of it is reduced to carbon monoxide by contact with carbon. Fully one-third of the length of the grate is covered by the fuel undergoing this change, and consequently a large volume of combustible gas is formed. This action continues until the carbon or combustible content of the fuel bed is lowered sufficiently to allow carbon dioxide to pass through with little reduction of carbon monoxide.

The quantity of combustible on the grate diminishes rapidly from this point on, and more and more free oxygen passes through the fuel bed until no carbon dioxide or carbon monoxide is formed, and the gases rising from the grates consist solely of air. To summarize, free oxygen is present at the very front and at the rear, while in between a large quantity of com-

bustible gas is present. In order to burn the coal completely in the furnace these three streams of gas must be mixed.

EVIDENCE THAT GASES MIX ABOVE GRATES

The extent of the mixing action of the furnace on the stream of gas can be seen by the changes in composition of the gases which have taken place between the grate level and the point of entrance to the boiler. At points 7 and 8, Fig. 1, no carbon monoxide was ordinarily present under normal operating conditions. The burning out of carbon monoxide was probably due to the fact that the air from the front of the stoker passed along just under the main arch, mixing with the combustible gas and burning it. The presence of carbon monoxide at points 9, 10, and 11 indicates that insufficient air was introduced into the main stream of combustible gas.

The gaseous products of combustion evidently acquire considerable velocity as they pass under the front arch, because the gas stream could be seen to pass toward the rear of the furnace beyond the end of the main arch before turning to enter the boiler. The stream actually impinged on the bridge wall which with the stack draft changed its direction toward the heating surface of the boiler. The presence of the main gas stream nearer the bridge wall than the curtain wall is confirmed by the analyses of the gases entering the boiler and by pitot-tube measurements, which indicated that the velocity at points 9, 10, and 11 was four to six times that at points 7 and 8.

SPEEDING GRATE LETS IN MORE AIR AT FRONT

It was found that combustion at point 1 is more complete when the grate travels fast and this indicates that more air enters the furnace at the front. An increase in air entering at the front of the furnace can only take place through green coal, and if the thickness of the fuel bed and the pressure of air in the first air chamber are the same, then there must be a larger area of green coal exposed to the pressure in the first air chamber at higher grate speeds to account for the more complete combustion at point 1.

In other words, as the grate travels faster, ignition takes place later. To check these deductions, the air pressure in the first chamber was reduced while the grate was moved at maximum speed, and it was found that the gas composition at point 1 was then the same

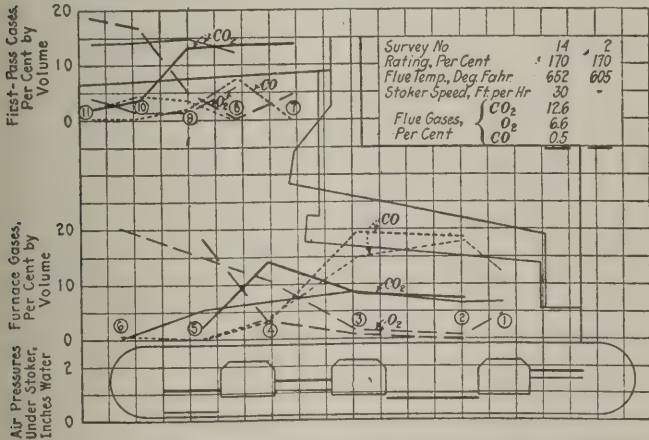


Fig. 3—Effect of Raising the Front Arch

This arrangement effected a reduction in the quantity of carbon dioxide and an increase in the quantity of oxygen showing the gas composition was not favorable to the high arch. There was little change in the quantity of combustible gas reaching the boiler.

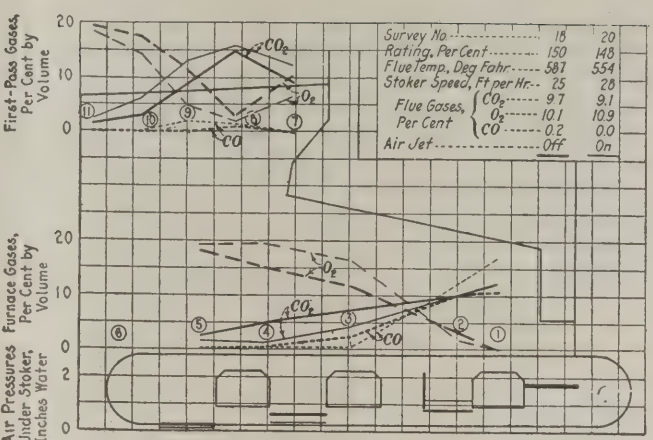


Fig. 4—Effect of Air Jet with Partition in No. 2 Air Chamber

The air jet reduced the quantity of carbon monoxide in the gases reaching the boiler, but it accomplished this with a large increase of excess air. The effect of an air jet in burning out carbon monoxide seems to be balanced by an increase in flue gas due to excess air, so that little real benefit is derived from the use of such a jet.

as at lower speeds. It was also found that the air from the front was responsible for the complete combustion of carbon monoxide by the time the gases reached points 7 and 8 for, with the reduced air pressure in the first air chamber, carbon monoxide was found at points 7 and 8. To circumvent the later ignition at higher grate speeds, radiation to the green coal must be increased by an increase in the area of radiating surface or by removing the obstruction caused by a thick ignition arch.

A study of the normal operating conditions indicates three possibilities for improvement. If the velocity of the gases as they pass under the front arch can be reduced materially, the number of particles of solid combustible carried to the rear of the stoker will be reduced. The obvious method of decreasing the gas velocity is to increase the cross-sectional area of the furnace under the front arch by building a higher arch. If this should improve combustion at the same time, because of the resulting increase in combustion space, it will be beneficial in solving two of the difficulties.

In order to burn out the combustible on the grates more completely, more air must be forced through the fuel bed on the last stoker section, with the single qualification that it must be possible to mix the additional air with the gases so as to complete the combustion in the furnace. In other words, it must be used so as to avoid losses due to excess air.

It might be advisable to introduce air into the furnace through jets under pressure in order to complete combustion in the furnace. All of these possibilities were tried and the results are shown in the following paragraphs.

INCREASED AIR AT REAR UNDESIRABLE

In order to study the effect of adding more air by increasing the pressure in the last air chamber, a set of samples was collected with no change other than the increase in pressure mentioned. The results are given in Fig. 2. The light lines indicate normal operation and the heavy lines indicate the effect of the additional air introduced through the refuse at the end of the stoker.

The results show that immediately above the fuel bed the gas composition did not change appreciably at the front of the furnace, but at the rear the oxygen is much

higher with the higher pressure. At the entrance to the first pass the effect of the increased air supply is very evident. The gas composition at points 7 and 8 is essentially the same for both trials. At point 9 there is evidence of a slight affect of the additional air, while at points 10 and 11 the rapid fall of the carbon-dioxide curve and the rise of the oxygen curve show that the additional air affected the gases passing these points materially. It is true that carbon monoxide was reduced, but the reduction in carbon dioxide and increase in oxygen showed the method to be impractical.

RAISING MAIN ARCH NOT RECOMMENDED

In an attempt to reduce the loss from particles of solid combustible blown from the front of the grate and carried to the ashpit, the main arch was raised to the level shown in the background in Fig. 3. The arch was raised 1 ft. at the front and 2 ft. at the rear, thus

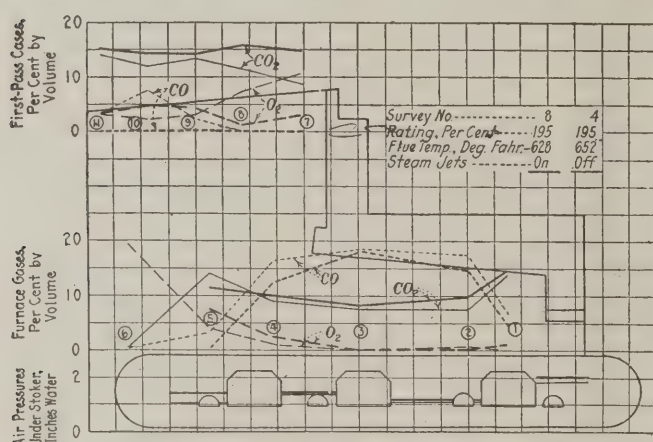


Fig. 5—Effect of Steam Jets with Low Front Arch

The air rising through the refuse is forced forward by action of the steam jets and mixed with the main gas stream. Thus the oxygen in this air is brought in contact with the combustible gas and combined with it burning the carbon monoxide and increasing the carbon dioxide. In the first pass the former is entirely eliminated.

increasing the cross-sectional area at the rear by about 16 sq.ft. and by about 8 sq.ft. at the front. This is somewhat greater than a 50 per cent increase at the end nearest the bridge wall, and ought to reduce the mean horizontal velocity by the same proportion.

The composition of the gases over the fuel bed and entering the boiler are shown by the heavy lines in Fig. 3. In this figure the background shows the two heights of arches. The light lines show the composition of the gases with the low arch, and the heavy lines indicate the gas composition with the high arch.

If raising the front arch is to improve combustion, the percentage of carbon dioxide found in the gases entering the boiler must be higher and that of carbon monoxide lower than with a low arch. It was impossible to determine exactly what weight to give the analyses at the various points, but if we assume that the points apparently in the main gas stream should be weighted according to the rough measurements of velocity that were made, points 9, 10, and 11 would have a weight of four to a weight of one for points 7 and 8, with the low arch in service. With the high arch, points 7, 8, and 9 would have a weight of four and points 10 and 11 a weight of one. Using the foregoing approximation the average composition of the gases entering the boiler shown in Fig. 3 is as follows:

	CO ₂	O ₂	CO	N ₂
With low arch, per cent.....	13.8	2.9	2.9	80.4
With high arch, per cent.....	12.1	5.4	2.8	79.7

From this it is evident that there was little change in the quantity of combustible gas reaching the boiler, but that there was a reduction in the quantity of carbon dioxide and an increase of oxygen so that the gas composition was not favorable to the high arch.

It is evident that if more air were forced through the refuse it would rise directly to the boiler past points 10 and 11 without coming into contact with the main stream of gas at all. With the low arch such an increase in air supply raised the excess of air, but with a high arch the effect would probably be worse in that none of the combustible gas would be eliminated by the accompanying increase of excess air.

The changes in the composition of the gases over the fuel bed were evidently not due to the change in arches.

In general as the raising of the front arch did not reduce the horizontal velocity of the gases sufficiently to stop the loss due to particles of solid combustible dropped from the gases to the ashpit, and as the composition of the gases entering the boiler was not improved, this change was not the most desirable.

No. 2 air chamber is that space under the grates between the first and second wind boxes. The distance between the sides of these two wind boxes, in the direction of the movement of the grate, is nearly twice the distance between wind boxes 2 and 3.

A partition was installed in each of the stokers of the boiler on which the investigations were made and is indicated by the vertical line in No. 2 section on the background of Fig. 4. The composition of the furnace gases at the several points is shown by the light lines in this figure, and, at low rating, the shortness of the fire is clearly shown. Because the carbon monoxide formed at the front of the fire had to pass under the front arch for a considerable distance before rising to the boiler and because oxygen was present in the gases below the arch, due to the short fire, there was somewhat less carbon monoxide in the gases entering the boiler. At the same time the greater quantity of oxygen passing through the fuel bed raised the excess air in the flue gases somewhat as shown by a comparison of the flue-gas composition for survey 14 (Fig. 3) and survey 18 (Fig. 4) at nearly the same rating.

AIR JET NEAR FRONT ARCH SHOULD BE OMITTED

The heavy lines in Fig. 4 show the effect of an air jet on combustion. The air jet was introduced through the side wall of the furnace about a foot below the end of the front arch and was supplied with air from a railway-type compressor which gave a pressure of about 25 lb. at the nozzle of the jet which was formed from a piece of ½-in. pipe. The differences in the composition of the gases over the fuel bed were caused by slight differences in the lengths of the fire.

As shown in Fig. 4, the oxygen at points 7 to 11, inclusive, was higher with the air jet in service and the carbon dioxide and carbon monoxide were lower. Thus the air jet reduced the quantity of carbon monoxide in the gases entering the boiler, but it accomplished this with a substantial increase in excess air.

At high ratings also, a reduction in the quantity of carbon monoxide in the gases entering the boiler took place accompanied, as at low ratings, with a decrease in carbon dioxide and an increase in oxygen when the air jet was in service.

The effect of an air jet in burning out carbon monoxide seems to be balanced by an increase in flue-gas loss due to excess air, so that little real benefit is

derived from the use of such a jet. In addition, it is illogical to provide an air supply above the fire if air can be forced through the refuse and properly mixed with the combustible gases. That the logical place for the admission of any air necessary for combustion is through the refuse is evident from the fact that air entering the furnace in such a manner must gasify some carbon and so reduce the loss due to combustible in the refuse.

STEAM JETS USED TO SIMULATE REAR ARCH

In order to simulate the action of a rear arch without waiting for its construction, a system of steam jets was introduced across the stoker at point 6 at the rear of the furnace. The steam jets were constructed by inserting sixteen 1/2-in. pipe nipples into a 1-in. pipe 8 ft. 8 in. long, and it was assumed that they would give an indication of the probable effect of directing the air rising through the refuse toward the front of the furnace where the necessity for such air has been shown.

The effect of the steam jets with the low arch in service is shown in Fig. 5. In this figure the light lines indicate the gas composition under normal operation and the heavy lines the composition with the steam jets in service. The combustion of the coal on the grates is, of course, unaffected by the steam jets. In the first pass, however, the effect of the additional air and the mixing action of the jet is evident.

The air rising through the refuse is forced forward by the action of the steam jets and mixed with the main gas stream. The oxygen in this air is thus brought into contact with the combustible gas and combined with it, burning the carbon monoxide and increasing the carbon dioxide. The composition of the gases in the first pass shows that by the time the gases have reached the boiler tubes the carbon monoxide is entirely eliminated. The following table gives a comparison of the two sets of analyses of the gases entering the boiler by means of averages weighted as formerly.

	CO ₂	O ₂	CO	N ₂
With steam jets, per cent.	14.8	4.0	0.1	81.1
Without steam jets, per cent.	12.7	3.7	3.7	79.9

From these results it is evident that steam jets gave the greatest improvement of any change discussed thus far.

BEST CONDITION FOR USE OF REAR ARCH

Because some of the arches in the boilers at the plant had been raised, it was desirable to learn the relative effect of steam jets on the combustion in a high-arch boiler. The curves in Fig. 6 show the results of an investigation on a high-arch boiler with and without steam jets. The heavy lines indicate the composition with the steam jets in service and the light lines the composition under normal operating conditions. The following tabulation gives a comparison of the weighted averages of the gas composition.

	CO ₂	O ₂	CO	N ₂
With steam jets, per cent.	12.4	6.6	0.5	80.5
Without steam jets, per cent.	13.0	4.5	2.2	80.3

It is evident, therefore, that steam jets—used to simulate a rear arch—were effective with a high arch but not as effective as with a low arch. This fact is of importance in deciding the best arch arrangement over a chain-grate stoker burning small sizes of anthracite.

To confirm the conclusions drawn from the action of steam jets a Detrick flat-suspended arch was installed in the rear of a low-arch furnace. The rear arch was

suspended 10 in. above the grate and extended 5 ft. forward from the bridge wall. The boiler was operated for several days at ratings varying between 250 and 270 per cent in order to learn the ability of the arch to withstand the heat of the furnace before a study of the furnace gases was undertaken.

During this period the dropping of particles of solid combustible matter from the gases to the ashpit stopped completely; this material dropped to the roof of the suspended arch instead and seemed to burn out, leaving a layer of ash which increased in thickness until it flowed slowly toward the grates, forming “whiskers” on the nose of the arch. The nose itself was brilliantly incandescent, although a layer of clear gas from the last stoker section seemed to cling to its surface. In rising to the boiler there seemed to be an expansion of the

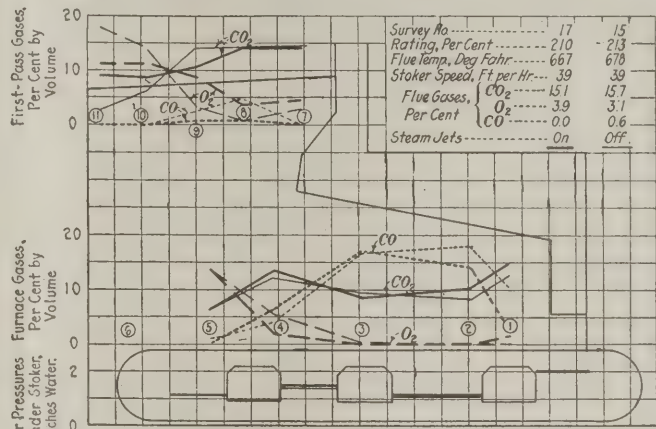


Fig. 6—Effect of Steam Jets with Raised Front Arch

The steam jets gave improved results. More carbon monoxide was burned to carbon dioxide. However, it is clear that the steam jets were not so effective with a high front arch as they were with one which was low. The weighted average of carbon monoxide was decreased only 1.7 per cent as against 3.6 per cent with a low front arch.

gas stream so that the whole width of the first pass was taken up by the gases entering the boiler.

The shape of the arch and its relation to the furnace is shown in Fig. 7. In this figure the results of a study of the furnace gases with the rear arch—heavy lines—are superimposed on those of a study of the furnace gases without the rear arch installed—light lines. Over the fuel bed the gas composition is different, although this is obviously not due wholly to the rear arch. The air pressure in No. 4 air chamber was maintained considerably higher with the rear arch in service and the refuse passing over the end of the stoker appeared well burnt out.

In the first pass the gas composition shows that the carbon dioxide is higher at all points and that the carbon monoxide is lower. The arithmetical averages of the gas composition show that without the rear arch about one-fifth of the carbon monoxide formed in the furnace entered the boiler and that with the rear arch in service only one-twentieth. These facts indicate that the rear arch as installed greatly improved the mixing action of the furnace.

The analysis of the flue gases shows a very favorable condition. The flue temperature shows a reduction of about 35 deg. F., which in itself is the equivalent of 1 per cent saving. The saving resulting from the favorable gas composition and apparent condition of the refuse cannot be estimated because no reliable figures are available for comparison. However, the plant records will eventually bring out the actual saving and

as the saving obtained by the operators is the true saving, this will be the criterion on which this form of furnace design will be judged.

The first function of a chain-grate-stoker furnace is to ignite the coal. Ignition is by radiation from incandescent brickwork to the green coal as it enters on the grate. Ignition can be improved mainly by increasing the area of incandescent surface and by decreasing the thickness of the ignition arch so that less coal will be in its shadow, or by both of these changes. It has already been pointed out that the nose of the rear arch became incandescent at high ratings and was hot at low ratings, and as this part of the arch faces toward the front of the furnace, radiation from it must be received by the green coal. Because the bridge wall never was heated above a dull red heat, the radiation from it to the green coal must have been less than from the nose of the rear arch, and therefore ignition was hastened by the addition of this form of arch.

The other function of the furnace is to mix the products of combustion so that the combustible gases from one part of the grate will be supplied with oxygen from another part and burned before they enter the boiler. The investigations reported here were made on a furnace of the Dutch-oven type and the indications are that some such type is necessary to produce mixing. Air and combustible gases are present at the front of the stoker and some arch over this section is necessary to force the two streams into contact.

Because the air entering the furnace at the front is generally insufficient to supply all the necessary oxygen, the combustible gases from the front must be forced to pass over the refuse section of the grate in order to come in contact with the free oxygen in the gases rising from this section. This action can be accomplished by placing the stoker completely under an arch and thus preventing any of the gas from entering the boiler until it has passed over the refuse section. This form of furnace would have obvious disadvantages from the standpoint of upkeep because intense gaseous combustion would probably take place over the refuse section and the arch would be subjected to the resulting high temperature at this point.

It is well, therefore, to shorten the main arch from this extreme length to a length that will permit the radiation to the boiler to cool the brickwork at the point where the most intense combustion will take place. If the front arch is shortened in this manner it will be

necessary to install a rear arch to prevent the gases from the refuse section from rising directly to the boiler and to force them to travel toward the front of the furnace far enough to insure their mixing with the main stream containing combustible gas.

The front arch should be low enough to insure the gases having such a velocity as will enable their momentum to carry them beyond the end of the front arch and over the rear arch to the bridge wall. Combustion under the front arch can be made more incomplete than normally, if advisable, by a decrease in the air supply at the front; and the necessary oxygen for the completion of combustion can be supplied by carrying high air pressures under the refuse section of the grates.

The details of the dimensions of such a furnace would vary with the height of the setting available, because the higher the setting the more time there will be available for the completion of combustion. Conversely, the lower a setting is the more effective must be the action of the mixing devices in order that combustion be completed before the gases reach the boiler. However, it seems necessary to utilize arches in the manner suggested, because by that means the gas streams from the front and rear of the stoker will give velocities in opposite directions such as will insure complete combustion of the gases within the furnace.

Bureau Seeks Way to Reduce Screenings

Coal mine operators in Illinois have requested the Department of the Interior to authorize the Central District Experiment Station of the Bureau of Mines, at Urbana, Ill., to conduct a study of the problem of reducing the proportion of screenings in the coal mined in that state. This is said to have become a quite acute problem with Illinois coal operators.

The market for Illinois coal is largely one for coal to be used in heating dwelling houses. The demand, therefore, is for the larger sizes. So acute is the situation that often there are hundreds of unbilled cars of screenings, but not one of lump. This problem of screens has been growing more intense since the plan of paying the miners for "run-of-mine" tonnage rather than for "screen coal" tonnage came into existence. While there are other factors involved one of the most important causes of this excess of screenings, according to the Bureau of Mines, is the method employed in the use of explosives.

Alaska Coal Field Making Haste Slowly

Plans for close co-operation between officials of the Alaskan Ry. and the U. S. Bureau of Mines, in all matters pertaining to mining along the railway belt have been developed. The arrangement is designed especially to facilitate the mine-rescue and first-aid service of the bureau. A distinct improvement in safety conditions in the coal mines of Alaska, particularly in the use of proper explosives and in providing adequate ventilation, is evident.

In the Matanuska coal field, the Evan Jones washery, put in operation in November, is delivering a satisfactory washed coal, for steam and domestic use in the towns of Juneau and Ketchikan. The ash content is reduced from 22 per cent to 14 per cent by washing, with an increase in heating value. After a prolonged shutdown, the Suntrana coal mine, in the Nenana field, is again operating.

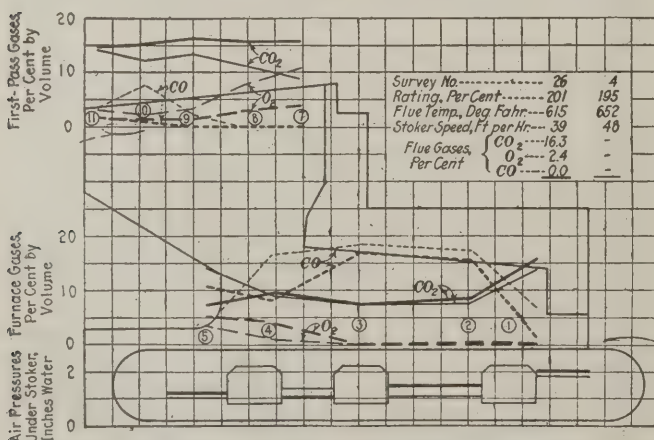


Fig. 7—Actual Effect of a Rear Arch

Analyses over the whole fuel bed showed marked improvements. The flue temperature showed a reduction of about 35 deg. F. The dropping of particles of solid combustible matter from the gases to the ashpit also stopped completely.

News Of the Industry

Mine Blast at Castlegate, Utah, Takes Heavy Toll of Lives

Hope of Finding Any of 173 Entombed Miners Alive Is Remote—Company Officials Reluctant to Assign Cause for Explosion—One of Rescuers Succumbs—All Fires Extinguished

Special Dispatch to Coal Age

A series of explosions in Mine No. 2, of the Utah Fuel Co., at Castlegate, Utah, at about 8:40 a.m., March 8, entombed 173 miners. Three successive blasts wrecked the mine portal shortly after 116 men had entered for the morning shifts. There were also 57 night men within the workings when the disaster occurred. The bodies of 58 victims had been recovered when this issue went to press, and hope of finding any of the others alive had almost been abandoned.

The force of the explosion blew out the bulkhead of the old entrance to the property and scattered debris covered the mountainside across the canyon with soot and slag for several hundred yards. For several hours following the explosion the gases and smoke so filled the canyon that it was stifling.

U. S. Bureau of Mines rescue cars were rushed to the scene, one from Dawson, N. M., and the other from Butte, Mont.

Early reports of havoc wrought by fire proved incorrect. It is declared that all fires have been extinguished. Work of the rescue teams have been speeded up, but is still slow owing to the distance bodies have to be carried. The mine evidently was literally riddled by the explosion and it is feared that those whom the blast did not kill were poisoned by the gases.

There is no way of determining where the first blast occurred because of the obstruction near the entrance. There are both 12 and 18 ft. entries to the bottom of the mine. About 40 per cent of the workers were in the dip end more than 7,000 ft. from the main portion and more than one mile from the entryway opening, which are the only two means of egress from the workings.

The company has four camps in all with 10 or 12 openings. It is impossible to say anything at present regarding the probable property damage. The fan has been started again. The explosions were so great that the debris thrown into the passage to the mine entrance was considerable, making the work of rescue exceedingly difficult. It is feared some days may elapse before the men or their dead bodies may be reached.

There were three or four explosions. The first was not sharp, it is stated. According to the townspeople it sounded like the tremble of thunder reverberating across the hills. Telephone and electric light poles, timber and pipes near the manway were blown across the valley, almost a mile in width, so tremendous was the force of the explosion. As further evidence of the impact, poles were splintered into kindling and boulders and pipes were scattered everywhere. The second explosion, one minute later blew the wall out of the fanhouse. The third explosion followed 20 minutes later, causing a cave-in. The office building of the company, 100 ft. away, was partly wrecked.

Offers of relief are coming in from state and national organizations and Governor Mabey has decided to issue a nationwide appeal for funds to be used for relief of the widows and dependents. Estimated dependents number 868 women and children. In addition to the relief fund it is estimated that each family will have \$5,000 from the workmen's compensation law.

Bureau of Mines officials have expressed the opinion that 72 hours is the minimum time it will take to remove the bodies from the mine. One of the victims is John Thorpe, general inspector for the company, who leaves a widow and five children.

Company officials are reluctant to express an opinion regarding the cause of the explosions. General Mine Superintendent Littlejohn said the mine was inspected and sprinkled as usual on Saturday morning and that at that time there was no indication of danger. So far the cause of the explosions appears to be a complete mystery. The mine was considered to be in first class condition by every one. The inquest is not expected to bring many facts to light as to the cause of the explosions, owing to the fact that hope of rescuing any of the victims alive is vanishing hourly.

No one, so far, seems to suspect any unlawful act on the part of an employee or other person. The men had been on short time, but a feeling of good will appeared to prevail and there is said to have been no agitation of any kind.

Castlegate Mine No. 2 of the Utah Fuel Co. has been the largest producer of that company for a long time. It was opened in 1912 and has been producing in excess of 1,500 tons a day. It was good for from 30 to 50 years more, it was stated at the chief offices of the company.

It is nearly 25 years since Utah had a mine disaster on anything like a scale such as that which befell her on March 8. On this occasion 200 men were suffocated by afterdamp. The tragedy occurred at Winterquarters, where the property also belonged to the Utah Fuel Co.

U. S. Supreme Court Upholds Kansas Industrial Court

In an opinion delivered March 11 the U. S. Supreme Court held in the case of August Dorchy that the provision of the Kansas Industrial Relations Court Act which prohibits strikes by coal miners must stand or fall on the decision of the Kansas courts. The decision of the lower federal court in issuing a writ of mandamus was reversed.

Justice Brandeis, delivering the opinion, said the Supreme Court could, if it desired, pass upon the validity of the section in question, but that it would rather leave that point to the state courts, and would accept their decision. He declared that the lower courts should not have passed upon the question.

Dorothy and Alexander Howat, district officials of the United Mine Workers, were indicted for calling a strike at the mine of the George K. Mackie Fuel Co. in Cherokee County, Kansas, and were convicted under the Kansas Industrial Relations Court Act, which designates coal mining as an essential industry affected with a public interest. They contended that a state could not arbitrarily make such a classification.

The state courts have held that application of the act to the mining industry was valid.

Central Pennsylvania Miners Convened at Altoona

Altoona, Pa., March 11.—The convention of United Mine Workers of District 2 (central Pennsylvania) was called to order at 10 a.m. today with President John Brophy in the chair. Mayor E. F. Gills made an address of welcome to the four hundred delegates present, after which President Brophy submitted a report reviewing his work during the last year. The convention probably will last all week and the miners' representatives will meet with the operators March 20.

Northern West Virginia Balks at Jacksonville Pact

A number of operators in northern West Virginia are outspoken in opposition to the Jacksonville agreement. As one operator expressed it, "the future of union mining in the county depends largely upon the attitude of the miners between now and March 31. Many operators contend that it is a foregone conclusion that the northern West Virginia field cannot accept the Jacksonville agreement and continue to operate. We will have to have a substantial readjustment of the scale or all of the union mines in the district will be shut down after March 31." There is already a considerable tonnage coming from mines operated on a non-union basis along the Monongahela R.R. and in other sections of northern West Virginia and the ranks of the non-union mines may be further augmented owing to the fact that the union mines may not be able to compete with the non-union mines owing to the lower scale of wages in effect at the latter.

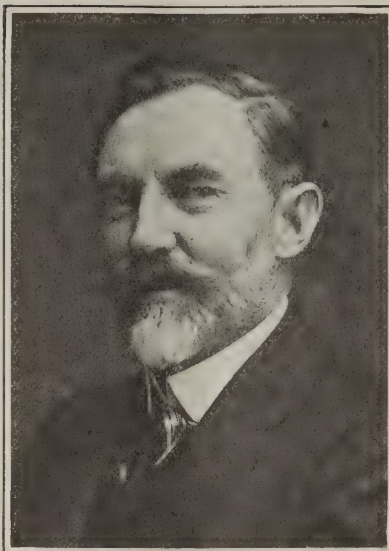
Negotiations have been initiated for a conference between officials of the Monongahela Coal Association and the Northern West Virginia Coal Operators' Association at which time preliminary steps will be taken looking to a joint conference of operators and miners, when the mine owners will ask for a concession in wages. Union representatives are not expected to make any concession inasmuch as they never have in district 17 deviated from the agreement made to cover the Central Competitive Field. Hence it seems probable that many northern West Virginia mines after March 31 will either be closed down or where mines are continued in operation it will be on a non-union basis and with a lower scale of wages prevailing.

To Hold National Parley on Uniform Cost Accounting

A national conference on the development of uniform cost accounting will be held at the Hotel Astor, New York City, on Tuesday and Wednesday, March 25 and 26, under the auspices of the Chamber of Commerce of the United States. Invitations are being sent to the representatives of the three hundred principal manufacturing industries of the country. It is expected that there will be a large attendance of association executives and others interested in cost-accounting activities.

On the morning of the first day executives from important industries getting good results from uniform cost accounting will tell about it and answer questions. The afternoon will be devoted to the exchange of experiences as to "The First Steps in Cost Accounting in a Trade Association—How to Arouse Interest."

The second day will be devoted to the more advanced problems, among which will be considered "The Service of the Cost Accounting Committee in Developing Uniform Methods." In the afternoon attention will be given to "How to Get the Uniform System Into Use by the Members of the Industry."



William Newton Logan

Dr. Logan, who is State Geologist of Indiana, has been made a fellow of the Royal Society of Arts, London, in recognition of his work in geological science.

Pittsburgh Coal Co. Has Big Year; Earns \$7,309,162

The Pittsburgh Coal Co. earned \$7,309,162.31 in 1923, after full charges for interest, depletion and depreciation, but subject to federal income tax, according to the annual report of the company, issued March 10. Gross receipts were \$63,069,472 and operating expenses were \$51,710,916. The available working capital of the company at the end of the year, exclusive of U. S. Government bonds and other securities owned, was \$18,528,767.23, a net increase during the year of \$339,043.56.

The company and its subsidiaries produced 13,915,588 tons of bituminous coal last year. Of this, 12,531,575 tons was from mines in the Pittsburgh district, 1,152,061 from mines in Ohio and 241,952 tons from its mine in eastern Kentucky. This is the largest output by the company since 1919, representing an increase of more than 100 per cent over 1922, when operations were suspended for five months by the strike.

The company had 64 mine plants at the beginning of the year and 11 additional mines were acquired with the Great Lakes Coal Mining Co., bringing the total to 75, of which 1 was sold and 2 were not in commission. Of the total in commission, 64 were operated all or part of the year, 5 were idle and 3 were leased. In the Pittsburgh district the mines in operation in the first half of the year numbered 46; in July and August, 45; in September and October, 44; in November, 36, and in December, 27.

Declare Claim Not Justified

Since 1916 the Myers-Whaley shoveling and loading machines have been made in a completely equipped plant devoted exclusively to their manufacture. Mr. William Whaley, the general manager, in a letter of March 4 draws attention to that fact in correction of a similar claim made by another company which appeared on page 327 of *Coal Age* of Feb. 28.

Treadway Scores Pinchot for Anthracite Settlement

Governor Pinchot of Pennsylvania is severely criticized for intervening in the anthracite strike in a letter to him made public in Washington, D. C., March 5 by Representative Treadway of Massachusetts. Referring to a brochure issued by Governor Pinchot, Representatives Treadway in his letter, says:

"You endeavor to justify the agreement you entered into on Aug. 27 last, whereby there was an increase of 10 per cent in wages of miners, and point out that this should not have led to any increase in cost to the consumer. As a matter of fact, you no doubt are well aware that it has resulted in an increase of 75c. to \$1 per ton to all consumers in New England. At the annual meeting of the United Mine Workers in Indianapolis a few weeks ago, Mr. Lewis, the president, stated that the wages of the miners had been increased by \$44,000,000 as a result of this adjustment, which laid a direct toll on the consuming public.

"It is surprising that you should defend the anthracite tax in your state. You say the repeal of this tax was before the Legislature of 1923, but failed to pass. Why do you not state the reason for its failure to pass, namely, your personal influence in opposition to it, even though your campaign committees published flaring advertisements of your support of repeal?

"Your argument of the small amount of this tax is a very weak one. In the aggregate it adds from \$8,000,000 to \$10,000,000 of expense to the coal-consuming public in order to care for, as it has been stated, deficiencies in the appropriations of your state."

Hero Medals to Four Miners, Including Jones, Who Died

Four coal miners whose acts stood out prominently in last year's mine disasters are to receive hero medals and diplomas on the recommendation of the Joseph A. Holmes Safety Association. One of the awards will be made posthumously. The medals and diplomas will be presented at the Seventh International First Aid and Mine-Rescue Contest at Huntington, W. Va., Sept. 11.

The miners and the deeds for which the awards are to be made follow:

Mike Pavlisin and Clifford Phillips of Frontier, Wyo., who, by "prompt and courageous action," saved the lives of twenty-one fellow miners after an explosion in the Frontier No. 1 Mine of the Kemmerer Coal Co., Kemmerer, Wyo., on Aug. 14, 1923, which resulted in the death of ninety-nine men.

Eben W. Jones, of Peckville, Pa., who saved six lives on the occasion of a roof collapse in the Mount Jessup Coal Co. (Ltd.), property at Peckville, Pa., on Dec. 8, and sacrificed his own life in attempting to rescue four others.

Isaac Cotton, of Jasonville, Ind., who rushed into a cloud of smoke caused by a powder explosion in the mine of the Merchants Heat & Light Co. at Jasonville, on April 18, and carried two men—their clothes aflame—to the surface. The two men, who were brothers, died from their injuries.

West Kentucky Upset by Consolidations And May Go Entirely Non-Union

Labor Policy Difficult to Determine While North American Co. Dickers
for Control of Hart, Kentucky Block and
St. Bernard Mining Properties

The western Kentucky coal field is in a perturbed condition. Nobody knows what the labor situation in the region is going to produce, and the pending consolidation of four of the main companies is leading to all sorts of speculation. It is now definitely known that the North American Co., owners and operators of public utilities throughout the Middle West, is negotiating not only for the St. Bernard Mining Co. but also for the properties of the Hart Coal Corporation and the Kentucky Block Coal Co. When all these are grouped with the non-union West Kentucky Coal Co. it is predicted that the whole western end of the state will scrap the union.

But the North American Co. has not yet bought all these properties. Engineering examinations and appraisals have been completed and the financiers interested in the proposal are negotiating without having reached a definite conclusion. An option on the St. Bernard properties running to April 26 is said to be bound by a forfeit of \$75,000 if the purchase is not made. This option is about to be exercised. If the North American Co. adds all three of the companies to its west Kentucky holdings it will control a potential output of about 500 cars of coal a day.

What is the relation of these negotiations to the western Kentucky labor problem? They have sufficiently excited the entire field so that no man knows what he can say to the union until the consolidation proceedings have culminated and the North American Co.'s labor policy is determined.

DISTRICT 19 MAY GO NON-UNION

There are two contracts with two sections of the west Kentucky field. An agreement between 5,000 miners of District 23 and operators of Christian, Hopkins and Webster Counties, excluding the St. Bernard Mining Co., has another year to run. The rest of the field has a contract with District 19 which expires March 31. Doubtless most of District 19 will now refuse to sign and will go non-union except in Muhlenberg County, where unionism is strong.

Of the coal properties about to be bought by the North American Co. the St. Bernard lies in that part of District 19 which no doubt will refuse to sign and will therefore go non-union. The Hart Coal Corporation, however, is in the three-county region of District 23, whose contract runs another year.

Of course the union would like to renew the three-county contract for three years and the other in 1925, for two years so as to run concurrently with the Central Competitive Field contract. There are many operators, however, who say they will never agree to a contract running longer than one year. Others are preparing to demand a return to the 1917 scale of wages and declare they will meet a strike

rather than grant anything higher. The politics of the situation is such, however, that a short-term contract may be made to avoid a tie-up.

The strippers of the field are an important labor factor, and may become even more vital. Already there are fifteen plants either working or ready to run, in most cases able to load out coal much cheaper than can the shaft operations. Well-designed cleaning and washing plants may be installed at more of them so as to give the coal an equal break on the market coal from shaft mines. Some of these mines are practically non-union since the only union men in the pits are the shovel operators, whose organization is in bad odor with the United Mine Workers of America.

This western Kentucky coal meets in various markets a great deal of eastern Kentucky output produced by miners working for varying wages averaging about the 1917 scale. What the producers will say to the miners in conferences to follow the March 11 meeting of the union miners in Louisville remains to be heard. Last week the sentiment was by no means crystallized and there were evidences of difficulty in getting such crystallization.

First-Aid Meet to Be Held at Huntington Sept. 11-13

The Seventh International First-Aid and Mine-Rescue Contest will be held in Huntington, W. Va., Sept. 11, 12 and 13, under the auspices of the Bureau of Mines, with the co-operation of the American National Red Cross, the National Safety Council, and various mine operators' associations and miners' organizations. It is expected that as many as 80 teams of miners trained in the first-aid and mine-rescue courses of the Bureau of Mines, will compete.

\$10,000,000 Stock Issue by Consolidation Coal Co.

Directors of the Consolidation Coal Co. have approved an issue of \$10,000,000 7 per cent cumulative preferred stock. Holders of common stock as of March 8 will be entitled to subscribe at par at the rate of one share of new preferred for four shares of common held. The proposal will be submitted for ratification at a special stockholders' meeting March 19. Proceeds from the sale of the issue will be used to pay the balance of the purchase price of the Sandy Valley & Elk Horn R.R. and to reimburse the treasury for other capital expenditures.

Cincinnati Convention Plans Set in Motion

Cincinnati, Ohio, will be the center of the coal-mining industry during the week of May 12 to 17 when the National Coal Association and the American Mining Congress hold their joint meeting. At a meeting of the Cincinnati Coal Exchange, Colonel E. O. Dana was appointed president of a committee to arrange for the annual convention of the National Coal Association. James Layne, Jr., will be the secretary, and W. T. Slaughter the treasurer. The meeting was held in the office of Stewart McVeigh, vice-president of the Island Creek Coal Co., after word was received from W. E. E. Koepler, chairman of the Convention Committee of the National Coal Association, that the invitation to meet in Cincinnati had been accepted.

The Manufacturers Division of the American Mining Congress has arranged to stage an exposition of coal-mining equipment and machinery and to work out a program covering informal discussion of the practical everyday equipment problems with which coal-mining engineers and operating officials are constantly confronted. The machinery exposition will embrace exhibits of the very latest types of mechanical equipment from approximately 125 representative manufacturing concerns. The display will be held in the North hall of the Cincinnati Music Hall, which is conveniently located and which will make an effective setting for the exposition. The sessions of the National Coal Association will be held during the mornings, leaving the entire afternoons free for an inspection of the displays and for the open-forum discussions of practical equipment problems, which will be worked out under the auspices of the Standardization Division and the Manufacturers Division of the American Mining Congress.

The headquarters of the National Coal Association will be at the Hotel Sinton and the headquarters of the Manufacturers Division and Standardization Division of the American Mining Congress will be at the Hotel Gibson.

Further information can be obtained from the American Mining Congress, Washington, D. C.

Canadian Miners Want More Pay

The agreement between the coal miners and operators in District 18, United Mine Workers, covering the southern Alberta and eastern British Columbia fields, expires on March 31, and the miners now are considering demands that are to be made for future operation. While nothing official has been announced, it is pretty certain that the miners' demands will include an increased wage and an agreement for a term of not less than three years. It also is quite certain that the operators will resist both demands. At the present time orders are slack, owing to the extended use of fuel oil on the railways and an unusually mild winter. Recently, the Crows Nest Pass Coal Co. closed two of its mines on account of no market.

Anthracite Safer and More Economical Than Oil

Anthracite is superior to oil for fuel purposes from the standpoint of safety, economy, practicability and desirability, according to a brochure issued by the Anthracite Bureau of Information, Philadelphia. The booklet is a reprint of an address by E. W. Parker before the Philadelphia Builders' Association.

Disastrous fires caused by oil-heating equipment in various parts of the country are cited as indications of the danger in its use. Issuance of a flood of summonses to court by the New York Fire Department for failure to obtain required permits as well as the refusal of the Fire Prevention Bureau to grant applications for dwellings with such installations also are cases in point. "It is different with anthracite. No rules are issued, no permits are required for the installation of an anthracite-burning equipment. It is absolutely safe."

In the matter of economy the booklet says: "The price of fuel oil in Philadelphia delivered in 500-gallon tank lots is 8c. a gallon, at which the cost of 153 gallons, the quantity required to produce the same amount of heat as a ton of buckwheat anthracite, would be \$12.24. The price of buckwheat delivered is \$8, the difference being \$4.24, or a little more than 50 per cent."

The use of oil fuel causes such speedy deterioration of boiler tubes and fittings that a Rhode Island plant was obliged to replace 1,500 boiler tubes in one year after oil-burning equipment had been installed. Anthracite, on the other hand, being low in sulphur, causes a minimum of injury to metal surfaces, insuring longer life to boiler tubes.

For domestic heating, says Mr. Parker, anthracite combines safety, economy, practicability and desirability, a number of simple and inexpensive devices now on the market making low-priced buckwheat available for that purpose, so that householders and building owners should think twice before changing their heating systems by substituting oil for anthracite.

New River Output Jumps on Resumption of 1917 Scale

Plants of the New River Co., operating in the New River district of West Virginia, are now producing coal at the rate of approximately 7,500 tons a day, equivalent to 187,500 tons a month. Production reached the present figure during the latter part of January, soon after the mines resumed operation upon the request of the miners and on the basis of the 1917 wage scale. It will be recalled that the mines suspended production on Jan. 14 owing to the low price prevailing on coal at that time, which made it impossible to produce coal at a profit with the higher scale of wages in effect. It is stated that since the resumption of operation at the lower level of wages the company has been able to operate profitably. It was possible to readjust wages to meet market conditions owing to the fact that the mines of the company are operated on a non-union basis.

Dempsey Ducks Bout with Old Battle-Ax Coal

Jack Dempsey, champion heavyweight boxer of the world, has decided not to go into Utah coal with the Great Western Coal Mines Co. This appears in connection with the announcement that unless the public leases parts of two coal tracts totaling 1,600 acres in Carbon County which have just been segregated by the Secretary of the Interior, the company will take the lease and develop the land. The proposed mining town, which was to have been called Dempsey, probably will be called Coaltown. The initial investment that must be made in the two tracts within three years is \$45,000. After three years the output of the property must attain 25,000 tons a year.

New Record Made in Output Of Briquets in 1923

A new high record was established in the production of fuel briquets in 1923. Reports to the Geological Survey show that the total output was 696,810 net tons, an increase over production in 1922 of 77,385 tons, or approximately 12 per cent. This increase may be largely attributed to improvement in demand for briquets in the Eastern States, which resulted in an increase of 48 per cent in the output of plants in that territory. Production increased slightly in the Pacific Coast States, but in the Central States, where the largest increase in 1922 occurred, there was a decrease of 5 per cent.

Fuel Briquets Produced in the United States in 1916-1923

Year	Net Tons	Value
1916.....	295,155	\$1,445,662
1917.....	406,856	2,233,888
1918.....	477,235	3,212,793
1919.....	295,734	2,301,054
1920.....	567,192	4,623,831
1921.....	398,949	3,632,301
1922.....	619,425	5,444,926
1923.....	696,810	5,898,698

Of the 14 plants that operated 5 used anthracite culm or fines, 2 semi-anthracite, 2 a mixture of anthracite fines or culm and bituminous slack, 1 semi-bituminous slack, 1 bituminous slack, 1 a mixture of bituminous slack and sub-bituminous coal, and 2 carbon residue from the manufacture of oil gas.

The total quantity of raw fuel used was 682,490 net tons, an increase of 11 per cent over the quantity used in 1922. Of the total, 49 per cent was anthracite and semi-anthracite, 33 per cent semi-bituminous and bituminous slack, and 18 per cent sub-bituminous coal and oil-gas residue.

Raw Fuels Used in Making Briquets in the United States, 1920-1923

Fuel	(Net Tons)	1920	1921	1922	1923
Anthracite culm and fine sizes and semi-anthracite.....		356,877	190,964	254,563	331,102
Semi-bituminous and bituminous slack and coke.....		a 125,506	121,925	235,542	a 225,508
Lignite, sub-bituminous coal, and oil-gas residue.....		89,656	b 85,352	b 123,339	b 125,880
		572,039	398,241	613,444	682,490

(a) Includes no coke. (b) Includes no brown lignite.

State Completes Its Case Against Keeney

With the testimony of three witnesses the State of West Virginia on March 4 completed its case against C. Frank Keeney, president of district 17, United Mine Workers, which was begun on Feb. 11. Keeney is charged with being an accessory to the murder of John Gore, a Logan County deputy sheriff, and of complicity in the Logan armed march of 1921. Just as soon as the last witness for the state had testified the defense entered a motion to strike out the evidence of the state, whereupon extended arguments on the motion ensued.

The state sought through the last witnesses introduced to prove certain circumstances as to a conference between Keeney and others at the home of Henry Nichols at Dry Branch on Cabin Creek in which union officials and Walter Allen, alleged leaders of the armed march, too part. According to the testimony of Nichols, his wife and his daughter, Christine Nichols, there were present at the conference, Allen, Keeney, Fred Mooney, district secretary, and Harold W. Houston, chief counsel for the union in the present trial. The witnesses were unable give the gist of the proceedings at the conference other than frequent mention of Logan and Mingo counties. They declared that the conference occurred just before the miners began to assemble on Lens Creek for the march. Nichols and his wife both testified to seeing Keeney at Marmet.

The last witness for the state was the Rev. J. E. Wilburn, who had been on the stand earlier in the trial. He was recalled in order that he might be asked about a letter purporting to be from him to William Blizzard. Wilburn identified the letter but declared that some changes had been made in it.

J. F. Hayes, of Milton, and Joe Huff, former members of the Dobra local of the United Mine Workers, were important witnesses for the state, testifying as to a payment alleged to have been made by District Secretary Fred Mooney to Earl Hager for the purpose of obtaining guns and ammunition.

It was testified by William Swanner that several weeks before the armed march began, Mooney, in the course of a talk to the Clothier local members, had told the miners to get guns and had said "If you haven't got the money, the local has; and if the local hasn't got enough, the district and the International will back you up."

As a matter of fact most of the witnesses used by the state in its case against Keeney have been former members of the union, many of them participants in the armed march, according to their own admission.

Legality of Trade Statistics a Vital Issue As Keen Competition Looms Ahead

Failing Judicial Pronouncement, Statement of Administration Policy
Would Be Important Help to Coal Industry—Opportunity Seen
in Offer of Full Data to Commerce Department

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

It is so important to the coal industry to have reliable statistics if disaster is to be avoided during the period of intensive competition which is certain to result from the three-year agreement entered into with the United Mine Workers that attention at this time seems to be focussed on the question of legality of trade statistics. Steps are being taken to obtain the enactment of legislation that will make clear the rights of industry to have the information necessary to the intelligent conduct of business. In view of the existing situation, all agree that comprehensive and accurate statistics are more important to the coal industry at this time than to any other activity.

It has been suggested that the Department of Justice should bring a test case against an association engaged in clear-cut statistical activities. The department is understood to be disinclined to take such action, although it is believed to concede that these statistics are in the public interest. It also has been suggested, as discussed in this correspondence last week, that a friendly suit be brought against one of the local associations by a consumer of coal who could contend that he is being injured by the statistical activities of the association.

It is agreed that a long time will be required to obtain legislation. Moreover, it is a situation which could not be met in a legislative way without arousing the politician who believes he can profit by baiting industry. All agree that a judicial determination of the uncertainty would be best. In case there should be any hesitancy about initiating steps to that end, however, the next best thing, it is agreed, is to obtain a pronouncement of policy from the administration.

The situation is similar to that which arose when Pittsburgh operators appealed to Secretary Hoover for a statement of policy as to their participation in a wage conference with the United Mine Workers. Mr. Hoover assured them that such action would not be in contravention of the anti-trust statutes. While it was reassuring to the operators to have such an expression from the Secretary of Commerce, they realize that he had no control over the Attorney General. They were fully assured, however, when Mr. Hoover obtained from the President a similar expression.

It is believed some way can be found to obtain from the administration a definite statement of policy in connection with trade statistics. The position of the Secretary of Commerce is generally known. His efforts to clear up the situation thus far have been futile, as is indicated by his correspondence

with the Attorney General. It now is suggested that one of the coal-trade associations might be able to obtain a pronouncement of administration policy were it to make a definite offer to the Department of Commerce to furnish it with its full statistical reports. The offer would be accompanied by a specific statement that it did not expect any guarantee of immunity from prosecution. It would be made plain that the issue is being raised to develop a method of making the information available so as to comply in the fullest degree with the law and with the hints which the courts have given that any information gathered must be made available to all concerned on equal terms.

The right would be conceded to the Department of Commerce to check against the original returns the accuracy of any reports furnished by individual companies. The association might promise to accept any suggestion from the department as to the time and method under which the information would reach its members. If such an offer were made along with a guarantee that the information is accurate and that it will be distributed in a way intended to prevent misuse of the information, it would seem that such an offer would have to be accepted or rejected. Sympathetic as is Mr. Hoover, it is not improbable that he would be willing to carry the specific offer to the next Cabinet meeting and try to get an expression of administration policy.

It is difficult to see how the administration could decline to accept such an offer. At any rate it certainly would put the trade association making it in a most favorable light. It also is possible that the discussion of such an offer by the Cabinet might result in the initiation of a test suit by the Department of Justice, which is the step most desired.

Central Pennsylvania Wage Parley March 20

March 20 has been selected as the date for the joint meeting of the operators of central Pennsylvania and the officials of District 2, United Mine Workers. The meeting will be held in Altoona and it is expected that an agreement will be reached as a basis on which a wage scale to take the place of the present scale, which expires March 31, may be formulated. It is probable that the plan adopted at the Jacksonville, (Fla.) conference, by the Central Competitive Field, will form the basis of the agreement in central Pennsylvania.

Line Forms On Left; Don't Crowd

A Klondike rush to buy western Kentucky coal may—or may not—start, now that R. F. Davis, 1224 South First St., Louisville, Ky., announces that he has perfected a chemical process that will take 2 lb. of silver out of 50 lb. of western Kentucky coal. The lower the grade of coal, the more silver he can get by soaking the coal 15 days in his secret solution. He is surprised, he says, that the chemists have been calling all this silver sulphur, and thinks it is too bad that so many million dollars worth have gone up the flues of the Middle West. Bar silver is quoted nowadays at \$10.30 a pound, but he says he is in no hurry to start a silver soakery, even though he can get \$834 worth of silver out of every ton of coal without hurting the coal much. Market news: West Kentucky mine run \$1.50@1.90.

Nova Scotia Miners Vote to Reject Wage Settlement

Coal miners of District 26 (Nova Scotia) on March 6 voted, 5,617 to 3,145, against acceptance of the wage scale recently negotiated between International officers of the union and the British Empire Steel Corporation. Semi-official reports were in circulation that the union would withdraw from Nova Scotia as a result of this action.

Unions of District 26 have been under a provisional government since last summer, John L. Lewis, president of the International, having ousted the regularly elected officers for calling an allegedly unauthorized strike. The latest suspension occurred in January, causing 12,000 men to remain idle for several weeks and ending when work was resumed under the wage agreement which failed of ratification in the referendum March 6.

Hundreds of Cape Breton coal miners quit work March 7 and a civic holiday was declared in honor of James B. MacLachlan, deposed official of the United Mine Workers, who arrived in Glace Bay on leave from Dorchester penitentiary, where he is serving sentence for sedition in connection with last year's strike.

MacLachlan, secretary, and Dan Lingstone, president, were removed as officials of District 26 at the instance of John L. Lewis, International president of the miners' union, during the 1923 strike. The secretary later was sentenced to two years for having circulated handbills denouncing the government for sending troops to the strike zone.

MacLachlan's arrival at Glace Bay and his trip through the coal fields was a triumphant procession. A thousand miners greeted him with two brass bands and he was formally welcome to each town through which he traveled.

When he reached Sydney he was paraded through the city to Steel Workers' Hall, where the "Red Flag," song of the Third International, was sung.

Watson and McAuliffe Point Out Advantages Of Three-Year Treaty of Peace

Comment of President of Consolidation Coal Co.

In commenting on the Jacksonville agreement it may be wise to distinguish between the contract as a three-year peace treaty and as an economic fact. To avoid another nationwide strike at this time and to provide for uninterrupted production for three years is clearly to the advantage of both the industry and the public. The latter is assured of a continuous supply of coal and is, therefore, without any just cause for complaint. The industry benefits by the fact that those portions of it which can live and prosper only by strikes, shortage and public panic are given no chance to profit at the expense of established enterprises. As a peace measure, therefore, the three-year contract has undoubted benefits.

So far as the economics of the industry are concerned, the three-year truce, if wisely used, can be made to contribute to the future strength and stability of the industry. Though peace between op-

erators and labor in itself alone does not guarantee a prosperous industry, it gives all constructive elements a chance to restore healthy conditions.

Though this process may be temporarily drastic for some, its results, in my judgment, will be beneficial to the industry as a whole. The free play of supply and demand usually has proved a good medicine for industrial ills. In the case of the present coal situation, whatever its temporary phases, the bituminous-coal industry may confidently be expected to retain its place as the country's basic business, fundamentally sound and vital to national prosperity. No temporary ailments can affect the essential work it has always performed, nor can any competitor permanently take its place in the industrial structure.

In my judgment, the clearest road toward profitable business this year, both for individual companies and for producing districts, lies

in the direction of *cheap coal*. This does not mean the saving of a few cents per ton here and there, so much as it means applying every method of economy, efficiency and improved machinery. Those companies and those districts which are so situated as to put these measures most fully into effect will receive returns in proportion to their efforts. In addition, if labor will co-operate in all these economies and adjustments, it also will receive its reward in employment.

During the months ahead, no one expects profits to flow into the treasury without much intelligent selling and operating effort. But for those who offer on the markets the cheapest coal that can be produced under the most improved mining and management there seems no good reason to anticipate other than a normal share in the prosperity of the country as a whole.

C. W. WATSON.

New York City. President

Statement of Union Pacific Coal Co. Head

The three-year contract arranged for at Jacksonville undoubtedly will tend to eliminate surplus mines and mine labor, and most of all will it reduce the cost of coal to the consumer. This will mean financial loss to many companies owning high-cost mines, but that situation is one that the industry has been drifting toward since 1917; in fact before that year.

As to the effect the reconstruction process will have on the mine workers' union, it is hard to predict. Mr. Lewis certainly made a logical, temperate presentation of his wants to the operators, and his arguments were well received, making a deep impression on many accustomed to the old order of affairs.

The operators, as well as their employees, who see failure ahead

of them will be loath to surrender their market and their day's work to other mines where more favorable cost conditions govern and to the competing non-union mines. An "honest to goodness" alliance between the union and union operators; expressed in the taking off of burdensome conditions, the taxes levied in the form of allowances for this and that, obtained by the workers in the past, coupled with a determination on the part of the men to get behind their portion of the industry rather than to harass it, would go far to carry such mines and their man power until the growth in demand for coal would perhaps restore prosperity.

Further progress toward coal-mining composure will automatically come from their gradual use of mechanical loaders and im-

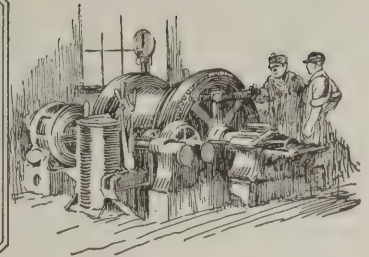
proved forms of mine transportation, and it behooves every operator to give serious attention to this line of endeavor. To venture any sort of prediction concerning coal is dangerous, but I am of the impression that if the rank and file of the workers fail to extend and amplify the apparent new spirit evidenced by their leaders at Jacksonville, the union will gradually suffer internal losses by reason of their men deserting the union mines to take employment in those working without the union. No one will gainsay the fact that union loyalty is built on the foundation of results obtained, and likewise even the dullest man knows that a high day or unit wage without work is an empty sinecure.

EUGENE MCAULIFFE.

Omaha, Neb. President



Practical Pointers For Electrical And Mechanical Men



Serious Damages Result from Hasty Repairs to Resistance Grids

It is a well known fact that mine locomotive equipment receives less attention and more abuse than any other piece of mining machinery. Locomotives, as a class, have been built very sturdy because of the kind of work they must perform and the bad conditions under which they operate. However, there are many points about locomotive equipment which must be given at least ordinary attention, in order to prevent serious damage or long delays.

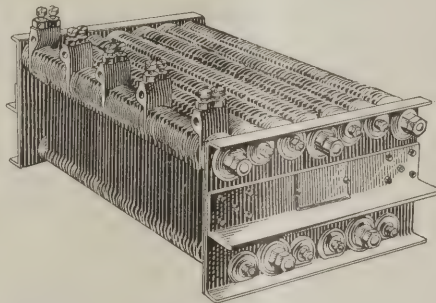
One of the worst mine practices is hasty and improper repair of resistance grids. Frequently, resistance banks are exposed to falls of rock, coal and re-tracking equipment carried on the locomotive. In some mines it is not uncommon to find the rheostat very poorly repaired and jumpered by pieces of iron, steel or copper.

When a resistance grid becomes broken, some motormen have deliberately broken other grids in order to temporarily twist the broken parts so as to complete the circuit. Another common practice is to wedge a piece of iron, usually a rail spike, into the broken parts of the resistance.

Such methods as those are often very dangerous to the equipment, cause jerky operation and damage, to say nothing about the possibilities of starting a mine fire. The illustration shows what resulted after a motor runner had forced a mine spike into some

broken grids and turned on the controller of the locomotive. This piece of metal very quickly fused together and soon dropped to the ground between the rails. It is not hard to imagine the fire hazard which very naturally resulted.

So as to eliminate the necessity for such dangerous forms of repair, it would probably be a good plan to equip



Locomotive Resistance Bank Equipped with Extra Terminals

A copper jumper may easily be attached to the spare terminals and an efficient and safe repair quickly made.

resistance banks with several additional terminals so spaced that whenever a grid becomes broken it would be possible to jumper it by inserting a copper wire into two such terminals. This is illustrated in the accompanying sketch. If such a plan were adopted, it would be very easy for the motorman to make a very good repair on the resistance and thus not be troubled with the frequent delays that usually occur when makeshift repairs are made.

Novel Method Will Be Used To Anchor Power Towers

A unique method of anchorage will be used to anchor the steel towers of the new \$1,250,000 electric transmission line to be built by the Illinois Power & Light Corporation from the power dam at Keokuk, Iowa, to Galesburg, Ill.

A hole 8 ft. deep and 5½ in. in diameter will be drilled where each leg of a tower is to stand. Dynamite will then be lowered into the hole and touched off, blowing a cavity at the bottom two feet in diameter. Concrete will be poured into the cavity and the legs of the tower set into it. After the concrete hardens, the tower legs will be anchored in solid balls of stone im-

bedded in walls of earth compressed by the exploded dynamite.

This will be the first trial, it is said, of the new anchor construction in Illinois, but one now being used in all modern building of steel transmission lines.

Material for the new line has been contracted for by the Illinois Power and Light Corporation. The Blaw-Knox Company, Pittsburgh, will furnish the steel towers; the Aluminum Company of America, Messina, N. Y., the wire; and the Westinghouse Electric & Manufacturing Co., East Pittsburgh, the insulators.

Hints on Coal Analyses for Clinkering Temperatures

The determination of the fusibility of coal ash has become increasingly important in recent years. Especially is this so in relation to the operation of mechanical stokers and production of gas. The composition of the ash is often far more important than the amount.

Alumina is the most refractory constituent of ash and its fusing point, 2,000 deg. C., is lowered proportionately to the amounts of alkalis, silica, and iron present. In many coals the amounts of all but the latter do not lower the fusing point sufficiently to cause great trouble; that is, below 1,400 deg. C. At this point, the amount of iron becomes of supreme importance, as is distinctly shown in the classification of coals such as white and red ash. The technical composition of the iron is of great importance also, as in the ferrous state it lowers the fusion point greatly while in the ferric state, it has but slight effect. The influence of sulphur upon fusing point probably depends upon the accompanying presence of iron as pyrites. In the presence of burning carbon, the ferric oxide may or may not be reduced to ferrous oxide, according to the amount of oxygen supplied and the care of the fire. This no doubt explains discrepancies occurring between actual clinkering of the coal on the grates and the fusing point as determined in a laboratory furnace. For the same reason the fusing point will be found to vary in different types of laboratory furnaces. Therefore, we should deem it advisable to choose such furnaces for laboratory tests as will give reducing atmospheres and hence lower the fusing point, indicating the proper results.

When a test is being made the coal should be burned to ash in clay dishes at as low a temperature as possible; then moistened with water and moulded



What Resulted from a Hasty Repair To a Resistance Bank

After the spike was driven between the resistance grids, the power was turned on and this hot molten mass fell to the ground. Obviously a serious mine fire might have resulted.

into the shape of a Seger cone ($\frac{1}{2}$ in. x 2 in.) by pressing into a mould that may be conveniently made of lead. A piece of thin paper may be moistened and laid in the mould to facilitate removal of the cone. Some coals may require a binder which may be made of a 10 per cent dextrin paste, although this is rarely necessary. The use of smaller cones has recently been advocated.

The cones may be set in triangular holes in a Dixon graphite block and placed in the furnace so as to stand horizontally. This position gives as concordant results as the vertical position and probably more accurate. The fusing point is noted when the cone droops to a vertical position. Care must be taken that the temperature does not rise too rapidly when nearing the fusing point. Satisfactory results may be obtained with a rise of about 5 deg. C. per minute. As reducing atmos-

pheres preclude the use of metallic couples at high temperatures, the temperature may be conveniently read by a fixed-focus total-reduction pyrometer or an optical pyrometer of the Wanner type.

Several furnaces for high temperatures, suitable for the laboratory, are on the market, and a very convenient one for the test just described is the Hoskins Electric Furnace. Heat is generated by means of a heavy alternating current of low voltage passing through a series of carbon plates. This furnace uses a standard 60-cycle supply of current at 220 volts, and consumes about 40 amperes. By the aid of an air-cooled transformer, the voltage is lowered to a pressure of 10 volts. The maximum temperature produced by this furnace is about 2,000 deg. C.

ROYCE L. GRIMES,
Electrical and Chemical Engineer.
Cleveland, Ohio.

Results of Study of Corrosive Action of Mine Water

Probably the most important corrosion problem to the mine operator is that of pumping equipment. Pumps which may give excellent service under ordinary conditions, where the mechanical strength, workability and other physical properties are the only factors to be considered, may not resist the action of acid mine water. Brass and bronze, as well as ordinary cast-iron and ordinary steel, corrode rapidly in acid mine water.

In many mines it has been the practice to babbitt the pump chambers. This will partially solve the problem, but is not entirely satisfactory for mechanical reasons. Lead-lined chambers give good service, if the lining is tight against the outer wall and does not permit leaks. Porcelain plungers are giving good service, and, if properly cared for, may be safely substituted for the brass and bronze or cast-iron. One advantage in the use of porcelain plungers is that packing troubles can be reduced if this type of plunger is placed in the pumps true and level. If there is any appreciable give or flexure after mounting, the porcelain may crack. The shell of porcelain must be attached and held firmly to the plunger rod. If allowed to run "dry" in the pump, it is liable to over-heat and crack.

PACKING TROUBLE ELIMINATED

The connections should be of some proved acid-resisting material. If care is not used in selecting the connections, corrosion may cause the failure of the connecting part, allowing the shell to wiggle and crack. Little packing trouble is encountered with a plunger of this type. If it costs, say, \$150 to install a 10-in. porcelain plunger, and \$125 to repack a pump, it can readily be seen that if packing troubles and "corrosion of plunger" troubles can be reduced, the extra cost is soon made up. The plunger rod may be made of a material such as a high-chromium-nickel-silicon steel. Such a rod was recently removed from a mine pump after four months of service. It had failed at the threads, but not else-

where. On bronze rods it was customary to obtain about one month's service under the same conditions.

Another serious problem is that of the corrosion of pipes. Ordinary iron or steel pipe, or even wrought-iron pipe, does not last long in very acid water. By lining the pipes with wood it is possible to obtain a satisfactory period of service, providing the pipe can be kept on a grade so that there is no trap. Wood pipe will have a tendency to clog up, if a dip or trap of any kind is in the line.

LEAD-LINED PIPES SUGGESTED

Substitutes for the wood-lined pipe or for iron or steel or wrought-iron pipe have been suggested. Lead-lined pipes might be expected to be of value, and would be if the joints were always tight and if no cracks or leaks developed as the result of buckling of the lead lining, or by attrition by sand or other material wearing through the lining. Lead-lined connections at the pumps might be expected to be of value, but the velocity and pressure of the water are high and the joints must be perfect, or leaks result. For pipe of small diameter, all-wood pipes can be used; say, up to four inches in diameter, or even above that, if bored. Stave pipe may fail, because even a tiny leak, or water from outside, may rapidly corrode the binding wire.

On pumps, acid-resisting alloys or porcelain can be substituted for the materials which fail rapidly. In pipelines, wood can be used, but for track corrosion there is nothing cheap enough which can be substituted. Track will corrode very fast if exposed to the action of acid water. Obviously it is expensive to tear up old track and buy and install new track. The remedy for track corrosion seems to lie in grading the track out of the way of the water. Frequently this can be done by shooting down the roof and building a ditch line alongside the track. In many cases the expense of grading would be more than the amount saved, but on main haulage ways care in the grading may save considerable expense.

There are paints which will resist the action of acid water fairly well, if

abrasion and friction or strains do not break the protective film. Of course, paint is widely used, and if properly chosen will aid considerably in lengthening the life of some of the equipment exposed to the action of the acid water.

The corrosion of other equipment, such as shovels, bars, picks, car-wheels, etc., can best be avoided by keeping them out of the water rather than by attempting to substitute a resistant material.

The question as to the effect of acid mine water on concrete, especially when used in dams and stoppings, has not been definitely answered. From such information as is available, it would seem that, if the mixture is correct, there is not much trouble experienced.

ACID NEUTRALIZED WITH LIME

Frequently, it is necessary or desirable to use mine water in the boilers of the power-plant. Of course, if the water is acid it will quickly corrode the boiler tubes unless previously neutralized. This neutralization can be accomplished by treating with lime rock, as is done at the Calumet mine of the H. C. Frick Coke Co. The resulting precipitate finds a limited market.

It has been suggested that if the water were neutralized underground the pumping equipment would not be corroded. Lime-rock and blast-furnace slag have been suggested as suitable neutralizing agents. There are serious objections to attempting to neutralize mine water underground: (1) large settling and overflow tanks are required, which would involve considerable extra expense in excavating the room; (2) water would probably have to be pumped to one central sump before treating, so the corrosion of pumping equipment would be only partly eliminated; (3) the neutralizing agent would have to be taken into the mine and the product of neutralization removed, involving considerable extra transportation or hoisting.

Tinning Stranded Copper Beyond Support

Bad effects often result from tinning stranded copper beyond the point where the joint is made. For example, instead of coming out through the end of the connector, the solder should stop just inside the connector, so that the stresses will not localize on the strands where the tinning stops and where the strands are not supported against vibration.

One hp. equals:

745.7	watts.
0.7457	kw.
33,000	ft.-lb. per minute.
550	2 ft.-lb. per minute.
2,546.5	heat units per hour.
42.44	heat units per minute.
0.707	heat units per second.
0.174	lb. carbon oxidized per hour.
2.62	lb. water evaporated per hour from and at 212 deg. F.



Problems In Underground Management



Indicating Mine Conditions by Placing Colored Tacks on the Mine Map

Room and Pillar Miners, Heading Men, Pumps, Hoists and Locomotives
Symbolized by Red, Yellow, Green and Other Pins
Spotted at Appropriate Points

BY JEROME C. WHITE
Penker Coal Mining Co.
Portage, Pa.

"Records and reports," says a prominent industrial engineer, "should be immediate, reliable, permanent and accurate." In the coal industry, one of the records which should be describable in these terms should be the mine map. Every mining man recognizes that necessity so its advantages need not be discussed.

On most maps not only is the completed work plotted but the proposed development also, broken lines being used for that purpose. Unfortunately, the map usually lags behind in its record of active workings, and many superintendents and mine foremen correct that deficiency by drawing the extensions in pencil on the blueprint.

Nevertheless, the map thus corrected does not convey information of a much needed character. It does not show, for instance, whether the places are working or standing idle nor the number of men at work at their extension if they are being worked. This can be accomplished by the use of glass-headed tacks or push pins of varied colors. The method of using these pins is susceptible of wide variation and may be expanded in detail as the user becomes adept in the portrayal of information by the means chosen. Any one can use the method I am about to describe which requires nothing more elaborate than the tacks to which I have referred.

Each pin represents a man; a red pin, let us say, represents a miner loading in a room; a green pin, a heading driver, and, a yellow pin, a miner removing a pillar. This system, by the way, has been found to be particularly valuable in widely scattered pillar sections. Any variety or number of different designs can be secured and used, let us say, to show the location of pumps, hoists or any other pieces or machinery that are moved from place to place and that cannot be posted justifiably on a permanent map or are not ordinarily shown thereon. For instance, if desired, it is possible to show the number and type of any locomotive serving any entry or section. Thus the company with which I am connected has a No. 5 locomotive that serves the 5th Left and 1st North headings. Now, a pin bearing the

number 5 can be placed at the opening of each of those headings. Consulting one's notes or memory it is found that locomotive No. 5 is an 8-ton trolley type machine fitted with a cable reel.

Every measuring day the mine foreman can move his "men" forward; but as far as this is concerned he can move them ahead every time he has the necessary measurements which, in the case of important headings, he will receive daily as advances are made. As men quit or are shifted to new positions the pins can be relocated accordingly. The picture presented can be used by the mine foreman or the superintendent to strengthen their arguments that an additional haulage unit or some other piece of equipment is necessary by showing forcefully the density of the workers or the degree of concentration employed.

Though it is admitted that mine foremen and their assistants usually know the mine and carry such facts in their heads, yet the advantage of putting these records in concrete form for the use of every one concerned will be at once appreciated. This information is highly useful on such occasions as the periodic visits of the superintendent, general superintendent, inspectors, etc. Numerous other advantages are possessed by this system, and with the exception of the first work of planning the nomenclature and placing or locating the pins, the total time daily expended in keeping this record abreast of actual work will not be more than five minutes. The total cost for the equipment will not exceed \$5, even for the largest mine. Some soft backing can be used for the mine projection such as pine, wall or beaver board. The pins can be stuck in plaster if necessary.

It should be understood that I am not suggesting this method as a substitute for, or to take the place of, any checking system. I am sure, however, that any one who cares to try it will be pleased with the results. This system is applicable to large and small mines alike, and with it one can quickly, intelligently and forcefully explain his work, methods and progress

and illustrate his explanation to the intelligent understanding of all interested parties.

It has this further advantage, that at a glance it will show to the operating officials in charge all the work in hand, together with its location and progress. This is true visualization. The records are thus immediate, reliable and accurate and the map is permanent. In this respect it puts the mining man on a par with the best of other industrial officials, and if immediately adopted, for the time being at least, will place him who uses it in advance of some of his brother operators.

To Replace Flame Safety Lamp As a Gas Indicator

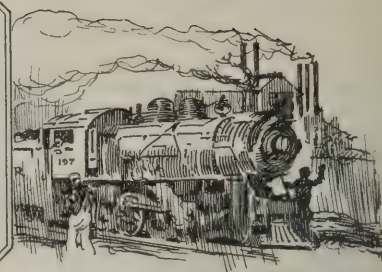
In order to give the miner the advantage afforded by the use of the flame safety lamp when using electric illumination an instrument known as the "methanometer" has been devised by L. Williams. It consists of a combustion chamber in which the methane in a methane-air mixture under pressure is burned by a heated platinum wire, and a long capillary glass tube containing a column of liquid which rests at one end on the elastic membrane by which the combustion chamber is covered and at the other engages a column of air against the sealed end of the tube. By this column of liquid the changes of volume after combustion are measured, the volumetric changes, of course, corresponding with the percentage of methane in the air.

The instrument acts slowly, for the combustion chamber does not contract promptly but gradually cools. This cooling is, however, sufficiently uniform that allowances can be made for it when calibrating and using the instrument. Thus if the time of heating the wire is five seconds and the time allowed to elapse after the current has been interrupted is always fifteen seconds, constant readings for a given percentage of methane are obtainable.

The British Committee on Miners' Lamps says of this device: "Inasmuch as the principle upon which this instrument works is that of combustion analysis, it will be understood that incorrect readings will be obtained if the inflammable mixture to be analyzed contains more methane than can be burned completely by the oxygen of the air, that is more than 9.45 per cent of methane. This should not militate seriously against its use, which we imagine will be mainly for the determination of small percentages of methane that cannot be estimated accurately with the flame safety lamp."



Production And the Market



Waiting Game Is Policy in Soft-Coal Market; Consumers Seem to Hold Off for Inducements

A disposition to hold back prevails throughout the coal trade. The habit at this time of year of "laying low" to see what will happen April 1 has grown to such a degree that it is observed as a sort of ritual. There is no doubt, however, that the action of the miners in voting March 12 on the Jacksonville agreement is awaited with interest. Then too, wage agreements are still to be negotiated in the Kanawha field, western Kentucky, central Pennsylvania and northern West Virginia. Meetings to draw up pacts in the latter two districts are about to be held.

In some regions consumers are waiting for new price circulars to appear before committing themselves, continued mild weather aiding and abetting them in their policy of "playing safe." In some quarters there is a strong belief that a favorable attitude by government authorities toward the compilation of trade statistics is one of the greatest needs of the coal industry at this time with the keenest kind of competition looming ahead.

Coal Age Index declined 2 points to 181, as of March 8, the corresponding average price being \$2.18. This compares with \$2.21 on March 1.

Midwest Sogginess Unrelieved

Even the most optimistic seller of coal in the Middle West can see little cause for encouragement in the present condition of the market. The usual slowing down of domestic business is in evidence and even steam coals, which were on the upgrade a week ago, have softened a little. Only one railroad, the Grand Trunk, has invited bids on fuel for the year, nor does industry show a disposition to let long-term contracts, though the operators show a real willingness to sign them up.

Big consumers seem to have adopted a program of keeping the producers on the anxious seat for awhile, with the apparent hope of being offered inducements to come in. Prices in the southern Illinois and Mt. Olive fields have fallen sharply and a number of mines in the Standard field have suspended for lack of business.

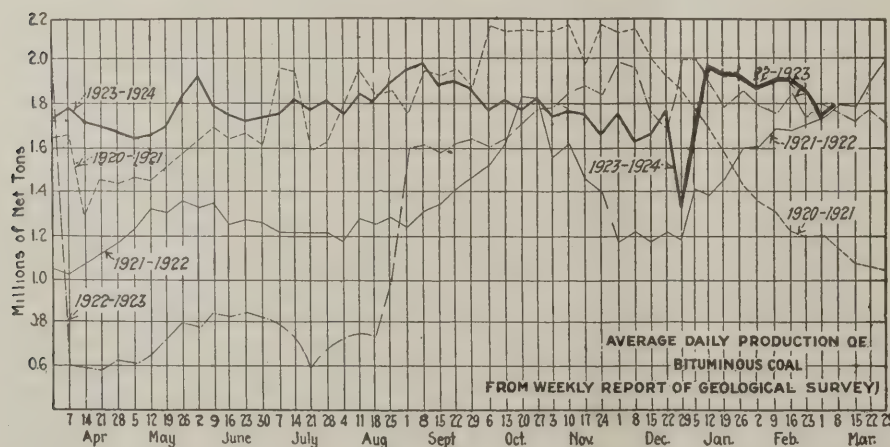
Western Kentucky Maintains Values

Operators in western Kentucky are maintaining values despite discouraging competition from non-union fields and strip operations. A strike is likely in April that will affect more than half the field's output.

Northwestern consumers shrewdly wait, with soft spring weather prevailing and a heavy supply on the docks, some of which may have to be moved in a hurry before the navigation season opens. Power companies seem to be the only buyers, some large orders having been placed to make up for lack of water power. Mines in the Southwest are working only a little better than half of normal, with a growing accumulation of lump and nut "no bills" and a shading of list prices on domestic grades.

The Ohio trade is completely at sea over the new conditions prevailing in the market. Dullness reigns in the Pittsburgh and central Pennsylvania markets. New England reports no new developments to relieve the funereal calm that has settled over the market. Dealers in Atlantic seaboard markets find customers scarce.

Bituminous coal produced during the week ended March 1 totaled 10,705,000 net tons, according to the Geological Survey, an increase of 338,000 tons compared with the previous week, which was a holiday week, but a decrease of 434,000 tons from the week ended Feb.



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Feb. 16.....	10,431,000	11,139,000
Feb. 23 (a).....	10,324,000	10,367,000
March 1 (b).....	10,946,000	10,705,000
Daily average.....	1,824,000	1,784,000
Coal year.....	385,688,000	503,467,000
Daily Average coal year	1,366,000	1,792,000

ANTHRACITE

Feb. 16.....	1,826,000	1,900,000
Feb. 23.....	1,838,000	1,655,000
March 1.....	2,104,000	1,866,000
Coal year.....	48,246,000	85,491,000

COKE

Feb. 23.....	371,000	277,000
March 1.....	402,000	319,000
Calendar year.....	3,110,000	2,418,000

(a) Revised from last report. (b) Subject to revision.

16. Production of anthracite also recovered, 1,866,000 net tons being produced, compared with 1,655,000 tons during the preceding week and 1,900,000 tons in the week ended Feb. 16.

Midwest Markets Soft

Nothing came along through the Midwest during the past week to bring much relief to the soggy condition of the market for all coals. Even steam coals, which were on the rise a week ago, seem to have overstepped themselves and softened a little during the last days of the week. Southern Illinois and Fourth Vein Indiana, which showed signs of passing \$2, settled back to \$1.75@\$.1.90 and central Illinois and Fifth Vein Indiana range from \$1.75 down to \$1.50.

Domestic business on all coals continues slowly to slow down toward the customary May low speed. The Franklin County Operators' Association has not yet announced its new circular, however, and this appears to have prevented others from doing so. It is expected that southern Illinois lump, which sets the pace for the Midwest, will drop a cold dollar from \$3.75. As the market stands now, some of it already moves at \$2.75.

A real willingness on the part of Midwest operators

to make long-term contracts has not rounded up much business. Only the Grand Trunk, among the railroads, has invited bids on the year's business. Most of the others appear ready to live for awhile on the stockpiles they bought last summer. There is no rush of industry to contract yet, either. "Let's wait until these operators have suffered awhile; then we'll get a price," is a common program.

In all southern Illinois fields a noticeable decline in business is in evidence. Operators generally are offering lump and egg at prices ranging \$2.85@\$.3, while nut is being offered at \$2.75, but orders are being taken for as low as \$2.50. In the Mt. Olive field lump prices have been reduced from \$3.25 to \$3, with very little demand. Screenings have advanced 25c. per ton and are being offered at \$1.50@\$.1.60. Other steam sizes, however, are sluggish. In the Standard field a number of mines have suspended, and most of those operating find it difficult to move prepared sizes at any price.

Mild weather, which has prevailed for the past week, has caused St. Louis consumers to withhold orders, expecting a price drop April 1. Local demand for screenings is good and dealers having storage space for their forkings are holding them rather than selling them, since every indication points to higher prices on fine sizes. Country domestic trade is flat.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern						Midwest					
	Market Quoted	Mar. 12 1923	Feb. 25 1924	Mar. 3 1924	Mar. 10 1924†		Market Quoted	Mar. 12 1923	Feb. 25 1924	Mar. 3 1924	Mar. 10 1924†
Smokeless lump.....	Columbus.....	\$7.00	\$4.10	\$4.10	\$3.75@\$.4.00	Franklin, Ill. lump.....	Chicago.....	\$4.60	\$3.50	\$3.35	\$2.00@\$.3.50
Smokeless mine run.....	Columbus.....	4.50	2.10	2.10	2.00@. 2.25	Franklin, Ill. mine run.....	Chicago.....	3.35	2.35	2.35	2.25@. 2.50
Smokeless screenings.....	Columbus.....	4.45	1.55	1.55	1.45@. 1.70	Franklin, Ill. screenings.....	Chicago.....	2.35	1.95	1.95	1.75@. 1.90
Smokeless lump.....	Chicago.....	7.00	3.60	3.60	3.50@. 3.75	Central, Ill. lump.....	Chicago.....	3.10	3.10	2.85	2.75@. 3.00
Smokeless mine run.....	Chicago.....	4.00	2.50	2.35	2.15@. 2.25	Central, Ill. mine run.....	Chicago.....	2.60	2.10	2.10	2.00@. 2.25
Smokeless lump.....	Cincinnati.....	6.85	3.75	3.50	3.25@. 3.50	Central, Ill. screenings.....	Chicago.....	1.45	1.50	1.70	1.50@. 1.75
Smokeless mine run.....	Cincinnati.....	4.85	2.60	2.50	2.25@. 2.60	Ind. 4th Vein lump.....	Chicago.....	3.60	3.10	2.85	2.75@. 3.00
Smokeless screenings.....	Cincinnati.....	4.50	1.85	1.75	1.50@. 1.75	Ind. 4th Vein mine run.....	Chicago.....	2.85	2.60	2.35	2.25@. 2.50
*Smokeless mine run.....	Boston.....	7.00	4.70	4.70	4.65@. 4.75	Ind. 4th Vein screenings.....	Chicago.....	2.10	1.70	1.85	1.75@. 1.90
Clearfield mine run.....	Boston.....	3.30	1.95	1.95	1.65@. 2.40	Ind. 5th Vein lump.....	Chicago.....	3.35	2.60	2.60	2.50@. 2.75
Cambria mine run.....	Boston.....	4.00	2.60	2.60	2.25@. 3.00	Ind. 5th Vein mine run.....	Chicago.....	2.60	2.10	2.10	2.00@. 2.25
Somerset mine run.....	Boston.....	3.60	2.30	2.25	1.85@. 2.60	Ind. 5th Vein screenings.....	Chicago.....	1.35	1.45	1.60	1.50@. 1.75
Pool 1 (Navy Standard).....	New York.....	4.50	3.00	3.00	2.75@. 3.25	Mt. Olive lump.....	St. Louis.....	3.10	3.10	3.10	2.75@. 3.00
Pool 1 (Navy Standard).....	Philadelphia.....	4.60	3.00	3.00	2.75@. 3.25	Mt. Olive mine run.....	St. Louis.....	2.50	2.50	2.50	2.50
Pool 1 (Navy Standard).....	Baltimore.....	3.80	2.25	2.25	2.00@. 2.50	Mt. Olive screenings.....	St. Louis.....	1.35	1.35	1.50	1.60
Pool 9 (Super. Low Vol.).....	Philadelphia.....	3.85	2.30	2.30	2.10@. 2.50	Standard lump.....	St. Louis.....	3.10	2.75	2.75	2.65@. 2.75
Pool 9 (Super. Low Vol.).....	Baltimore.....	4.00	1.85	2.05	2.00@. 2.15	Standard mine run.....	St. Louis.....	2.25	1.95	1.95	1.90@. 2.00
Pool 10 (H.Gr. Low Vol.).....	New York.....	3.10	2.00	2.00	1.75@. 2.25	Standard screenings.....	St. Louis.....	1.35	1.15	1.15	1.15
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	3.20	1.85	1.85	1.70@. 2.00	West Ky. lump.....	Louisville.....	3.05	2.85	2.85	2.75@. 3.00
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	3.00	1.70	1.80	1.75@. 1.85	West Ky. mine run.....	Louisville.....	2.00	1.70	1.70	1.50@. 1.90
Pool 11 (Low Vol.).....	New York.....	2.45	1.60	1.60	1.40@. 1.85	West Ky. screenings.....	Louisville.....	1.65	1.30	1.30	1.25@. 1.40
Pool 11 (Low Vol.).....	Philadelphia.....	2.70	1.65	1.65	1.55@. 1.75	West Ky. lump.....	Chicago.....	3.10	2.85	2.60	2.50@. 2.75
Pool 11 (Low Vol.).....	Baltimore.....	2.25	1.55	1.65	1.60@. 1.70	West Ky. mine run.....	Chicago.....	1.80	1.60	1.60	1.40@. 1.50

High-Volatile, Eastern						South and Southwest					
	Market Quoted	Mar. 12 1923	Feb. 25 1924	Mar. 3 1924	Mar. 10 1924†		Market Quoted	Mar. 12 1923	Feb. 25 1924	Mar. 3 1924	Mar. 10 1924†
Pool 54-64 (Gas and St.).....	New York.....	2.20	1.60	1.60	1.50@. 1.75	Big Seam lump.....	Birmingham.....	3.85	3.85	3.75	4.00
Pool 54-64 (Gas and St.).....	Philadelphia.....	2.15	1.70	1.60	1.50@. 1.75	Big Seam mine run.....	Birmingham.....	2.10	1.80	1.80	1.75@. 1.85
Pool 54-64 (Gas and St.).....	Baltimore.....	2.25	1.50	1.60	1.55@. 1.70	Big Seam (washed).....	Birmingham.....	2.60	2.10	2.10	2.00@. 2.25
Pittsburgh sc'd gas.....	Pittsburgh.....	3.60	2.55	2.55	2.50@. 2.65	S. E. Ky. lump.....	Chicago.....	4.60	3.10	3.10	3.00@. 3.25
Pittsburgh gas mine run.....	Pittsburgh.....	2.55	2.10	2.10	2.00@. 2.25	S. E. Ky. mine run.....	Chicago.....	2.85	1.85	1.85	1.75@. 2.00
Pittsburgh slack (Gas).....	Pittsburgh.....	2.75	1.50	1.50	1.30@. 1.45	S. E. Ky. lump.....	Louisville.....	5.00	3.25	3.25	2.75@. 3.25
Kanawha lump.....	Columbus.....	4.25	2.60	2.60	2.50@. 2.75	S. E. Ky. mine run.....	Louisville.....	2.60	1.80	1.75	1.50@. 2.00
Kanawha mine run.....	Columbus.....	2.60	1.60	1.60	1.40@. 1.65	S. E. Ky. screenings.....	Louisville.....	2.20	1.30	1.30	.90@. 1.25
Kanawha screenings.....	Columbus.....	2.10	1.15	1.10	1.00@. 1.10	S. E. Ky. lump.....	Cincinnati.....	3.75	2.85	3.00	2.50@. 3.00
W. Va. lump.....	Cincinnati.....	3.75	3.00	2.85	2.75@. 3.00	S. E. Ky. mine run.....	Cincinnati.....	2.75	1.75	1.60	1.50@. 1.75
W. Va. gas mine run.....	Cincinnati.....	2.85	1.60	1.55	1.35@. 1.65	S. E. Ky. screenings.....	Cincinnati.....	2.25	1.10	1.00	.85@. 1.00
W. Va. steam mine run.....	Cincinnati.....	2.75	1.60	1.55	1.35@. 1.65	Kansas lump.....	Kansas City.....	4.50	5.00	5.00	5.00
W. Va. screenings.....	Cincinnati.....	2.50	1.20	1.05	.85@. 1.00	Kansas mine run.....	Kansas City.....	3.50	3.50	3.50	3.50
Hocking lump.....	Columbus.....	4.00	2.60	2.60	2.50@. 2.75	Kansas screenings.....	Kansas City.....	2.60	2.25	2.25	2.25
Hocking mine run.....	Columbus.....	2.40	1.85	1.85	1.75@. 2.00						
Hocking screenings.....	Columbus.....	2.00	1.10	1.10	1.10@. 1.20						
Pitts. No. 8 lump.....	Cleveland.....	4.00	2.10	2.35	2.00@. 2.75						
Pitts. No. 8 mine run.....	Cleveland.....	2.90	1.80	1.80	1.75@. 1.90						
Pitts. No. 8 screenings.....	Cleveland.....	2.75	1.35	1.35	1.25@. 1.35						

* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in *italics*.

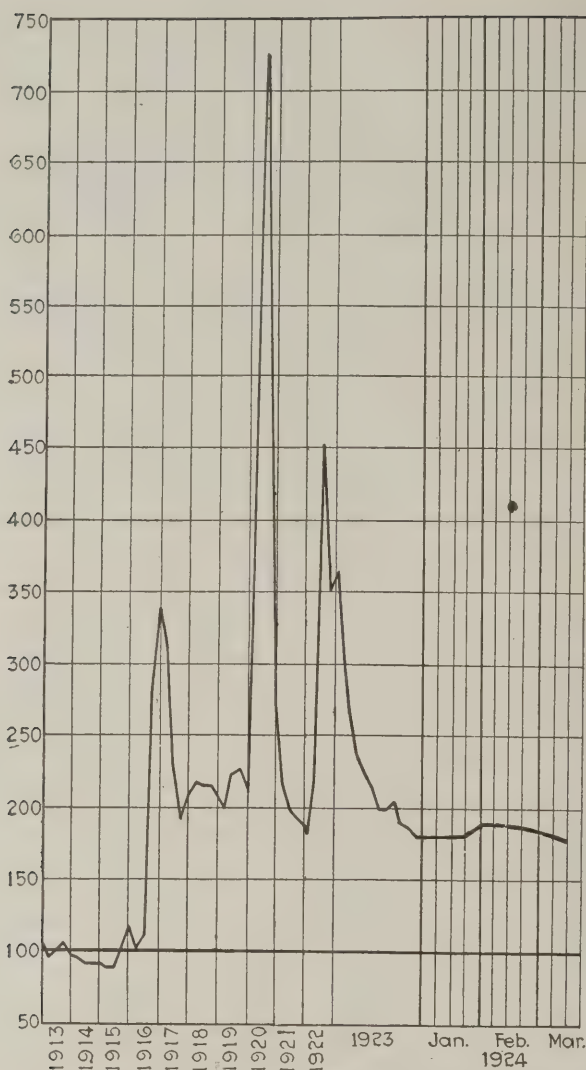
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	March 12, 1923		March 3, 1924		March 10, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34		\$9.00	\$7.75@\$.8.25	\$8.00@\$.9.25	\$8.00@\$.9.25	\$8.00@\$.8.50	8.75@. 9.25
Broken.....	Philadelphia.....	2.39			7.90@. 8.10			8.50@. 10.00	8.75@. 9.25
Egg.....	New York.....	2.34		9.25@. 12.00	8.00@. 8.35	8.00@. 8.50	8.75@. 9.25	7.50@. 8.80	8.00@. 8.35
Egg.....	Philadelphia.....	2.39		9.25@. 11.00	8.10@. 8.35	8.50@. 10.00	8.00@. 8.35	9.25@. 9.75	8.75@. 9.25
Egg.....	Chicago.....	5.06		12.00@. 12.50	7.20@. 8.25	7.50@. 8.80	8.00@. 8.35	9.85@. 11.00	8.90@. 9.25
Stove.....	New York.....	2.34		9.25@. 12.00	8.00@. 8.35	9.25@. 10.00	8.75@. 9.25	7.95@. 9.25	8.00@. 8.35
Stove.....	Philadelphia.....	2.39		9.25@. 11.00	8.15@. 8.35	9.85@. 11.00	8.90@. 9.25	9.25@. 9.75	8.75@. 9.25
Stove.....	Chicago.....	5.06		12.00@. 12.50	7.35@. 8.25	7.95@. 9.25	8.00@. 8.35	9.85@. 11.00	8.90@. 9.25
Chestnut.....	New York.....	2.34		9.25@. 12.00	8.00@. 8.35	9.25@. 10.00	8.75@. 9.25	9.25@. 9.75	8.75@. 9.25
Chestnut.....	Philadelphia.....	2.39		9.25@. 11.00	8.15@. 8.35	9.85@. 11.00	8.90@. 9.25	9.85@. 11.00	8.90@. 9.25
Chestnut.....	Chicago.....	5.06		12.00@. 12.50	7.35@. 8.35	7.95@. 9.25	8.00@. 8.35	7.95@. 9.25	8.00@. 8.35
Range.....	New York.....	2.34			8.25		9.00		9.00
Pea.....	New York.....	2.22		7.50@. 11.00	6.15@. 6.30	4.50@. 5.50	6.15@. 6.65	4.50@. 5.50	6.15@. 6.65
Pea.....	Philadelphia.....	2.14		7.00@. 9.00	6.15@. 6.20	4.75@. 6.50	6.35@. 6.60	4.75@. 6.50	6.35@. 6.60
Pea.....	Chicago.....	4.79		7.00@. 8.00	5.49@. 6.03	4.50@. 5.60	5.40@. 6.05	4.50@. 5.60	5.40@. 6.05
Buckwheat No. 1.....	New York.....	2.22		4.50@. 4.75	4.00@. 4.10	2.25@. 3.50	3.50	2.00@. 2.75	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14		4.00@. 5.00	4.00	2.25@. 3.50	3.50	2.25@. 3.50	3.50
Rice.....	New York.....	2.22		2.25@. 3.00	2.75@. 3.00	1.75@. 2.50	2.50	1.75@. 2.25	2.50
Rice.....	Philadelphia.....	2.14		2.75@. 3.00	2.75@. 3.00	1.75@. 2.50	2.50	1.75@. 2.25	2.50
Barley.....	New York.....	2.22		1.40@. 2.00	1.50@. 2.00	1.50@. 1.75	1.50	1.50@. 1.75	1.50
Barley.....	Philadelphia.....	2.14		1.40@. 2.00	2.00	1.25@. 1.50	1.50	1.25@. 1.50	1.50
Birdseye.....	New York.....	2.22			2.10	1.60	1.60	1.60	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	March 10 1924	March 3 1924	Feb. 25 1924	March 12 1924
Index	181	183	184	268
Weighted average price	\$2.18	\$2.21	\$2.23	\$3.24

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

West Kentucky Faces Trouble

Although demand is off and western Kentucky operators are not loading out any large quantity of coal it can truthfully be said that the operators are maintaining values in the face of rather hard competition from non-union fields and strip mines. Demand for prepared coal has slumped, causing some cancellations and rejections, but production of screenings has been small, and prices have advanced to \$1.25@\$1.40 asked for pea and slack and nut and slack. Prepared sizes continue steady, with block at \$2.7@\$3; lump and egg, \$2.40@\$2.75; nut, \$1.75@\$2.25. Mine run is quoted at \$1.50@\$1.90, but some stripper mine run has been quoted as low as \$1.30, it is reported.

There is every indication that production of the field will be materially reduced in April, as there are indications that there will be a strike, which will affect more than half the production of the field. Ordinarily this would tend to force prices upward, but as it will come at a dull season, it probably will affect only screenings to any material extent.

Prices have weakened about 25c. a ton on all sizes in the eastern Kentucky field over the week. Operations in most of the state fields have slumped and there are not

many mines with much business on their books, while cancellations and rejections on account of warmer weather and lower markets have resulted in more coal on track. It is doubtful whether any coal is being quoted at over \$3.25 a ton today, while some screenings are offered as low as 90c. for nut and slack in the Hazard field.

Northwest Awaits Price Cuts

A softening all along the line was noticeable throughout the Northwest during the past week, although no changes in prices have been announced. This applies to the Head-of-the-Lakes and all the way down to Milwaukee, where soft spring weather did its worst. The supply on hand on the docks is heavy and buyers wait shrewdly. Some of it may have to be moved hurriedly before the spring navigation season opens.

At Duluth Youghioghenny and Hocking were especially weak. About the only customers now are the power companies, which are placing large orders to make up for the lack of water power. The Northern States Power Co. is reported to have contracted for 30,000 tons recently, and to have had the shipment sent to the Twin Cities. Ordinarily these companies would be buying no coal.

A relatively good demand for Pocahontas exists. This is because of the scarcity of desirable hard coal and its high price. The use as a substitute for househeating is the only reason for the demand for Pocahontas.

Official figures of shipments from the docks in February have not been announced, but it is safe to say that the number of cars from the Head-of-the-Lakes will not be more than 14,000. This is practically the same as in February last year and compares most unfavorably with the 25,000 odd cars shipped here in January of this year.

Little Doing in the West

Strengthening of the demand for screenings with an accompanying weakening of the demand for lump and slack resulted in an advance of 25c. a ton on Kansas screenings, to \$2.50, March 1. Mines in the Southwest are working from 50 to 60 per cent of normal, with a steadily growing accumulation of lump and nut "no bills." Shading of list prices on domestic grades continues to increase as the market falls off. Kansas coal is quoted at \$5 for lump; \$4.50 for nut, \$3.25 to \$3.50 for mine run and \$2.50 for screenings.

The market in Colorado is low. The working time dropped to an average of twenty-four hours per mine last week. The chief point of interest is the reduction on March 1 in the prices on all coals from northern Colorado, Crested Butte and Canon City districts. These prices are absolutely the lowest that have ever been quoted from these fields, considering the cost of production. Walsenburg and Canon City lump and nut are \$4.25 and \$3.75 respectively, Trinidad lump and nut are both \$3.50, and Crested Butte anthracite furnace and baseburner sizes are \$6.50.

Utah mines do well to get two days a week nowadays. The heavy cut in prices on domestic two weeks ago produced little business. Low mine production has boosted slack 25c., however, to \$1.50, with screened slack \$2.

Ohio Trade All at Sea

At Cincinnati the whole price line-up shivered this week with the impact of overproduction and disinterestedness of buyers. From top to bottom—from the top grade of specialized coals to the lowliest of the slacks—the shock had a telling effect. The result is that the trade is completely at sea. Coal on consignment has been clogging the avenues of trade for the past week. Again the purchasing agents of large plants north and west from here are using the most effective weapon in their hands—rejections. And while this liquid tonnage is only a small percentage of the total going through this gateway, yet it is, in truth, creating the market price and settling the values in its time accustomed way. Lake buyers are coy—they are not in the market and even tempting offers of price to extend over several months has not caused them to rush in. Slack prices have slid off this week in a surprising way in view of the fact that domestic, egg and other sizes are below normal in the making. Domestic naturally is soft with the retailers refusing to load up with more than immediate requirements. The increase in the make and take out of the smokeless, also has softened that market. There has

been no change in the retail situation. Specialized coals are quoted at \$2.75@3 for egg and \$3.50@4 for block.

The Cleveland market is simply marking time until some of the stockpiles accumulated in anticipation of labor difficulties are used up. Steam consumers generally still have thirty to sixty days' supply on hand, the railroads have ample fuel and are taking only a minimum amount at this time, and public utilities are heavily stocked. Therefore, the producer is receiving little inquiry for fuel and the market is more dull than it has been in many months.

Quiet prevails in all branches of the coal trade in Columbus. Both steam and domestic buyers are using caution in placing orders and there is no disposition to increase stocks under present conditions. This is seen most strikingly in the steam trade, where many large users had accumulated stocks in anticipation of a suspension. With the settlement of the wage scale these users shut off orders and are now gradually reducing reserves. This is having its effect on trade and buying is limited to only a small amount sold off the open market to fill in or where prices have been made attractive. Utilities are not buying to any extent and the same is true of railroads. Iron and steel plants are taking some tonnage, but not sufficient to cause much stir in the market.

The spot market at Pittsburgh is extremely dull, but this makes little difference as at no time recently has there been much tonnage moving in the spot market. The chief movement has been on regular contracts for the coal year and on less formal arrangements whereby shipments were continued and prices were agreed upon periodically, generally from month to month. Spot prices show no change except for a decline in slack. In mine-run and lump operators are simply holding prices, despite the light demand in the spot market, as they see no advantage in cutting. Operators report that there has been little if any decrease in coal production in the Pittsburgh district in the past two or three weeks.

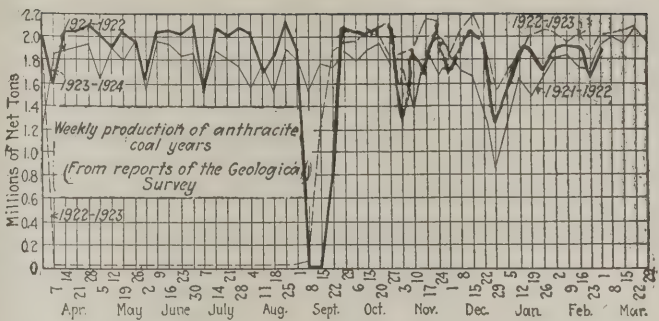
Operators in central Pennsylvania report a dull market, with prices low. Manufacturing plants generally have a sixty-day supply of fuel on hand. Contract prices range from \$2.10 to \$3.

Demand at Buffalo is up to normal and promises to continue so right along, but output still is in excess of needs, and so long as that lasts the market must remain dull.

Inquiry Lacking in New England

In New England the past week brought forth no new developments whatever. Both all-rail and by water there is a dearth of inquiry, and shippers are hard put to it to find places for coal. Practically every large consumer is determined to let his present stock run down to the narrowest prudent margin, and certainly in the current situation there is no inducement to make purchases much in advance of actual consumption.

In the smokeless districts mining is barely on a 40-per cent basis, and except for certain contract requirements there is nothing even approaching stable demand. The Virginian piers have a reasonably large supply on hand, but few agencies now care to take the chance of sending coal down more than a short time in advance of requirements. Coastwise trade is dull, and offshore there is relatively little tonnage moving. From day to day there are occasional inquiries for spot cargoes, and on these the price varies from \$4.60 to \$4.80 per gross ton f.o.b. vessel. No. 1 Navy Standard Pocahontas and New River are selling at \$4.70@4.75, but among buyers here there is a feeling



that quotations are bound to be lower later in the month, a \$4.50 level being anticipated for April. This would make the net price at the mines somewhat less than \$2 per gross ton, and should any such price carry through it is easy to see there will be only a very restricted market in New England for coals other than Pocahontas and New River.

The all-rail situation shows no hopeful sign. East of the Connecticut River, smokeless shippers have every reason to expect that they will have the call, and so long as railroad tariffs are maintained on their present scale central Pennsylvania tonnage reaching this market is certain to be small. Both at New York and at Philadelphia only minimum tonnages are being dumped over railroad piers, and in this market Pennsylvania coal even by water is seldom heard from.

Inactivity Prevails in Seaboard Markets

The recent condition of inactivity in the Atlantic seaboard markets still prevails. New York dealers are order hunting, but with indifferent success. At Philadelphia the trade runs along quietly, there no longer being any disturbing factor to cause the consumer to be anxious about his future coal supply. While this market has shown no outward signs of taking an unusual tonnage since the first of the year, still much coal has been moved. The price situation is unchanged, there having been little variation for a couple of months.

Feelers for contracts have appeared at Baltimore. Closings on this class of business are not heavy as yet, but there are signs that the policy of purchasing in the open market at prices still some 15c. off the spot level is beginning to break. A meeting of representatives of the Monongahela Coal Association, the Northern West Virginia Coal Operators' Association and the United Mine Workers to be held in Baltimore during the coming week is expected to settle the wage situation in northern West Virginia for the period after April 1.

Various factors have combined to depress prices not only of high-volatile but of low-volatile coals as well in West Virginia since the first of March. Settlement of the wage controversy, milder weather and a material increase in the car supply have all been factors tending to weaken prices owing to the fact that buying is on a limited scale and fuel supplies at the mines and in the market are plentiful.

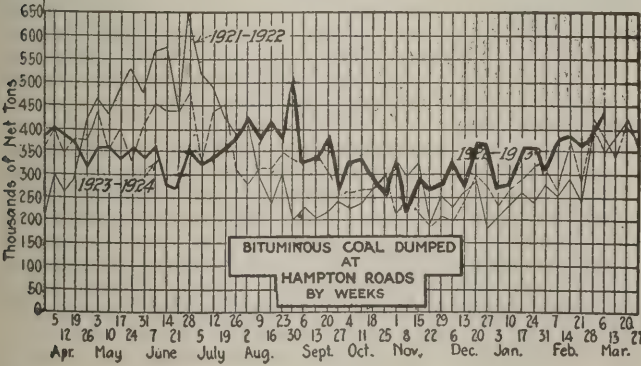
Anthracite Now a Weather Proposition

With spring officially only two weeks off, the anthracite situation in New York is swayed by temperature—if not temperament. Stove is in good demand; but some of the yards have none. Some companies are breaking egg to stove and nut sizes.

March having been quite mild thus far, the Philadelphia consumer is doing his best to get by the balance of the season with as little coal as possible. Dealers do not have the least trouble now to get all the coal they want, and of any size; just now they seem to be trying to manipulate their stocks so as not to have an excess on hand when April 1 arrives. Similar conditions prevail in Baltimore.

Car Loadings, Surpluses and Shortages

Week ended Feb. 23, 1924.	Cars Loaded			
	All Cars	Coal Cars	Surplus Cars	Car Shortage
Week ended Feb. 23, 1924.	845,898	175,834		
Previous week.	935,109	194,295		
Same week in 1923.	830,187	188,558		
			All Cars	Coal Cars
Feb. 22, 1924.			125,177	48,252
Previous week.			127,415	46,293
Same date in 1923.			20,786	5,322



Foreign Market And Export News

British Coal Market Shows Firm Tendency; Output Declines Slightly

The firmness of the Welsh coal market is very well maintained, probably due to the fact that the collieries are still in arrears owing to the rail and dock strikes. As a result many Continental buyers are clamoring for coal, fearing a miners' strike in April and desiring to lay in stocks. There are rumors that much business has gone to America and Germany because of the tardiness of Welsh deliveries. The Italian and Near East business has fallen off, though the demand from South America is satisfactory. The Egyptian State Rys. has purchased 50,000 tons of steam coals.

Coal production at British mines during the week ended Feb. 23, a special cable to *Coal Age* states, totaled 5,802,000 tons, according to the official reports. This was a decline of 19,000 tons from the week ended Feb. 16, when 5,821,000 tons was produced.

The situation in Newcastle is unchanged though prices are showing a tendency to rise. Though the dock strike introduced an element of doubt on the part of buyers, the collieries kept busy clearing off arrears.

Negotiations between the miners and the colliery owners were resumed on March 6 and there is good reason to hope that a mutually satisfactory basis for a new wage agreement will be arrived at before the expiration of the present one, on April 17.

Market Tone at Hampton Roads Dull; Prices Tend Downward

Business at Hampton Roads shows little change, with considerable movement in all branches of trade, but practically all activity on direct orders or old contracts. Spot business is dull, and prices show a downward tendency.

Actual movement is fairly heavy, coastwise, foreign and in the bunker trade. Italy is getting a big share of the movement, while several large car-

goes were noted bound for French ports. The tone of the market is dull.

Increase in general shipping continues to affect the bunker trade, and the outlook is pronounced by shippers to be bright. No big contracts have been reported, though several were rumored.

French Industrial Inquiry Brisk; Domestic Demand Better

Industrials, anxious to escape the high prices for British coal, are taking to French coal whenever possible. Inquiries are in greater volume than production. The demand for house coals also has increased, due to the cold weather.

The 3 fr. cut in coal prices is now applied in all the mines, except the Houve and Petite Rosselle collieries, in Lorraine, and the Mines Domaniales de la Sarre.

French consumption of Sarre coal has increased, having now reached an average of 45 per cent of the capacity of the field, compared to 30 per cent in 1921.

In the matter of indemnity fuels the Office des Houillères Sinistrées is not filing any new orders, only furnishing coal on contracts in course of execution. Prices remain unaltered.

Coke deliveries continue to come through in fair volume. Renewal of the agreements for the delivery of indemnity fuels expiring on April 15 is now being discussed between the Inter-Allied Mission and German industrials.

United States Coal and Coke Imports During January

(In Gross Tons)	1923	1924
Anthracite.....	11,331	8,228
Bituminous.....	337,649	43,751
Imported from:		
United Kingdom.....	142,349	3,675
Canada.....	179,639	37,854
Australia.....	11,525	
Other countries.....	4,136	2,222
Coke.....	8,307	7,979

United States Coal and Coke Exports During January

(In Gross Tons)	1923	1924
Anthracite.....	356,016	272,005
Bituminous.....	1,092,084	1,045,587
Exported to:		
France.....		15,285
Italy.....	6,361	95,172
Netherlands.....	511	2,092
Other Europe.....		
Canada.....	1,001,650	745,232
Panama.....	9,440	
Mexico.....	6,534	5,828
British West Indies.....	1,139	4,026
Cuba.....	59,664	50,529
Other West Indies.....	6,253	28,912
Brazil.....		49,790
Chile.....		7,097
Egypt.....		7,418
French Africa.....		7,950
Other countries.....	531	26,256
Coke.....	77,759	53,117

Export Clearances, Week Ended March 8, 1924

FROM HAMPTON ROADS

For Canada	
Amer. Schr. Margaret Spencer, for St. Georges.....	1,209
Br. SS. Bonny, for Second.....	1,018
For Chile	
Br. SS. Mount Berwind, for Iquique.....	3,000
For France	
Fr. SS. Wesseling for Marseilles.....	6,667
Fr. SS. P. L. M. 21 for Marseilles.....	7,913
Fr. SS. P.L. M. 20 for Marseilles.....	7,849
Nor. SS. Asator for Nantes.....	4,365
For Greece	
Br. SS. Wearpool for Piraeus.....	7,661
For Italy	
Ital. SS. Pelotas for Trieste.....	6,987
Ital. SS. Independente for Genoa.....	4,528
Ital. SS. Labor for Genoa.....	5,878
Ital. SS. Robilante for Genoa.....	9,447
For Jamaica	
Dan. SS. Borglum for Port Antonio.....	3,233
For West Indies	
Amer. Schr. Albert H. Willis for Santo Domingo.....	637

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	Feb. 28	March 6
Cars on hand.....	1,236	1,403
Tons on hand.....	80,705	85,399
Tons dumped for week.....	145,514	185,418
Tonnage waiting.....	20,000	25,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,006	1,429
Tons on hand.....	71,200	96,950
Tons dumped for week.....	95,587	117,679
Tonnage waiting.....	8,226	9,562
C. & O. piers, Newport News:		
Cars on hand.....	1,226	1,469
Tons on hand.....	69,200	69,555
Tons dumped for week.....	93,694	88,361
Tonnage waiting.....	9,400	4,840

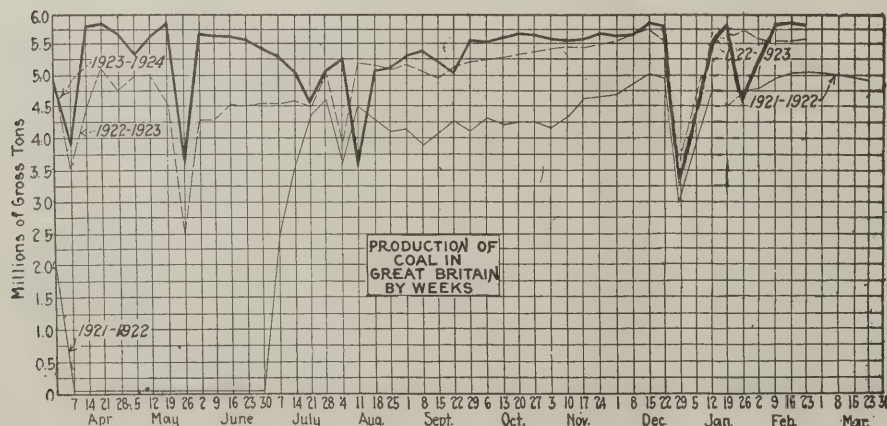
Pier and Bunker Prices, Gross Tons

PIERS	March 1	March 8†
Pool 9, New York....	\$5.00@ \$5.25	\$5.00@ \$5.25
Pool 10, New York....	4.75@ 5.00	4.75@ 5.00
Pool 11, New York....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia..	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia..	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia..	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads..	4.75@ 4.85	4.75
Pools 5-6-7 Hamp. Rds.	4.25	4.15@ 4.25
Pool 2, Hamp. Roads..	4.50@ 4.60	4.50
BUNKERS		
Pool 9, New York....	5.30@ 5.55	5.30@ 5.55
Pool 10, New York....	5.05@ 5.30	5.05@ 5.30
Pool 11, New York....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia..	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia..	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia..	4.65@ 5.10	4.65@ 5.10
Pool 1, Hamp. Roads..	4.85	4.75
Pool 2, Hamp. Roads..	4.60	4.50
Pools 5-6-7 Hamp. Rds.	4.35	4.25

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to Coal Age	March 1	March 8†
Cardiff:		
Admiralty, large	28s. 6d.	27s. @ 28s.
Steam smalls...	20s.	18s. @ 20s.
Newcastle:		
Best steams...	25s. 6d. @ 27s. 6d.	26s. 6d. @ 26s. 9d.
Best cas.....	25s. 6d.	25s. @ 25s. 3d.
Best bunkers...	25s.	24s. 6d. @ 25s.

† Advances over previous week shown in heavy type declines in italics.



Traffic News

Indiana Intrastate Rates

Drop April 1

An advance copy of the decision of the Public Service Commission, which orders a reduction in the rates on bituminous coal from Indiana mines to practically all consuming points within the state, has been received by Jonas Waffle, secretary of the Indiana Coal Traffic Bureau. The order requires the carriers to establish the reduced rates effective April 1, 1924. The extent to which reductions will be made from the Linton and Clinton groups to typical consuming points is shown in the following statement:

	Brazil-Clinton		Linton-Sullivan	
	Old Rate	New Rate	Old Rate	New Rate
Anderson.....	\$1.58	\$1.48	\$1.58	\$1.48
Angola.....	2.36	1.90	2.46	2.00
Bloomington.....	1.51	.95	1.13	.95
Connersville.....	1.70	1.48	1.70	1.48
Fort Wayne.....	1.76	1.65	1.81	1.75
Greencastle.....	1.13	.95	1.13	.95
Lafayette.....	1.45	1.38	1.55	1.38
Michigan City.....	1.70	1.60	1.80	1.70
Muncie.....	1.58	1.48	1.58	1.48
Stroh.....	2.33	1.90	2.43	2.00
Union City.....	1.76	1.58	1.76	1.20
West Lebanon.....	1.45	1.20	1.55	1.20

Mr. Waffle states that while the reductions ordered by the commission are somewhat less than those suggested at the hearing, the new rates will be a big improvement over the present adjustment and will eliminate to some extent the discrimination which exists between the Indiana rates, on the one hand, and those from the Eastern producing fields on the other.

Assigned-Car Order Postponed Yet Again

The Interstate Commerce Commission has again postponed the effective date of its order restricting the use of assigned cars to bituminous-coal mines from April 1 to June 1, 1924. This is the seventh postponement of the order.

To Discuss Lignite Rates

Rates on lignite from points of origin in North Dakota to points of destinations in South Dakota and Minnesota as well as to intrastate destinations, will be discussed at an Interstate Commerce Commission hearing to be held in Bismarck, N. D., April 21. Examiner Wagner will preside.

Frisco About to Build Nine-Mile Cut-Off

The Frisco railroad will begin construction this spring of the nine-mile cut-off from Schuster, Okla., through the new coal field west of Henryetta, Okla., to again connect with its main line at Creek mine on the south according to report. The survey of this line was made and the right of way purchased last summer. This cut-off will open up the new coal field on the west-

ern limits of Henryetta. This report previously has been regarded merely as a device to keep the M. K. & T. out of Henryetta. An application by the M. K. & T. road is now before the Interstate Commerce Commission seeking an extension of its line from Oktaha to a junction with the Okmulgee Northern short line, which would be extended to Henryetta. The coal west of Henryetta is said to be much harder than that produced closer to town, and has no middle band, thus permitting it to be mined at less expense.

Virginian and N. & W. Cuts Rates to Washington

It has been announced by the Virginian and the Norfolk & Western rys. that the rate on coal from mines on those roads to Washington will at once be established at \$2.84 per gross ton. Shippers in the New River district have been enjoying the same rate for some time over the Chesapeake & Ohio. The action of the Norfolk & Western and the Virginian simply puts the Washington rate on a parity with the rate already established by the Chesapeake & Ohio.

C. & O. Reduces Rates Outside New River Field

Freight rates on coal from points on the Chesapeake & Ohio other than the New River field have been reduced to the extent of 5c. a ton, as the result of a conference between W. P. Tingley, manager of the traffic department of the Jobbers and Manufacturers bureau of the Huntington Chamber of Commerce, and A. P. Gilbert, general freight agent of the road. The new rate will be \$1.08 per ton instead of \$1.13 and the new rate into Huntington from the New River district will be \$1.28 per ton instead of \$1.33, which previously prevailed.

It is estimated that the reduction will result in a saving of at least \$5,000 a year to the users of coal in Huntington. In Kenova it is estimated that from 160,000 to 170,000 tons of coal yearly are consumed, so that industries in the city named will effect a saving of from \$8,000 to \$8,500 per year.

Southern Roads Plan Betterments

The Central of Georgia Ry. will expend from \$5,000,000 to \$6,000,000 in eliminating heavy grades, sharp curves and grade crossings on its line between Birmingham, Ala., and Columbus, Ga., contracts to be let about April 1.

The Southern Ry. will begin work at an early date installing a complete block system of signals between Birmingham and Atlanta. A telephone line also will be constructed which will carry a double circuit for use in dispatching trains and another line for miscellaneous company business.

W. D. Beck Moves Up

W. D. Beck, having been appointed chairman of the Chicago Operating Committee, American Railway Association, also has been appointed district manager and manager refrigerator department of the Car Service Division, in place of J. M. Egan, resigned, to accept position of vice president, Missouri Pacific R.R. The change became effective March 1, 1924.

Would Build New 16-Mile Line In Cambria County, Pa.

The Conemaugh & Blacklick R.R. has applied to the Interstate Commerce Commission for permission to issue \$1,000,000 of capital stock, the proceeds to be used in the construction of sixteen miles of new line in Cambria County, Pennsylvania.

Obituary

Morgan R. Morgan, aged 76, one of the best known mining men in the Wyoming Valley, Pennsylvania, died March 8 at the City Hospital, Wilkes-Barre, Pa., following a six months' illness of diabetes. For many years Mr. Morgan was general inside superintendent of the Lehigh Valley Coal Co. in charge of the Wyoming Valley operations. He retired from active duty about five years ago. Mr. Morgan was born in Llandoverly, Wales, in 1848, and came to America in 1867, settling in the Wyoming Valley, where he was first employed as a miner at the Empire Colliery. In 1887 he was made mine foreman of the Wanamie and Stanton mines of the Lehigh & Wilkes-Barre Coal Co., and in 1891 became general superintendent.

Robert L. Hearon, 59, traffic manager of the Colorado Fuel & Iron Co. and vice-president and general manager of the Colorado & Wyoming Railway Co., died in Pueblo, Colo., March 1 after a long illness. He had been traffic manager for the fuel and iron company since 1907.

Coming Meetings

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Fuel Saving Conference, April 2 and 3, William Penn Hotel, Pittsburgh, Pa. Secretary, J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

Canadian Retail Coal Association. Annual meeting, April 3 and 4, King Edward Hotel, Toronto, Ont., Can. Secretary, B. A. Caspell, Brantford, Can.

American Institute of Electrical Engineers. Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

News Items From Field and Trade

ALABAMA

A report from Gadsden is to the effect that a \$25,000,000 St. Louis syndicate is negotiating for the purchase of 25,000 acres of coal and ore lands in Etowah and DeKalb counties, the same company having recently acquired 41,000 acres of these mineral properties in Marshall County. It is reported that the erection of several furnaces near Attalla is contemplated and also on the Tennessee River, near Guntersville. It is said that plans are under way in connection with the Scullin Steel Co., of St. Louis, to develop that city as a steel-making center.

Organization of the Deep Water Coal Co., with a capital of \$15,000,000 was announced at Birmingham, March 1. L. B. Musgrove, of Jasper, Ala.; C. A. Meade, formerly vice-president of the DuPont Powder Co., and C. A. Lask, New York attorney and capitalist, are the three leading officials of the new company, which recently purchased 500,000 acres of coal lands in Jefferson, Walker and Winston Counties. The main office will be at Jasper. Mr. Musgrove said this will be one of the largest coal companies in the United States. Tipples will be constructed immediately, and Mr. Musgrove thought that the company would be in operation soon.

ALASKA

Complete electrification of the Evan Jones mine, in the Matanuska field, will soon make that the most modern coal mine in Alaska. A tunnel 1,300 ft. long will be driven from the bunkers at the foot of the hill directly into the underground workings, eliminating a slope. The mine is owned by Oscar Anderson, Z. J. Loussac and Jack Collins.

COLORADO

The Crown Fuel Co., with mines in the northern Colorado lignite fields, paid \$6,604 in back wages to ninety miners in the Crown mine at Marshall, last week. These settlements came about through the combined efforts of the State Industrial Commission and the Attorney General's office, after the case was placed before them by the men. When the miners were not paid, they refused to work on Feb. 2, conducted a mass meeting and sent representatives to place their case before the state officials. According to the members of the Industrial Commission the miners will return to work immediately.

The new Oliver Fuel & Coal Products Co. mainly made up of Kansas City, Mo., capital, has organized to develop coal land near Paonia, in the Canon City field.

ILLINOIS

The Chicago Section of the American Institute of Mining Engineers, held its annual election on Feb. 14, at which time the following officers were elected for the ensuing year: Chairman, John A. Garcia, vice chairman W. R. Wright, secretary-treasurer, Keith Roberts, executive committee members, H. T. Walsh and H. P. Gillette.

A new mining record was set for Saline County when on Feb. 28 the Harco mine of the Harrisburg Colliery Co. hoisted, screened and loaded into railroad cars 4,730 tons of coal in eight hours. This surpasses the previous Saline County record by 593 tons. It was only recently that Big Creek No. 3 mine hoisted 4,187 tons of coal in eight hours, taking the honors previously held by the Harco mine by 25 tons.

The Andrew mine of the Springfield District Coal Co. has been closed for an indefinite period, laying off 250 men.

Prepared to spend a half million dollars in its development, the Crerar-Clinch Coal Co., of Chicago, has completed plans for the opening of a new strip mine on an acreage about two miles north of Du Quoin. The operating company is the new Gayle Coal Co. The company has purchased 133 acres of land located immediately on the east side of the main line of the Illinois Central right of way, and is a part of the old Williams and Henry H. Kimmel farms. The vein underlying is 6 ft. and over in thick-

ness with about 25 to 28 ft. of overburden. The equipment will be electrically operated. The Illinois Central has begun construction of the switch and it is estimated that approximately three miles of track will be used in handling the output of the strip mine when operating. Elmer Mayor, of Du Quoin, will have charge of the operations at the new strip pit. This is the third new strip mine in the Du Quoin district. The other two are the mines of the Scott, Smith Coal Co., a large stripping concern just south of Du Quoin, and of the Hartshorn Coal Co. just west of Elkhartsville, controlled by the Hartshorn interests, of Danville.

F. F. Green, of Christopher, who was chief engineer, has been promoted to be superintendent of the Valier Coal Co.'s mine at Valier. Charles E. Anderson also of Christopher, who was former mine manager when the New North mine of the Old Ben Coal Co. reached its highest record in tonnage output, has been appointed as mine manager for the Valier mine.

INDIANA

Are railroads in Indiana weighing coal shipments as required by law? The Indiana Coal Merchants Service Bureau, Inc., acting for six complaining coal companies of Indianapolis argued before the I. C. C. in a recent hearing, that the Monon, Big Four and Nickel Plate railroads are not, and that, as a result, coal is billed by the roads at excessive weights and these errors were not corrected. A commission report is expected early in the summer.

Three shifts of men are working on the bottom of Francisco mine No. 2, which was opened recently near Princeton, after having been closed for several weeks because of a fire. Falls of slate in different parts of the mine caused the most damage. The debris is being cleaned away and port timbers replaced. The mine will be ready to resume operations this week.

Walter Bledsoe & Co., recently added the Ventura coal mine in Indiana, on the Big Four railroad, to its list of collieries. The new mine has a daily capacity of 1,500 tons and its coal is No. 5, seam.

Union miners in District 11, which includes all the Indiana coal field except the block coal district, which is No. 8, held a district convention in Terre Haute, March 11. Only matters pertaining to the district organization and constitution were discussed. John Hessler, of Terre Haute, is president of the district, and William Mitch, also of Terre Haute, is secretary-treasurer.

IOWA

Many small coal mines of southern Iowa would be saved the expense of constructing a second opening to their shafts by an amendment to the Senate to the general mining law. The House of Representatives has passed an amendment providing that all mines should have at least two exits for safety purposes, but Senator Shane, of Wapello County, successfully sponsored an additional clause, giving the mine inspector discretion as to the enforcement of this section in the case of small mines, where only a few are employed. Without this amendment, he contended, the new law would work a hardship on many small companies.

The Shuler Coal Co., with mines at Alpha, Ill., has opened offices at 506 Kuhl Building, Davenport. S. K. Marsh has been appointed manager of the Davenport office.

KENTUCKY

The federal court at Maysville, recently issued a temporary injunction against striking employees of the Liberty Coal & Coke Co., Pineville, to prevent them from interfering with the company, or carrying out alleged threats of violence. Thirty-eight workers, members of the United Mine Workers of America, and President John L. Lewis, are named in the order. The miners went out on strike over a disagreement as to wages.

Following a meeting of the board of directors of the Reinecke Coal Co., Madisonville, on Feb. 26, a statement was

issued to the effect that it had been decided to close down the mines for an indefinite period due to high production cost, low prices and inability to operate profitably under existing conditions.

Involuntary bankruptcy proceedings have been instituted at Covington against the Green Rock Coal Co., of Riceville, and the Harlan Co-operative Coal Co., of Harlan.

The Storm King Coal Co., at Storm King, on the L. & N. RR., near Whitesburg, closed down indefinitely on March 1 following six months of unprofitable operation. Over 150 men are employed in the mines.

MICHIGAN

The firm of Charles A. Floyd & Co. has been organized for the purpose of handling securities, particularly in connection with coal properties and the coal business with offices in the Dime Bank Building, Detroit. The company is capitalized at \$50,000 and the officers are as follows: Charles A. Floyd, president of Kennedy, Floyd & Co., president; A. H. Green, Jr., president of Charcoal Iron Co. of America, vice-president; H. J. Eckenrode, president of the National Plate Glass Co., secretary and treasurer; Merlin Wiley, formerly Attorney General of the State of Michigan, general counsel.

The new representative of the Falk Corporation in Detroit is Charles C. Walsh, 1500 Real Estate Exchange Bldg. He will sell Falk herringbone gears and Falk-Bibby flexible couplings.

MISSOURI

In an effort to find a domestic market in St. Louis for their coke, the St. Louis Coke & Chemical Co., with plants in Granite City, has opened up sales office with H. S. Graves in charge, formerly of the Graves Coal & Coke Co.

The Mitchell & Lovell Coal Co. has closed the mine known as the old Mitchell mine but is placing additional men in the Busy Bee mine as fast as possible.

NEW YORK

Bids have been requested by the New York, Susquehanna & Western R.R. for 32,240 gross tons of No. 1 buckwheat, to be delivered as may be designated during the period April 1, 1924, to March 31, 1925. Bids are to be submitted by noon, March 19.

The Erie R.R. has asked for bids for its coal requirements during the period April 1, 1924, to March 31, 1925, proposals to be submitted not later than noon, March 19. The requirements consist of 1,040 gross tons grate coal; 500 tons each of egg and stove coals; 1,000 tons chestnut coal; 7,800 tons pea coal; 174,200 tons No. 1 buckwheat; 20,800 tons rice coal; 190,000 net tons bituminous mine run, 5,000 net tons fine washed blacksmith; 20,800 net tons screenings; 20,800 net tons prepared stoker coal and 1,458,400 net tons bituminous mine run. The specifications provide that prices are subject to readjustment in case existing rates for mine labor are changed.

The annual banquet of the Bituminous Coal Association of the Buffalo district took place in the neighboring village of Williams-ville on Feb. 28, with about 75 in attendance, including several from Pittsburgh, Cleveland and other coal centers. A. L. Stubbs, local agent of the J. P. Burton Coal Co., of Cleveland, was in charge of the program.

Directors of the Lehigh & Wilkes-Barre Coal Co. have declared a dividend of \$5 a share on the capital stock payable March 1, to stockholders of record Feb. 20.

The Steamship Fuel Corporation, of New York City, which also has offices in Philadelphia, Boston, Baltimore, Springfield and Norfolk, announces the opening of a sales office at 872-74-76 Ellicott Square, Buffalo, N. Y., in charge of J. Fred Morlock.

The Pittsburgh Terminal Coal Co. has opened an office in the Prudential Building, Buffalo, and placed it in charge of J. E. Doran, of Pittsburgh.

NORTH DAKOTA

State officials are directing forces fighting a fire of mysterious origin in a mine of the Haynes Coal Mining Co., at Haynes. Officials hope to keep the blaze from spreading to adjoining lignite mines owned by North Dakota and South Dakota. The two states have been asked to advance \$50,000 each to help extinguish the flames. The Haynes Mine was damaged last year by a fire set by a crazed miner.

OHIO

A fire at the mine of the North Hocking Coal Co., near Murray City, destroyed the tippie and much valuable machinery. Work will be stopped for some time and about 75 men are thrown out of employment.

A meeting of a number of locals of the United Mine Workers of Southern Ohio will be held soon, when steps will be taken to iron out a number of difficulties with the operators on the mining scale. A movement is on foot to have the miners waive payment for all dead work, which has been costing the operators about 50c. on the ton for all coal produced in the district.

Failure of the Rome Coal Co., of Columbus, to pay its delinquent premiums under the Ohio Compensation law caused action to be taken for a receiver in the local courts. Willis Liggett was named receiver in the action brought by Attorney General Crabbe of Ohio. The delinquent premiums amount to \$1,171.78.

William J. Hamilton, head of the W. J. Hamilton Coal & Coke Co., Columbus, has filed a petition in voluntary bankruptcy in the federal court at Columbus listing liabilities at \$281,079.95 and assets of \$126,753.48. Of the liabilities \$156,534.82 are unsecured and \$55,792.26 are secured. The assets consist of land in Morgan and Perry counties, underlaid with coal valued at \$13,238, accounts receivable of \$100,951.37; promissory notes of \$6,524.29; office furniture, \$4,137.26 and a small amount of cash. Mr. Hamilton has been in the jobbing business in Columbus for about 20 years.

The Majestic Coal Co., Marion, has been chartered with an authorized capital of 500 shares, no par value designated, to mine coal and deal in coal and coke. Incorporators are E. G. Fickell, R. B. Baldwin, Arthur S. Burket, E. L. Kaiser, and M. V. Kessler. Offices of the company are at 150 Center St.

Papers have been filed with the Secretary of State, authorizing the increase in capital stock of the Beluan Coal Co. from \$450,000 to \$650,000. C. A. McFadden is president and O. G. Beans, secretary of the company.

The accounting department of the Ft. Dearborn Coal Co. has been moved from Chicago to Cincinnati and will be under the direction of Lake Bobbitt. Sales offices of the company will continue in Chicago for the Western territory. The headquarters of the company will be moved to enlarged quarters on the eighth floor of the new Frederick H. Schmidt Co. Building.

The Hatfield-Reliance Coal Co., of Cincinnati, has been chartered with an authorized capital of \$10,000 to produce, buy, sell and deal in coal and building materials. Incorporators are: John G. Metcalf, J. T. Metcalf, F. J. Ed. Bramlage, John W. Stinborn and William J. Mulhivill.

OKLAHOMA

The Montezuma Creek Coal Co. has been incorporated at Okmulgee with a capital of \$50,000. The incorporators are Harlan Reed, H. D. Loyd and Ruth Barnett, all of Okmulgee.

A labor lien claim totalling \$23,299.10 has been filed at Henryetta by United Mine Workers union local No. 3061 in the case of W. H. Crume as trustee against the Southwestern Coal & Oil Co., of Okmulgee. The miners allege a prior claim over and above the First National Bank of Okmulgee, the petitioner in the receivership action. Harlan Reed, an official of the coal company, and W. T. Bowling are receivers.

The Black Diamond Coal Co., which recently began operating in the Garland district, shipped its first carload of coal early in February. It went to northeast Arkansas. There are approximately a dozen strip-pit enterprises now in operation.

PENNSYLVANIA

Wurley W. Gillett has resigned as purchasing agent of the Hillman Coal & Coke Co., of Pittsburgh, and has taken an interest and part of the management of Gellatly & Co., manufacturers' agents, Oliver Building, Pittsburgh.

George S. Baton, of Baton & Elliott, consulting mining engineers, Pittsburgh, has been placed by the Union Trust Co., of Pittsburgh, in charge of the operations taken over from the receivers of the American Coke Corporation a few months ago. The plants consist of American Nos. 1 and 2, at Linn and Martin respectively, both in Fayette County. No. 1 has 142 beehive ovens, but is nearly worked out, having only about 25 or 30 acres of available coal left. No. 2 has 240 beehive ovens and has

a large body of unworked coal still remaining. No move has yet been made to resume operations at either of these plants, which have been idle since last November.

The General Grievance Committee of the Hudson Coal Co. adopted a resolution March 1 protesting against the order of Governor Pinchot, and concurred in by Joseph Walsh, State Secretary of Mines, that "all mine inspectors shall work for a period of two months without compensation" and asking that "vacancies in three anthracite districts" now existing be filled, "so that proper care can be taken that life and limb shall be preserved about the anthracite mines." The resolution was accompanied by a letter to the Governor requesting reconsideration of his order and that action be taken along the line suggested.

A threatened strike of 800 employees at the Pine colliery of the Glen Alden Coal Co. was settled at a conference, March 4, between Rinaldo Cappellini, president No. 1 district, United Mine Workers of America; W. W. Inglis and S. B. Dimmick, president and general manager Glen Alden Coal Co. This controversy has been three years in process of settlement.

Earnings of the Bucyrus Co., of Milwaukee, during 1923 were \$25.50 per share on the common stock, which was the largest in the history of the company, according to President W. W. Coleman's letter to stockholders. The total earnings for the year after all deductions was \$1,299,932, as compared with \$746,301 in 1922 and \$1,010,985 in 1920, the best previous year. The company went into 1924 with a larger volume of orders on its books than it had at the opening of 1923.

The Carnegie Coal Co. with big holdings in Washington County, has filed with the recorder a mortgage of \$7,500,000, given to the Colonial Trust Co. of Pittsburgh, to secure the first mortgage 6 per cent serial gold coupon bonds issued by that firm.

The following coal companies were incorporated recently at the State Department at Harrisburg: W. G. Robertson Coal Co., Scranton, mining and preparing coal for the market; capital, \$50,000; treasurer, A. A. Sweetser, 1402 Price Street, Scranton. Incorporators: W. G. Robertson, A. A. Sweetser and J. Henry Jones, Scranton. Ampere Coal Co., Scranton, mining and preparing coal for the market; \$75,000; incorporators, A. A. Sweetser, 1402 Price Street, Scranton, treasurer; W. G. Robertson and J. Henry Jones, Scranton. The Homer Coal Co. Co., the Purity Coal Company and the Grazer Coal Mining Company have notified the State Department they have merged into the Cosgrove-Meehan Coal Co., of Pennsylvania, with a capital stock of \$315,000. J. E. Graham, Johnstown, is treasurer.

WEST VIRGINIA

Net earnings of the Clinchfield Coal Corporation in 1923, according to the annual report of the company, just out, were \$1,011,690.67 before fixed charges, the latter item amounting to \$107,881.70, leaving net income after fixed charges \$903,808.97. During the year \$246,104.35 was expended on improvements and developments. Output was 2,323,133 tons, an increase of 44,101 tons over 1922 and the largest yearly output in the history of the company. The cost of coal, including selling expenses, for the year averaged \$2.3979; the average price for the year, f.o.b. at the mines, for all coal was \$2.7549, and the coal earnings, before interest, dividends and federal taxes, were 35.7c. per ton.

A heavy fire loss was sustained by the Low Moore Co. when the large tippie at the No. 1 operation, at Kay Moor, was completely destroyed by fire, the loss amounting to \$125,000. This was one of the largest tipples on New River and among other equipment destroyed was the crushing plant conveyor and three storage bins in which there was fully one thousand tons of prepared coal for use in coke ovens. It was possible to save the incline leading to the mine only by tearing out a portion of it in order to block the spread of the fire. The power house was not damaged, being of stone construction. It will require several months to replace the tippie. It will be replaced however by a tippie even larger and of more modern design than the one destroyed. In the meantime a temporary tippie has been constructed so as to permit continuous mining of coal for use in the company ovens.

The Kenova-Lincoln Coal Corporation has been organized by Virginia and West Virginia capitalists for the purpose of developing coal lands in Wayne and Mingo

Counties. This company, with a capital stock of \$100,000, has purchased 500 acres of coal and will begin the development of the acreage acquired within a short time. Organization of the company has been perfected by the election of the following officers: W. R. White, Bristol, Va., president; E. A. Schubert, Roanoke, Va., vice-president; W. H. Shelby, Huntington, treasurer. The company will have its principal office at Kenova.

The Katherine mine of the Antler Coal Co., at Lumberport, has been sold to the Sitnek Coal Mining Co., together with 200 acres of Pittsburgh coal. The new purchasers include Louis Sitnek, of Philadelphia; Ralph L. Rankin, secretary and treasurer of the Sitnek Fuel Co.; H. H. Stagers and Edmund Cramp, of Fairmont. Mr. Sitnek will become the president of the Sitnek Coal Mining Co., for which a charter has been applied, this company to be capitalized at \$500,000 consisting of 5,000 shares of a par value of \$100. Fairmont people will be interested in the new company. The company now being organized contemplates the expenditure of about \$100,000 for additional equipment. The Antler Coal Co., of which Col. Thomas W. Arnette is the president, will continue to operate two other mines—one at Round Bottom, on the Connellsville division of the Baltimore & Ohio, and the other known as the Sue mine, on the Charleston Division of the Baltimore & Ohio.

Organization of the Spice Creek Land Co., in which McDowell County business men are interested, has been perfected by the election of the following officers: E. W. Cullen, president; S. J. Cooper, vice-president; L. J. Signiaco, secretary; Jno. M. Cook, treasurer. The stockholders, at their organization meeting, authorized the lease of coal land owned by the company.

WASHINGTON, D. C.

The Interior Department has classified more than one and one half million acres of land in Montana, Utah and Wyoming as coal land, and nearly 900,000 acres in California, Montana, Nevada, New Mexico, Utah and Washington as non-coal, of which 15,000 acres in New Mexico had been previously classified as coal lands. In Montana 1,700,000 acres previously withdrawn as coal lands were restored to entry.

CANADA

The annual meeting of shareholders of the Intercolonial Coal Mining Co., Ltd., was held at Montreal, March 5. The financial report showed results of operations to have been more satisfactory than for many years past. Operating profits, after allowing for depreciation and depletion, amounted to \$153,364, as compared with \$136,471 in 1922 before depreciation had been deducted. Net income on the common stock was equal to 29.27 per cent, as compared with 13.83 per cent in 1922. The balance sheet showed the company to be in a strong position with net working capital increased by more than \$40,000.

Another chapter has been written in the case of the Minudie Coal Co., which operated bituminous-coal mines at River Hebert for some years. For the past two years, the existence of this company has been sprinkled with strikes, labor disturbances, financial disaster, and now the property of the company has been seized and the assets auctioned for the benefit of creditors. The gross indebtedness is \$125,000. When the property was sold at auction the highest bid was \$10,500, which was accepted because of the need for ready money to pay claims of miners for wages. The purchaser was the provincial government, which has claims against the company totalling \$111,000 for workman's compensation, royalty, etc. For some time the government has been keeping the pits in repair, at a cost of about \$11,000.

According to the December report on the coal statistics of Canada just issued for the month of December the coal made available for consumption in the Dominion was 2,692,000 tons, a decrease of 12 per cent from November and 20 per cent from the three-year average of the month. For the whole year the coal made available for consumption showed an increase of 21 per cent. The output from Canada's mines for the month was 1,231,600 tons, a decrease of 17 per cent from November and 23 per cent from the three-year average for the month.

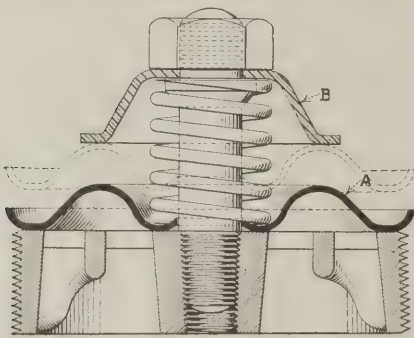
McGill Coal Co., Ltd., of Toronto, has been incorporated with an authorized capital of \$250,000. George H. Sedgewick, James Aitchison, John W. Pickup and others are the provisional directors.

New Equipment

Acid-Resisting Valve for Reciprocating Pumps

The Durabla Manufacturing Co., New York, has recently placed on the market a monel metal valve particularly suitable for reciprocating type mine pumps. The view of the valve shows a disk *A* arched so as to close upon an inner and outer valve seat. This construction makes possible a strong disk made from a very thin sheet of material. This latter feature is highly desirable because it prevents the tendency to chatter regardless of the position of the valve. The guard *B* is a protector to the spring and also limits the movement of the valve disk.

Aside from being acid-resisting, the material of the valve and its construction is such that it is suitable for use with many different kinds of liquids at various temperatures and pressures.



Monel Metal Valve

An acid-resisting valve specially suitable for use on reciprocating type mine pumps greatly reduces the idle time usually necessary for renewing worn or corroded parts.

Low-Freezing Dynamite

Tests were recently conducted at Hibbing and Virginia in northern Minnesota which prove that ordinary straight 40 per cent dynamite now being made by the du Pont Company on a low freezing formula was practically unaffected at a temperature of 35 deg. below zero. A continuous series of tests which had been made during the comparatively mild winter weather at those points when the temperature was at zero or a few degrees below, proved that the low freezing dynamite would detonate without difficulty. In the test made at 35 deg. below zero, it was shown that one cartridge would detonate another at a distance of one foot.

The development of this low-freezing dynamite is considered to be the greatest advance made in the explosive field since the invention of dynamite by Nobel. It makes possible the use of dynamite in road building and all kinds of open construction work under any temperature encountered in the United States.

This low-freezing dynamite created a sensation last year when it was used in some ditch blasting work in the

Northern states. The night before the ditch was shot, the explosives had been subjected to a temperature of 10 deg. below zero. The ground was frozen and covered with snow. The next day the holes were punched through the frozen ground, and the dynamite put down. It was shot by the propagation method where the detonation of one cartridge sets off the others. There was no difficulty whatever experienced. The dynamite showed the same qualities which it would show in the summertime.

Fountains for Wash Room

The Bradley Washfountain Co., of Milwaukee, Wis., is now manufacturing a washing fountain suitable for installation in mining company offices and wash houses.

Because of its circular shape, it easily accommodates a large number of people and at the same time gives them more available elbow room. The wash-room equipment and floor space is thereby materially reduced, as is also



Sanitary Type Wash Fountain

One inlet and one outlet control eliminates water wastage, and provides continuous flow of water which is always desirable for carrying away the dirt after it is loosened by the soap.

the time ordinarily required for washing. Each fountain has only one water inlet and one large open drain. This eliminates the continual nuisance of clogged waste pipes and leaky faucets. The spilling of water on the floors and walls is almost completely eliminated, thus materially reducing the cost of upkeep.

The fountains may also be provided with special fixtures, such as enameled trays for holding cake-soap and liquid soap containers.

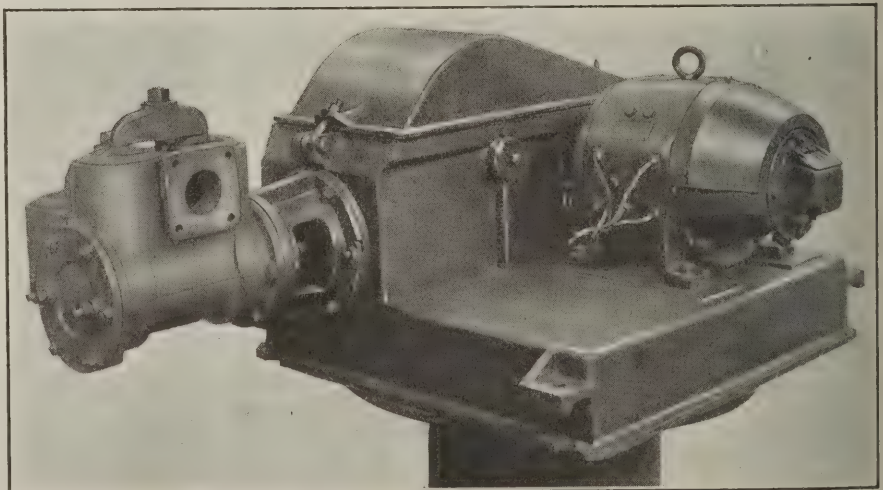
Self-Contained Gathering Pump

The Diamond Machine Co., of Monongahela, Pa., has recently developed a new self-contained pumping unit. The power frame is cast integral with the motor sub-base and forms a compartment for the working parts and a reservoir for lubricating oil which is closed with a removeable cast iron cover. A bored crosshead guide, bolted to the power frame is extended to carry the water end.

The gears and eccentric are keyed to seamless steel sleeves, fitted with removable bronze bushings, and turn on stationary axles as separators extending through the frame. The gears are duplicates as well as the sleeves, bushings and axles. A small quantity of

oil in this compartment provides ample lubrication by the splash system to the gear teeth and all moving parts except the motor bearings. Brackets for truck axles are provided on the sub-base and are so placed to give the lowest possible height above the track.

The water end is exceptionally heavy and is furnished in acid-resisting metal or is cast iron bronze fitted. A removable cylinder liner held in place by two studs through the rear cylinder head, is regularly furnished in acid-resisting bronze. A special liner of extreme hardness, great durability and resistance to wear, can also be furnished. The cylinder is reversible end for end so that the suction and discharge openings can be placed on the side most convenient for piping. All studs are of acid-resisting steel.



Pump Motor and Gear Reduction Unit

This equipment is substantially built so as to require continuous operation at low maintenance cost. All parts are carefully protected against corrosion and dirt.

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, *President*
E. J. Mehren, *Vice-President*

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Problems of the Coal-Mining Industry

R. Dawson Hall
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Fine Anthracite an Intruder

IN THE domestic field fine anthracite is an intruder. It has to force every inch of its way. Its use as an exclusive fuel demands special equipment. Consequently it has more reason than large coal to be kept up to the best standard that can be continuously and broadly maintained. The prejudices are against the fuel, and consequently it might pay perhaps to raise the standards for its preparation. We do not say that we know it would be advisable, only that it *might* be profitable to do so.

Innovators easily are discouraged and easily do they discourage others. For instance, an ex-treasurer of an anthracite company had a heater that would burn No. 1 buckwheat. He got a bad brand of that fuel, and he promptly concluded that pea was the fuel for him. Doubtless he could burn the finer coal satisfactorily, but he no longer attempts it. Had the buckwheat he got been cleaner he would have been burning that size yet. His neighbors are purchasing it and apparently find that the use of it pays.

Clearly then, one delivery of bad buckwheat, no matter whence it comes, can do immense injury to the whole business. It creates an unfavorable attitude to that size, no matter where produced. It hinders the public from equipping itself to burn fine anthracite. The injury wrought by one substandard delivery is incalculable. The honorable producer suffers with the dishonorable and suffers longer, for he is striving to live on in the business rather than to make a big stake and withdraw.

Localism of Consulting Engineers

MUCH care should be exercised in the choice of a consulting engineer. A man in a given locality is the best judge, as a rule, of a local property. He knows the market, the standing of the coal in public estimation, the value of coal lands, the prospects of trouble in operation, and if he is freed of favoritism and prejudice he can make a good report. Unfortunately, that is rarely the condition of his mind. He may steel himself to render a fair appraisal, but circumstances are likely to be against him.

Send him, however, to another field and he is prone to make other false judgments. He may go from a high-volatile to a low-volatile coal, and seeing the coal is of a somber hue and breaks up fine he overlooks its sterling qualities. He has been catering all his life to a market demanding lump coal, prejudiced against coal that does not glisten and that has few stokers to absorb the slack. Consequently he returns an unfavorable report.

Perhaps he finds that the coal is not of the bed which has attained a fair name in the past but is in one of lower quality. He forgets that the other bed

is worked out, that the market has become well content to accept the coal from the new bed, now that it has no competition. He exploits his one piece of geological knowledge but serves only to mislead his client.

It takes a broad knowledge to make a good consulting engineer, and some humility. If a certain coal is selling he must still that desire of his to say that by all the rules of the selling game it ought not to sell. It may be well if he should find the cost of mining and freight to be high to inquire whether that is acting as a deterrent to business; if it is low he will still do well to ask whether the market is satisfied to buy it. The coal may clinker on the grate. It may have a particularly strong rival in the marketing field. Selling coal is not all geology, as coal men know, but this fact is not always appreciated by geologically minded engineers from other regions than that being investigated.

So much for a producing region. The consulting engineer for a region not yet producing or only just beginning to produce needs still more to be a superman.

Every Man Has His Mental Twist

MOST of us are victims of mental habit and our employees are no more free from that twist of mind than others. It is a wise man who sums up correctly the natural bent of those whose services he is employing. Most non-technical mining men have the direction of human effort as their major qualification. To place their attention on anything else requires earnest and even painful mental effort, and most of them pursue the line of least resistance and avoid such cerebrations.

Many men would sooner wander around a mine than write a letter or cast up a line of figures to find out what their coal cost may be on any given day. Others there are who would write their letters and calculate their costs and distribute them before they would enter the mine to make an examination. They would find a hundred reasons to justify their action, and their reasoning would not be easily controverted.

Some men have an actual abhorrence of machinery. In earlier years they did not use it. To coddle a troublesome machine, to wrestle with the problems involved in making a pump run steadily are alien and displeasing jobs. They would sooner inquire why one man is a slow worker and why a certain miner loads dirty coal—two important matters, to be sure, and needing attention, but still, not sometimes as important as some mechanical matter which may keep many men or the whole mine idle. In fact a disinclination to busy himself with mechanical details has kept many a man from proving a good superintendent and has been the cause why many a mechanical device has not proved effective or efficient.

Foremen have learned by long experience that idle haulage men mean high cost of coal and presage

demotion. In consequence, they are little disposed to hold the transportation system standing for a while even if thereby they can keep a large number of day-wage men on a mechanical shovel from loafing on the company's time. As a result the shovel has failed to do its duty.

In fact every innovation has met with silent resistance from men whose thinking processes could not adapt themselves to it. Several years are often needed to fit the superintendent or the foreman to his new environment. He has to be compelled for a while to do violence to his inclinations. He has to overcome his subconscious tendency to do everything as if the old conditions still ruled, to argue all problems as if the old difficulties and not new ones had to be met.

The successful manager will sense this opposition, none the less because it is not vocal or obvious. If he hopes to make an important change in a subordinate's habit he will have to be a skillful advocate and follow his reasoning with pressure. That cannot be done at long range or without a knowledge of the idiosyncracies of the man in subordinate charge. Several visits to the mine are necessary and perhaps some changes in personnel.

It is quite easy usually when on the ground to find out if some primary duties are being neglected in favor of secondary duties that might be permitted to wait. Sometimes it is better not to try to teach "an old dog new tricks," but to rearrange matters so that the responsibility for new duties shall fall either on shoulders of men more progressive or of those whose habits fit more closely with the new need.

Our Shattered Faith in Water

ANYONE who has sprinkled wet coal on a fire knows that the water has little effect compared with that of the coal that goes with it. The glowing coals beneath the wet slack are not quenched, they are fed with new combustible.

We are losing faith in water as an immunizing agent in preventing explosions. Saturated air certainly has no appreciable effect in preventing an explosion so long as the dust is dry. By this is meant that to satisfy with water vapor the air entering a mine will in no way deter the extension of a dust explosion.

Saturated air and thorough sprinkling will assist in making the mine safe. It will certainly tend to keep down the dust, and it is likely that it will keep the fallen coal in roadways from degradation. Probably a mine kept saturated will have granular rather than decrepitated coal in the passageways. We do not know why some mines explode violently and others do not have explosions but it is possible that in some the coal tends in itself to comminute and in other mines it does not become fine except as a result of the crushing and grinding processes of traffic and travel. There are other reasons of course, as the Bureau of Mines has demonstrated, but this seems quite a probable reason why some dusts explode readily and others do not.

If coal under water or in saturated air is protected from deterioration it may be prevented thereby from becoming dangerous. Furthermore if some is ground and some is still granular the granules will cover the dust and make for protection. It has even been suggested that coarse coal may assist in smothering an explosion.

We might suggest that a layer of fresh fallen un-

broken coal may be a protection rather than a menace. That sounds and perhaps is a dangerous doctrine, but it may be worthy of consideration. The point arises: "Are our mines safer than they would be if we had less fallen coal in our roadways?" Do they not cover fine coal with granular and so work out an immunity from a violent explosion?

Dangerous as this question seems to be it must be faced. If we are going to build coaltight cars, if we are going to load our cars less heavily, will they increase or decrease immunity, and if they will increase it in some, will they increase it in those where the coal is self-decrepitatory or will they decrease it?

Truly, Dr. Wheeler is right when he says little is known about the coal-dust hazard. It is cheering that he says also in the addresses that we brief this week that perhaps 10 per cent of rock dust may help in this country even though 50 per cent has failed in some English mines. We hope he is not too optimistic in making this suggestion.

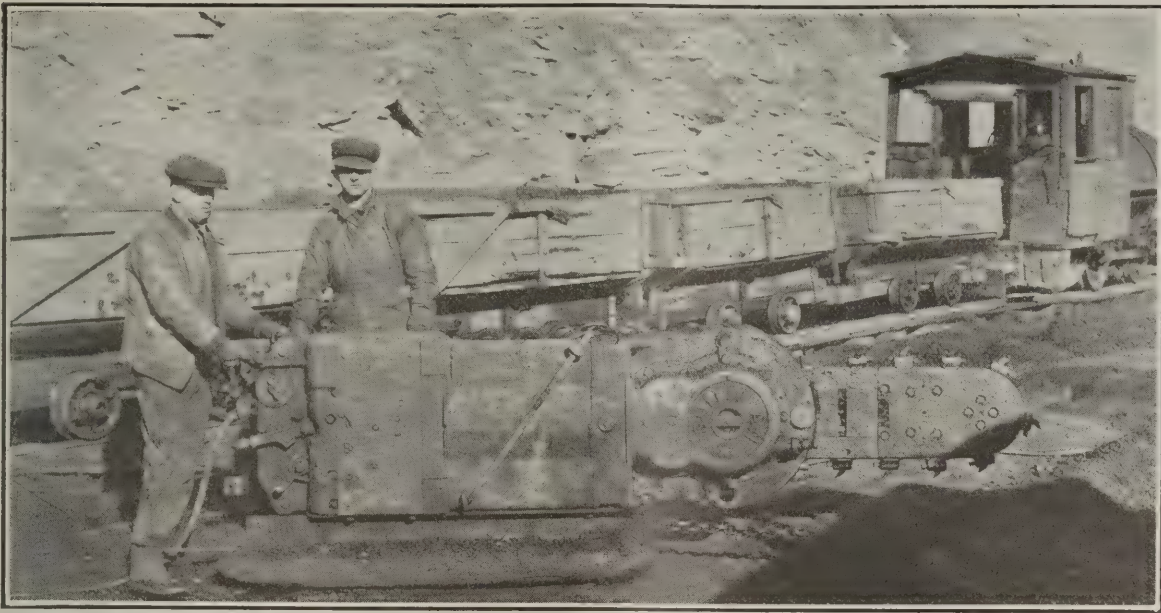
He needs, of course, to be careful of generalizations about the United States. It is less a unit than Great Britain. With lignite and low-volatile coal, with a relative dryness and wetness that Great Britain, we believe, cannot duplicate, we must be cautious in believing that his suggestion has a broad application to all sections of our country and must even be careful in assuming it is true in any of our bituminous coal mines.

Still his suggestion gives us all hope. We are sprinkling so much coal from the tops and sides of our cars that the suggestion that we use 50 per cent of rock dust is staggering unless we change our car loading and adopt everywhere cars suited to the rotary dump such as Great Britain so generally, if not so invariably, uses. His table of applications of rock dust and their results might be valuable in England but here they merely suggest what we could do if we would mend our ways at great expense, for coal transportation, repairs and equipment.

Give Your Shovels a Fair Trial

TOO many companies try out a new mechanical shovel in a mine without providing the conditions that alone will make the experiment successful. To put one under the charge of a foreman already harassed by a thousand operating problems is not likely to bring the results sought. The better plan is to give the new devices a mine of their own, properly, yes, even excessively staffed, and then concentrate all effort on the results. If regarded as somebody's side issue they will not succeed.

Let the man operating the mechanical-shovel mine or the section worked with such a machine realize that his reputation depends solely on his ability to get results with the new equipment. Provide a suitable mechanical engineer and proper equipment for repairs. See that adequate locomotive service is provided. Let the shovels have every aid that good judgment prescribes, especially conveyor service. See that there are no delays at the tippie. Afford always adequate power for operation. After the device has proved its value it is always possible to extend its use, but if sent into a mine to take its chances with opposition from some and with the languid interest of others, it will almost certainly fail. The mechanical shovel needs sympathetic treatment from its owners or its problems will not be solved.



Machine for Channeling Coal in a Strip Pit

Coal Stripper Uses Ice Harvesters' Method

Turns Longwall Cutting Machine on Edge "Sawing" 28-in. Seam Into Panels 12-Ft. Wide So That Pop Shots Make Less Screenings - Scheme Reduces Over-all Cost of Coal

BY DON M. SUTER
St. Louis, Mo.

THE coal strip-pit operator is taking a leaf from the ice harvesters' book. He is "sawing" up his coal into long panels, 12-ft. wide so that a few pop shots will loosen it in big lumps for easy and economical loading. This reduces labor and powder costs and saves time. It increases the value of the coal because the fuel comes cleaner and with less slack. It also improves strip-pit practice in a variety of other ways.

All this is directly creditable to the adaptability of a type of underground longwall coal cutter for open-cut mining. The machine, instead of lying in its normal horizontal position with its cutter bar extending outward, as for an undercut, is turned up on its edge with the cutter bar extending downward. Thus the machine performs the function of the ice harvester's cross-cut saw. The Leavell Coal Co., near Tulsa, Okla., is among the first to profit by this method.

MACHINE CUTTING REDUCES PRODUCTION COSTS

Most strip-pit men worry over their problems of loosening the coal. After the cover has been removed and the surface of the seam has been swept, the process of breaking up the coal is varied, and often is wasteful in cases where the coal is too thick and hard to be lifted by the loading shovel unaided. Usually many holes have to be drilled. The powder charge in these holes may be fairly heavy because the coal has only one loose end, namely, the upper surface of the seam. These relatively heavy shots necessarily shatter the coal and produce a large quantity of screenings and slack. Where the coal

can be wedged loose by the plug-and-feather method, the shattering effects of powder are avoided, but much time and labor are required to drill the holes and drive the wedges. The machine-cutting process as now practiced by the Leavell Coal Co., obviates these difficulties and reduces the production cost.

IS BIGGEST PRODUCER IN SOUTH WEST

The Leavell strip pit is one mile from the city limits of Tulsa, Okla. The company's holdings cover 600 acres of coal land, which is developed by stripping tracts 50 ft. wide and two miles long. The coal seam is 28 in. thick and furnishes an excellent grade of clean fuel, which is prepared in three forms, namely 6-in. lump, egg-and-nut mixed and slack. The annual output is about 110,000 tons. In 1922, the Leavell pit shipped more coal than any mine in the Southwest. In November, 1923, 10,200 tons were shipped.

The overburden is from 19 to 35 ft. thick, with varying quantities of blue and yellow shales, which must be shot to permit the stripping shovel to handle them. The drilling for these shots is done by water-well drills working from the surface. A steam shovel strips the coal. It is equipped with a 7-yd. dipper and an 80-ft. boom. The coal is loaded into three-ton cars with roller-bearing wheels, by a horizontal thrust coal loader, having a one-ton dipper and a pit width capacity of 65 ft.

Prior to last August, the coal was drilled with a hammer drill, operated by a belt-driven air compressor, and "shot off the solid." This method had a tendency



Machine Making Its Cut

The cutter bar extends vertically downward from the rear of the machine, channeling the coal as it works itself along the chain extending out at the right of the picture. Two men are required, an operator and a helper who shovels cuttings away from the channel. The chain causes the machine to move in a straight line, which is a great advantage, at the edge of the excavation.

to break up the lump coal, naturally reducing its market value.

Accordingly, in August, 1923, the company installed its vertical cutting or channeling Sullivan machine, and with it has obtained some interesting and valuable results.

This new coal cutter is a longwall machine, turned up on its side, and mounted on a steel shoe or skid. When moving from place to place, the cutter bar is locked in line with the body of the machine. When ready to cut, the locking pin is removed, the feed chain attached to the machine, and a vertical sumping cut is made, similar to the horizontal cut made by the ordinary longwall cutter in a longwall mine. When the bar stands vertically, or at right angles to the body, it is locked in place, and the machine is ready to cut its channel.

The lines to be cut are laid off lengthwise of the pit, and a hole is bored every 50 ft. ahead of the machine.

In these holes pins are inserted, to which the feed chain is secured. The machine pulls itself along the chain on its skid, making a straight cut the full depth of the seam. Two men, a runner and a helper, handle the cutter. The helper's chief duty is to shovel the cuttings away from the channel.

At the Leavell pit, which as already noted is 50 ft. wide, four channels each 150 ft. long are cut by the machine 12 ft. apart, and the machine handles the 600 ft. of cutting readily in an eight-hour shift. It is thus able to keep well ahead of the loading shovel.

Two holes are drilled in each 12-foot. block of coal, 3 to 4 ft. in from the free end. These are shot with 6 oz. of black powder each, the two holes being wired together. The longitudinal cuts provide two additional free faces, so that the light powder charge is sufficient to crack off the coal, without materially shattering the lump. As a result, the percentage of large coal has been increased from 12 to 15 per cent, and the cost of powder



The Leavell Pit, Near Tulsa, Where Cutting Machines Made Their Debut in Coal Stripping

After the cover is removed by the big shovel in the background, longwall cutters, operating on edge, "saw" the 28-in. seam

into panels 12 ft. wide so that light shooting loosens it in big lumps for the loader in the foreground. Operation is speedier.

the loader gets greater efficiency, and the coal is produced at lower cost than it was under former methods.



Strip Pit Coal Cutter Getting Ready for Action

It is a longwall cutter turned on edge and mounted on a shoe. The chain, here shown unattached, is hooked to a pin 50 ft. ahead of the machine. The cutter bar, long enough to penetrate the seam, sumps in until it is vertical to the frame. Then the machine cuts along the chain.

per ton has been cut in half. One keg of powder now loosens 200 tons of coal, instead of 100 tons, which was all that could be obtained without channeling.

LESS THAN 20 PER CENT IS SCREENINGS

The tippie at the Leavell pit is equipped with shaker screens and loading booms. Their loading record in a recent month showed lump 65 per cent, egg-and-nut mixture 15.5 per cent, and screenings, 19.5 per cent.

A smooth, unbroken coal face is left by the mining machine instead of a jagged broken face. For this reason, it is possible to lay the loading track close to the cut with no danger of its crumbling under the weight of the cars and locomotive. Before the machine was used, a much wider shoulder had to be left for support. The clean, solid face also enables the loading shovel to do a better job, and it is estimated that the capacity of the shovel has been increased 25 per cent by this feature and by the larger coal obtained. The solid face also assists the stripping shovel on its next trip, and the cut is thereby carried as close to the overburden as possible. This reduces the quantity of coal lost by deposits of overburden from the shovel.

The cuttings from the machine are coarse and are graded as screenings and not as slack. With contemplated improvements in firing the big shovel, these cuttings may be substituted for lump, thus making some 300 tons more of large coal available for the market monthly.

The mining machine is operated on 440 volts alternating current, which is stepped down from the 11,000-volt supply of the Public Service Co., of Oklahoma, to 2,300 volts by transformers at the tippie, and carried along the pit side to secondary transformers which are moved as the pit progresses. Rubber-covered cable carries the 440-volt current from the pit bank to the machine.

The Leavell Coal Co. is obtaining from its channeling machine all the advantages which accrue from the use of mining machines underground, namely, a more marketable product at lower cost for powder and labor, a better physical condition of the property, and a more complete recovery of the coal.

Even Coal and Non-Siliceous Dusts Harmful to Health*

Any Dust, Especially if Not Soluble in Water Will Clog the Lungs—Miner's Asthma a Form of Consumption

BY D. HARRINGTON,
U. S. Bureau of Mines, Denver, Colo.

THE following impressions regarding dusts in mines are the result of general observations in coal and metal mines during nearly 25 years, about seven years of which were devoted to a more or less intense study of dust. Though many of the views expressed are at variance with the ideas of eminent authorities, it is felt that there is at hand sufficient supporting evidence, though it will not be given here.

Any dust insoluble in the fluids of the respiratory passages, and in sufficiently finely divided form to float in the air and be breathed by underground workers, will ultimately be harmful to health if the dust is in the air in large quantities and is breathed by workers for long periods of time. This applies to insoluble non-mineral as well as mineral dusts or mixtures of them and includes coal dust or mixtures of coal and other dusts.

The lungs appear to be affected by dusts largely as would a sponge if its open spaces were gradually filled with fine sand; ultimately there would be practically no expansion or contraction possible and the ability of the sponge to take up or release water or similar material would be destroyed. As the lung cells are gradually being filled with dust, the lungs are correspondingly prevented from performing their usual functions, vitality is reduced and the body becomes a prey for disease germs, especially those of tuberculosis.

INFINITESIMAL PARTICLES SOLUBLE IN WATER

It appears that the dusts which lodge in the lungs usually are less than 10 microns in size, and are insoluble in the fluids of the lungs. It seems probable that much of the extremely fine, ordinarily insoluble, dust (that below 0.00001 in., or $\frac{1}{4}$ micron) is soluble in the lung fluids; at any rate, it has been proved that very small particles of such extremely insoluble matter as flint and chert (free silica) are definitely soluble in distilled water. It now seems probable that the dust dangerous to lungs is between 10 microns and 0.1 micron in size.

Silica dust, whether free or combined, is not always in equally dangerous form nor are all kinds of free silica (quartz, chert, flint, etc.) always equally dangerous, nor do particles of free or crystalline quartz always have sharp cutting edges, though when the sharp needlelike or knife-like edges are found, they constitute probably the most dangerous kind of dusts that can be breathed. Insoluble mineral dusts without presence of silica or mixtures of quartz or other siliceous dust, with other more or less insoluble dusts such as calcite, alumina, hematite, etc., are likely to be harmful if in finely divided state and present in large numbers in air breathed by underground workers.

Coal miners working at very dusty occupations or in moderately dusty but poorly ventilated places get a lung involvement, frequently within a few years, called

*Paper entitled "Dust and the Health of Miners," presented at the meeting of the Industrial Relations Committee, American Institute of Mining and Metallurgical Engineers, at its February session.

miners' asthma, which is generally miners' consumption, having essentially the same symptoms and ultimate effect as phthisis or silicosis. Where lung involvement does not occur, coal miners in fairly dusty occupations or in places with poor air circulation and moderate dust content of air frequently are afflicted with bronchitis, though the disease does not become apparent for many years.

Breathing of coal-dust laden air does not immunize or even partly protect a worker from being affected by miners' consumption when subsequently working in dusty metal mines; nor does work alternately in air laden with coal dust and with rock dust prevent harmful lung or bronchial involvement, and a worker with lung involvement from metal-mine air cannot expect relief by subsequently working in dusty or poorly ventilated places in coal mines.

The coal-mine occupations most likely to produce a dusty condition harmful to health are undercutting of coal or of material under the coal by chain machines, or the mining and shoveling of long-standing dry pillars, or working in places with little or no circulating air (especially when shoveling fine dry coal) or where frequent heavy blasts are made during the working shift.

OVER-EXERTION INCREASES DUST INHALATION

Contract workers in both coal and metal mines are more likely than others to be afflicted by dust diseases because of their failure to take time or to use available methods or appliances to protect themselves, and the over-exertion of contract workers causes increased rate and depth of breathing of dust-laden air, thus hastening the accumulation of dust in the respiratory passages.

When the air temperatures are above 80 deg. F., the humidity is over 90 per cent and the air is stagnant, the effects are intensified; and in mines with poor air circulation at working faces or where blasting is done during shift, poisonous carbon monoxide from explosive fumes hangs in the air and adds to dust danger by lowering the worker's vitality.

Some individuals are better able to resist the ill effects of breathing dusty air than others; and men of some nationalities seem less able than others to resist lung trouble from dust; the Irish and Finns apparently having minimum resistance to mine dust.

The logical remedy for the dust hazard in mines is prevention of the formation of dust, but that is not always possible and the most efficient and practicable method of protecting under-ground workers from dust is the circulation of continuous currents of pure air through and past points where workmen are found in mines. It is entirely probable that the reason why the dust in coal mines is less prejudicial to health than the dust in metal mines is due chiefly to the fact that the working places in coal mines are generally much better ventilated than those in metal mines.

Dust prevention in coal mines may be aided by: (a) using water sprays at the cutting chain on undercutting machines; (b) sprinkling the broken coal at the face with water while loading or after the car has been loaded, or both; (c) sprinkling the region of the working face before and after blasting; also at other times during the working shift; (d) sprinkling the roadways at least once or twice a week, washing down the ribs and timbers, as well as thoroughly wetting the floor; and if the roof material will permit, also washing down the roof, and timber caps near roof; (e) thoroughly spraying loaded coal cars at auxiliary partings, unless

they are sprinkled at the face, before they go into the main haulage roads, which usually have air currents of sufficiently high velocity to remove any fine dry dust from the tops of loaded cars; (f) eliminating blasting while the shift is in the mine. Blasting during shifts is dangerous to life on account of possible explosion or other accident; and dangerous to health because of the noxious gases that explosives produce, and because clouds of fine dust are thrown into the air to be breathed by the mine workers. Blasting during shifts is unnecessary, is an out-of-date practice and should be absolutely prohibited.

ROCK DUSTING NOT PREJUDICIAL TO HEALTH

The use of pulverized-rock dust in coal mines to prevent explosions is justified because the danger to life from explosions is infinitely greater than that from the breathing of dust. Moreover, dust is dangerous to health only when suspended in the air. The rock dust used to prevent explosions is not thus suspended and therefore cannot be breathed by workers. It is rather placed on the floor and ribs and in barriers. The relatively small quantity of rock dust thrown into the air during working periods should not be particularly dangerous to health, especially if the rock dust is selected so as to have minimum potential harmfulness.

Some authorities propose the introduction of coal dust into the air of metal mines as a possible preventive of miners' consumption. Even if this dust could be thrown into the air and kept there (a very difficult undertaking) it would introduce the explosion hazard into metal mines and, worst of all, would intensify the existing dust hazard rather than in any way alleviate it.

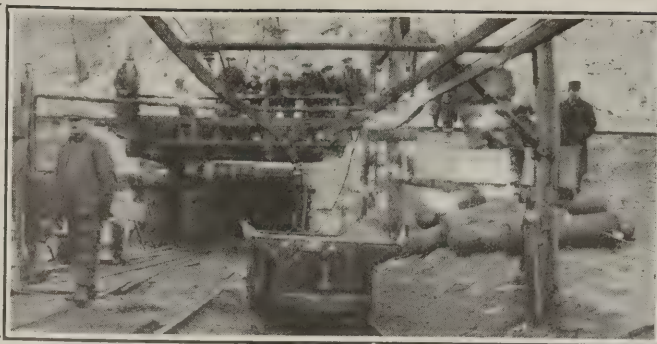
The usual types of respirators on the market do not prevent the breathing of the very small (hence most dangerous) dust particles, but, if workers could be prevailed upon to use them, the catching of the larger particles would help to hold some of the small ones; and the nasal and other passages thus relieved of catching the large particles would be more effective in catching the small. However, it seems impracticable to get respirators used at all consistently by workers.

All mining employees should be given physical examination at least once annually. To get definite data as to lung condition, X-ray photographs should be taken and interpreted by an expert on pneumoconiosis, otherwise dust involvement of lungs may escape notice, especially in coal mines, for several years.

Though coal dust is responsible for at least two-thirds of the loss of life in the mine explosions of the United States, it is entirely probable that a much greater number of men who have worked in our coal mines die annually of bronchitis, pneumonia, miners' asthma or other diseases caused directly or indirectly from coal dust, than die from mine explosions. It is well known that more men die annually from metal-mine dust than are killed in dust explosions in coal mines. Moreover, the economic loss from men partially disabled by different stages of miners' consumption in and around both coal and metal mines (though around coal mines the cause of the partial disability either is not named or is styled miners' asthma, etc.) certainly is not less than many millions of dollars per year in loss of output alone; and the misery caused the victims and their families cannot be estimated.

Hence dust is the scourge of the mine and the miner, and every feasible method of preventing its formation or of eliminating it should be consistently provided.

Shanktown Explosion Evidences Need of Greater Regard for Safety at Mines



Five Precautions Which Should Have Been Observed—Condition of Machine Which Inspectors Said Caused Explosion—Miller Seam Has Shown Recently Many Indications of Unsafe Conditions

TESTIMONY at the inquest into the explosion at the Lancashire mine of the Lancashire Coal Co. (a subsidiary of the Barnes & Tucker Coal Co.), at Shanktown, Pa., was to the effect that many precautions which should have been taken were disregarded. According to the evidence, trolley locomotives were operating in the return airways in violation of Art. 11, Sec. 6, Rule 77, of the State Mining Law of Pennsylvania; an arc-welding machine was used in the return air, which was known to contain at times dangerous quantities of explosive gas; cutting-machine cables not provided with closed-type switches were connected openly to trolley wires by means of "hook" connections;

slope and was developed by four main entries. The mine was ventilated by a reversible fan which ran as an exhaust, drawing 75,000 cu.ft. of air per minute against a water gage of 2.5 in. That section of the mine which gives off gas is shown in Fig. 2.

ELECTRIC WELDER WAS USED INADVISABLY

Fireboss Joe Adams testified that he found gas at times in all places he inspected on his rounds, and that gas was generated in dangerous quantities in all the live development entries. He admitted that a hoist, a pump and an electric welder, the first two machines not complying with the closed-type standards of the U. S. Bureau of Mines and the last an exceedingly dangerous appurtenance if used in places generating gas, were used in the Eighth Right section, where the explosion originated.

Examination of Mine Electrician Wolf disclosed that weekly inspections of cutting machines to detect defective connections, etc., were not made. Only when a machine broke down did it receive this attention. It was said that the rheostat cover on the particular cutting machine that the mine inspectors declared caused the explosion, and that was working in No. 1 Butt airway off the Eighth Right headings, had been punctured. In case of a short in the machine, the power circuit could not be broken through the controller without letting the customary arc of breaking project into the atmosphere. Neither fuses on cutting machines nor switches on cables, enclosed in explosion-proof casings, were used as required by the mining law.

It was stated at the inquest that though the rheostat cover is arranged for fastening with twenty-two bolts, only twelve were in place when the cutting machine was examined.

State Inspector T. J. Lewis, of the Twelfth Bituminous District, reported the finding of the investigation commission. It found explosive gas at the faces of the main slope entries but no manifestations that this was the source of the explosion. In the Seventh Left flat headings and in the room headings off the former and in some rooms also explosive gas was discovered.

An accumulation of gas was found in the Eighth Right flat headings. As shown in Fig. 2 the most advanced face is that of the haulageway, which is 223 ft. beyond the last crosscut. To avoid working the face to the dip the airway was being driven outby on the rise by a pocket from the last crosscut. Ventilation was maintained in this pocket by a canvas as indicated.



Fig. 1—Fan Came Through Explosion with Little Injury

Contrary to early reports little damage was done to the fan house by the force of the Lancashire mine explosion. A few leaks which developed in the roof were quickly stopped by tucking and covering with canvas.

no attempt was made to keep cutting machines safe by careful maintenance and weekly inspections, as required in Art. 11, Rules 1 and 70; miners without safety lamps in certain instances were allowed to fire shots, though a shotfirer was employed; such firing being forbidden under Art. 4, Sec. 14.

It must be conceded that the Lancashire mine No. 18 had not been long in the hands of the Lancashire Coal Co. Up to Dec. 15, just thirty-nine days before the explosion, it had been owned by the Glenside Coal Co. It was operated in the Lower Kittanning bed, sometimes termed the "B" or Miller seam. It was opened by a

Headpiece shows how slope mouth was not injured in any way. When the explosion occurred the hoistman was in the act of dropping down a trip of empties. All he saw was a big blow of smoke, which spent itself immediately on reaching the outside. Though stoppings were demolished, mine cars and track were little damaged. Rescue crews pushed mine cars of supplies ahead of them, in most cases without difficulty, as the roof did not fall as a result of the blast.

NOTE—Mine inspector's report on this disaster was printed in *Coal Age*, Feb. 21, p. 285.

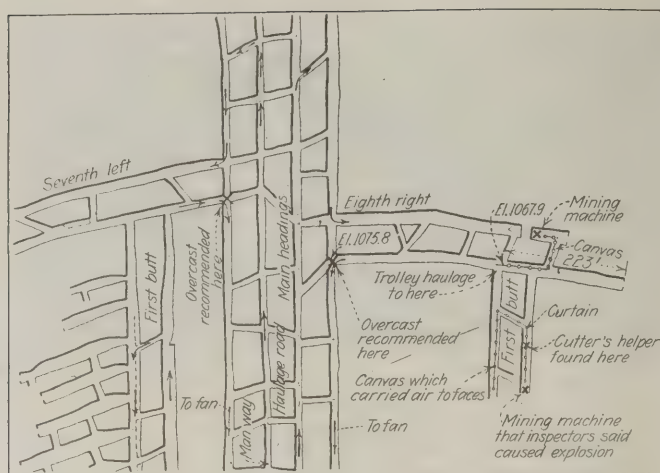


Fig. 2—Gaseous Section of Lancashire No. 18 Mine

Comment at the inquest favored the idea that, had the faces of the Eighth Right flat headings and those of its First Butt been driven in the ordinary manner, had the machines been duly inspected and had tests been made for explosive gas by the machine men, the explosion would not have occurred. With the entries as shown, too much reliance is placed on the efficiency with which the canvas would compel the air to sweep across the faces. Without overcasts, splits of intake air could not be made to reach the main cross-headings. Trolley wire, as will be seen, was strung in return air.

A mining machine was found in this place. There were no indications to show that the explosion had originated here.

At the face of the airway of No. 1 butt entry off Eighth Right flat headings, the commission found evidence of intense heat and much force developed outby. There was an accumulation of explosive gas at this point. Ventilation was maintained at the two faces of No. 1 butt headings by canvas strung from face to face through the first crosscut. At the face of the airway was a closed-type cutting machine which had completed a cut and apparently was being loaded onto its truck when the explosion took place.

A careful examination of this cutting machine showed that the rheostat was defective. Arcing apparently caused intense heat inside the cover. The heat was so intense that it had burned out the gasket between the frame of the machine and the cover, and also charred the lining of the latter. The rheostat, consequently, had ceased to be explosion-proof. The second point on the rheostat was burned off completely, and the first point was loose, whereas the third and fourth points were solid. Arcing in the rheostat without proper insulation was such that the whole machine became charged and could cause arcing at all points of ground.

ARCING, GAS AND COAL DUST MAY HAVE BEEN CAUSE

Such arcing, the generation of gas and the suspension of coal dust in the air may have combined to cause the explosion. A door on the return of the Eighth Right headings was blown out to the left rib of the nearest main heading, suggesting that the force of the explosion moved away from this particular place. Coked coal was seen on the inby side of the timbers, leading the inspectors to declare that the explosion moved outby. The machine cutter's helper was found about 70 ft. from the machine. It is believed that he was on his way to disconnect the cutting machine cable from the trolley on the Eighth Right, following the development of arcing in the cutting machine. Unfortunately, the explosion occurred before he could do this.

Reforms are much needed in the mines which are

working the Miller seam in Indiana County and the north of Cambria County, if the series of explosions extending over the last few years is to be broken.

In March of 1916 gas was ignited in the Robindale mine by an open light, eight men being killed. In May of 1920 an explosion of gas set off by an open light killed two men in the Lancashire No. 18 mine. Open lights ignited gas in Watkins No. 3 mine in June of 1921, killing two men who preceded a man trip into the mine; if it had occurred fifteen minutes later, this blast would have killed many men. At the Dilltown mine in April of 1922, four men were killed when a room hoist ignited gas. This hoist was located in a heading in advance of the intake air. The worst explosion of all took place in the Spangler shaft in November of 1922, when seventy-seven men were killed, a body of gas being ignited by an open light.

These six explosions together caused the death of 129 miners. The death toll might have been much greater had the explosions occurred when more men were at work. When workings in the Miller seam advance such great distances as to be covered by a thick overburden and gas is likely to be released in dangerous quantities, such workings become gaseous and call for compliance with those clauses of the mine law of the state that apply to gaseous mines.

Self-Rescuer From Carbon Monoxide Gas

Approval of a new type of safety device, a "self-rescuer," designed as a means of escape for persons accidentally caught in mine or other atmospheres containing carbon monoxide, has been given by the U. S. Bureau of Mines. This approval has been given to the Self-Rescuer, manufactured by the Mine Safety Appliances Co., of Pittsburgh, Pa., under the provisions of Schedule 14-A of the Bureau of Mines, which outlines the procedure for establishing a list of permissible gas masks.

The self-rescuer consists of a pocket size canister with mouthpiece directly attached, filled with granular fused calcium chloride and granular hoolamite (mixture of special copper oxide and manganese dioxide) which causes carbon monoxide in air to unite with the oxygen at ordinary temperatures forming harmless carbon dioxide. Cotton filters for removing smoke are also included in the canister. The self-rescuer and a nose clip for closing the nostrils are enclosed in a hermetically sealed brass case to prevent deterioration until used. The weight complete is about 1 lb. 5 oz. The small size permits carrying in the pocket or on the belt, for the latter purpose a metal belt loop being attached to the case.

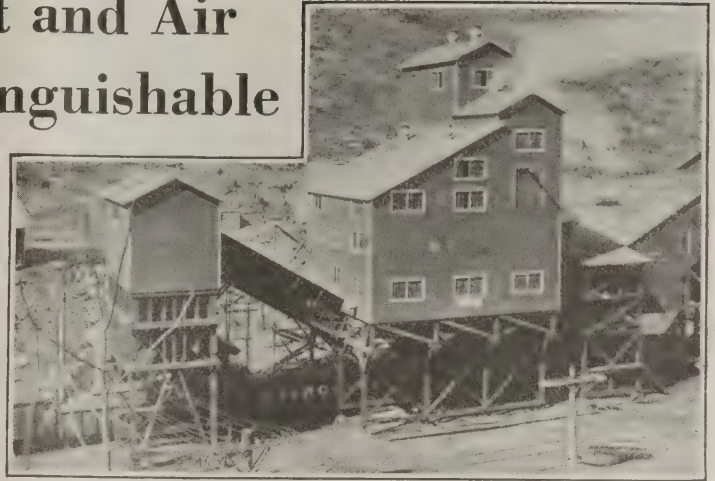
Carbon monoxide self-rescuers may enable miners to escape from atmospheres containing carbon monoxide in mines following fires or explosions. They may also safeguard workers in industries above ground where carbon monoxide may be encountered, such as around blast furnaces and metallurgical operations, or in the chemical industries.

The self-rescuer is approved only for carbon monoxide. The Bureau of Mines does not recommend its use as a substitute for carbon monoxide gas masks, having large canisters designed to protect persons who are called upon voluntarily to meet carbon monoxide in the course of their work. The approval rather is limited to self-rescue by persons who may be accidentally caught by carbon monoxide.

By Tumbling the Reject and Air Cleaning Smalls, Indistinguishable Bone Is Freed of Ash

Refuse from the Picking Table After Being Rolled Around Loses Its Coal Content Which Is Crushed in the Process—This Coal Is Then Winnowed on an Air Table

BY RAY W. ARMS
Chicago, Ill.



DIFFICULTIES which would have foiled earlier engineers who depended on water jigs are being met by dry-cleaning methods. Finely crushed coal was jigged inefficiently and with difficulty, and much coal was washed away in the streams. Now, the coal in the rejects of picking tables can be crushed and removed and then cleaned by air, giving an excellent slack product which will not freeze in the car or arrive at the market with excessive water. Furthermore, freight no longer has to be paid on water and rubbish that cannot be burned.

The dry-cleaning plant built for the Wyoming Coal Co. at Wyco, W. Va., is located on the Virginian R.R., four miles from Mullens, W. Va. The No. 3 Pocahontas seam at this point contains a middle band several inches thick which is high in ash, and grades gradually and with no distinct line of separation into the usual low ash and high quality coal characteristic of the No. 3 Pocahontas bed. The coal in the outer edges of this bone band resembles so closely the best coal that it is quite impossible to remove in the mine anything but rock and a small quantity of the heaviest of this bone.

The coal, after being brought to the surface, is passed over a 1½-in. screen, the lump being hand-sorted over picking tables to remove as much of the bone coal as possible. After picking, the lump and slack are usually reassembled in the form of picked run-of-mine, as it is that size of coal which is marketed from this mine, and in fact, from a large part of the territory tributary to the Virginia R.R.

It soon became evident however that so much of the ash of the resultant run-of-mine coal was due to the slack, which could not be hand-picked that it was necessary to provide some means of mechanical separation.

W. P. Tams, president of the Wyoming Coal Co., personally conducted tests on various cleaning devices and finally determined that the best results could be obtained by installing a Bradford breaker in which the larger lumps of hand-picked bone could be shelled from the adhering coal, a pneumatic cleaning plant being added to clean the slack as well as to treat the fine coal obtained from the Bradford breaker. This cleaning plant was expected to remove all rock and those poorer grades of bone coal which were tending to keep the ash in the slack above the desired figure.

The plant, to accomplish this purpose, was designed and built by the Roberts and Schaefer Co., using a

Bradford breaker, elevators, conveyors, Hum-Mer screens, Universal rescreens, American pneumatic separators and a B. F. Sturtevant Co. dust-collecting system. The plant is constructed of timber and built adjacent to the tippie to which it delivers its cleaned product.

The first operation is that of breaking down the big lumps of bone coal in the Bradford breaker. The fine coal from this goes to the cleaning plant and the rejected material directly to a rock bin. The slack from the tippie together with this fine coal go direct to the foot of a bucket elevator capable of handling 175 tons per hour which raises them to the top of the dry-cleaner building whence they go through the succeeding operations by gravity.

A cross conveyor takes the coal from the elevator and distributes it to the top of a tandem series of four Hum-Mer screens, each of which drops the undersize to a pocket and delivers its oversize directly to the succeeding screen. The openings in these screens are of a size to divide the coal into the proper proportions and the proper sizes for the pneumatic separators. The undersize from the first of these screens is delivered to a second set of four screens which separates the fine coal into the sizes to be tabled.

DOESN'T TREAT SLACK UNDER ½ IN. DIAMETER

The finest of these screens is ½ in., the undersize of which is bypassed without further treatment to the slack coal. All screened products except these fines are run into five hoppers, each of 4-ton capacity, feeding the pneumatic tables. Attached to the bottoms of the bins are fine Universal rescreens which serve further to screen the products and remove the fine breakage occurring in the bins. These screens not only improve the operation of the table but reduce the dust which would otherwise be blown about on the table floor.

The re-screens feed to the five pneumatic separators which grade the coal in a discharge line varying from the heaviest refuse at one end to the best coal at the other. This line is divided into finished refuse (which is discarded) cleaned coal, and middlings, which are either to be returned to the foot of the elevator for retreatment in the plant, or used as a separate product under boilers or sold together with a part of the good coal as an inferior product.

The finished products are collected on a single, two-compartment, gathering conveyor which on one strand takes the cleaned coal to the tippie and the middlings to the elevators and on the other strand delivers the

NOTE—Illustration in headpiece shows Wyco dry-cleaning plant.



Another View of Dry Cleaning Plant with Tippie

In this plant the refuse from the picking table is broken in a revolving breaker and the fine coal removed. With the slack from the mine, the coal is sized and cleaned on air tables. The middlings product of these tables can be used under the boilers or again sent back through the process.

refuse to a bin and the middlings, if desired, to a separate bin.

To control the dust about the plant, care was taken

to keep the fine coal at all times under cover so that dust could not escape. With this end in view all conveyors, chutes and elevator were covered. Over the tables, where air tends to keep the dust in circulation, are placed dust hoods with such suction provided that all the air is removed from the covered area, a surplus being afforded to insure that the hoods will remove all dust. The covered area varies from about 50 per cent of the table surface to about 90 per cent, depending on the fineness of the coal and its tendency to produce dust. To prevent dust clouds from boiling up during screening, suction is provided on all hoppers leading from the screens. All the dust-laden air from these various sources goes through a fan and to a cyclone collector which removes the dust and delivers it to a covered screw conveyor which returns it to the slack.

The Wyco plant started operations Feb. 1 and has been running continuously ever since. It is too early to state what the actual results of the operation will be as the organization and training of the operating crew and the adjustments always incident to the starting up of a new plant so far have occupied the time of those in charge. From the few days of operation, however, it is apparent that refuse and bone are being removed from the coal with a minimum of expense.

The Miner's Torch

Making the Smoke Problem Our Problem

EVERYONE connected with the coal industry should be interested in Technical Paper No. 273, Subject: "Smoke Abatement." This paper has just come from the press and copies can be obtained from the U. S. Bureau of Mines, Washington, D. C.

During the war while there was a shortage of coal and an ever-growing demand for more and more production, most city smoke abatement ordinances were allowed to become ineffective, but now with a plentiful supply of coal assured there seems to be a growing demand for the enforcement of such ordinances.

Mr. Coal Operator, your city friends are liable to ask you embarrassing questions after they read some of the proposed smoke ordinances or listen to speakers who are working up a demand for such edicts. The paper referred to will give you the answer to most of the questions that will be put to you and instead of being on the defensive you may pose as an authority on the subject.

If the soft-coal men do not wake up it will only be a matter of a few years before coke, gas, or some other substitute will take the place of the soft coal now being used for domestic purposes. Although smoke from residences furnishes only about 10 per cent of the total smoke of the cities, such smoke is particularly destructive in its effects on property and vegetation and there is a growing conviction among physicians that it affects seriously persons suffering with acute lung diseases and possibly is one of the most common causes of cancer.

There may be chance for argument in discussing the effect of smoke on health because this is as yet largely a matter of opinion, but there is no chance for argument when committees appointed by city governments submit figures showing the additional cost to the aver-

age citizen for laundry bills, paint bills, etc., because of smoke-polluted air.

Of course, if we are to believe all the reports coming from the Ford engineers it will only be a few years at most until all soft coal will be turned to low-temperature coke and the smoke problem will be solved, but the paper under discussion does not mention the work of the Ford engineers and simply states "During the past 10 years increasing attention has been given to the possibility of low-temperature carbonization."

Approximately one-half of the paper deals with the domestic smoke problem and the information which it contains should be in the hands of everyone who burns coal for domestic purposes. If the producer of coal will pass such information on to the consumers he will render a service that must have far-reaching results. For example we learn that by simply changing the method of firing and without the expenditure of a penny for equipment the density of the smoke from an ordinary hot air furnace can be reduced from 11 to 4 per cent. The same thing is almost true of grate fires and kitchen-stove fires. I venture to say that half of the coal men who read this will question this statement at first sight so let me hasten to say that this is honest-to-goodness information and not propaganda.

One of the unfortunate conditions surrounding the coal industry is the lack of a point of contact between the producer and the consumer. The product that the consumer obtains is far from attractive in appearance and when he comes to pay for it he sees red instead of black. He knows nothing of the problems of the man who has his money invested in coal mines, nor of the men whose sustenance is dependent on their labor in the mines. If his memory is good he recalls "Coal Barons" and "Reds" but beyond that all is a blank. Taking such facts into consideration, would it not be better for the coal producer to take the initiative in assisting the general public with its smoke problem rather than to wait until the daily papers start the campaign with scary headlines something after this manner: "Soft coal smoke doubles our laundry bills and destroys our shade trees"?

Dr. Wheeler Explains That Wet Coal Dust Is Still Coal Dust And Liable to Explode



Haig Pit*

©Keystone View Co.

BY A. F. BROSKY

Assistant Editor, *Coal Age*

Only One Sure Cure Exists and That Is Fine Rock Dust, Not Only in Barriers, Though That Is Well, but Also Spread on Sides and Floor of Passageways

ROCK dusting—or “stone dusting” as the English mining engineers term the mixing of limestone or shale with coal dust to check the propagation of an explosion of the latter—seems likely to be adopted as a general practice in the United States. The interest created in this work following the recent visit abroad of George S. Rice, of the U. S. Bureau of Mines, and others is being intensified by a return visit to this country of Dr. R. V. Wheeler, director of the Mines Department Experimental Station at Eskmeals, and Henry Walker, deputy inspector of mines, both of Great Britain.

Arriving in New York City too late for the 129th meeting of the American Institute of Mining and Metallurgical Engineers, they made their first appearance in Pittsburgh, where the coal-mining activity of this country naturally centers. At a series of meetings the conferences in the Pittsburgh station of the U. S. Bureau of Mines, and in two lectures at the Carnegie Institute of Technology, Dr. Wheeler spoke of the factors which enter into gas and coal-dust explosions, placing greatest emphasis on the prevention of the latter by rock dusting; in fact he was obliged to do so because of the astonishing interest taken by men who attended these gatherings. Time and again his audience would revert to rock-dusting, revealing the thoughts which were uppermost in their minds. Can we and shall we dilute the content of combustible material of the dust which gathers in our underground workings? No doubt we shall.

DINNER IN ATHLETIC ASSOCIATION CLUBHOUSE

The English visitors were welcomed to the smoky city by a dinner in the clubhouse of the Pittsburgh Athletic Association. Men from the Bureau of Mines, representatives of coal companies, technical educationalists and engineers made up the dinner party of thirty-seven, which was limited in number to make the get-together informal. The after-dinner talk resolved into a quizzing of Dr. Wheeler and Mr. Walker who in turn asked questions of our own engineers. Inspection, regulation and practices as applied to the elimination of hazards in the mines of both countries were the topics

of discussion; rock-dusting was a subject much to the fore. Dr. Wheeler advocated without qualification the use of rock dust as the means best suited to prevent dust explosions, declaring that they will occur even after all other precautions have been taken. That rock-dusting does not remove the need for continuous effort in diminishing the hazards due to ventilation, electricity and machines, was another high mark in his speech.

No doubt the readers of *Coal Age* who did not have the opportunity of hearing Dr. Wheeler in Pittsburgh last week are eager, as were the 200 men who did, to learn more about explosions and how they may be made less hazardous by rock-dusting and other means. Lack of space limits this report to an account of Dr. Wheeler's two lectures and the discussions which followed in the “union room” of the Carnegie Institute of Technology in the evenings of March 5 and 6. What was said along similar lines at a joint meeting of the civil engineering section of the Engineers' Society of western Pennsylvania, the Pittsburgh section of the American Institute of Mining and Metallurgical Engineers and the Coal Mining Institute of America on the evening of March 4, as well as all that transpired in the assembly room of the Bureau's Pittsburgh station during an all-day mine safety conference will be told in next week's issue.

FIREDAAMP EXPLOSIONS SLOWER THAN COAL DUST

In his first lecture Dr. Wheeler dealt with the causes and physical characteristics of explosions in coal mines. Though these explosions account for only a small percentage of the fatal accidents that occur in coal mining, most of the deaths being due to falls of roof, they serve to make imminent an even more serious disaster. Much patient study has been devoted therefore, to the character of firedamp and coal-dust explosions, with a view to reducing, by the adoption of preventive measures, the likelihood of their occurrence.

Firedamp explosions, as compared to those caused by ignition of coal dust, are comparatively easy to study. The speed of propagation of a flame of firedamp and air is comparatively slow. Dr. Wheeler showed by curves on a lantern slide that the most rapid flame under conditions of “uniform movement” originates from a mixture of $9\frac{1}{2}$ to $10\frac{1}{2}$ per cent of methane with air.

When this mixture is ignited the flame moves with a speed of 90 cm. (35.4 in.) per second; the speed of an 8-per cent mixture is 70 cm. (27.6 in.) per second, and

*At this pit, which forms part of the Whitehaven Collieries, Cumberland, England, a serious explosion occurred Sept. 5, 1922. The Chief Inspector of Mines reported that it originated from the flame of a shot and that the evidence of coked dust showed that coal dust, even though wet, had aided in extending the explosion. The mine generated gas and the explosion apparently was preceded by a sudden outburst of methane. The face of the working place contained a big pool of water, and the management asserted that the mine was “naturally wet throughout,” yet coked dust was found on some of the ribs and props.

that of a 14-per cent mixture is only 30 cm. (11.8 in.) per second. A mixture of air with $6\frac{1}{2}$ per cent of ethane will propagate flame with greater speed than any mixture of methane. Fortunately ethane does not occur in coal mines.

The data mentioned in the preceding paragraph of course refers to a mixture of methane with pure air, which contains 20.9 per cent of oxygen. In mines the air is not pure. This leads to the question: what are the limits of inflammability of firedamp with impure air? And naturally it can be answered only in a general way by saying that the limit of speed is considerably reduced in air that contains much less than 20.9 per cent oxygen.

When the ignition point of a firedamp flame is at the open end of a tube which is closed at the other end, the speed of flame propagation is 140 times greater than that of a flame ignited at the closed end. If a gallery is open at both ends the most dangerous condition obtains for that condition favors a prolongation of the period of an explosion. In a gallery with one end closed, a partial vacuum is set up which tends to break the flame and extinguish the explosion.

A moving current of methane and air increases the speed of propagation of an explosion and develops the maximum pressure more quickly. When the velocity of the current is 75 cm. (29.6 in.) per second, the speed of propagation of an explosion is more than five times as fast as it is when the mixture is at rest prior to the explosion.

MANY DUST-EXPLOSION PROBLEMS UNEXPLORED

Many of the basic phenomena attending coal-mine explosions are yet in doubt, despite the years of study devoted to the subject. It is assumed that the laws which govern the propagation of flame in explosive-gas mixtures are applicable to explosive mixtures of coal dust and air. Nevertheless, we do not know such important details, as the exact effect of various conditions in the working places and galleries, and many of the physical and chemical actions relating to the bringing together of coal dust, air and ignition agents.

The speed of a molecule of oxygen is 350 m. (1,150 ft.) per second, which is in striking contrast to that of the gently floating particles of coal dust suspended in air. An analogy between the ignition of a mixture of gases with that of a mixture of coal dust and air therefore is not accurate. Consequently, generalities only may be dealt with.

Many coal-dust explosion tests have been made at the Eskmeals station in England within steel-tube galleries. The maximum pressure produced by a coal-dust explosion in a gallery of uniform cross-section is 50 lb. per square inch at a distance of about 500 ft. from the point of ignition. Three restrictions in the airway formed by the introduction of angle irons, so arranged as to reduce the diameter of the testing gallery by 1 ft., increased the pressure of the explosion at a point 450 ft. from the source of ignition to 152 lb. per square inch. Without these restrictions, other conditions remaining the same, the pressure is 16 lb. per square inch at a point 450 ft. from the point of ignition. Restrictive barriers in the testing gallery serve the same purpose as timbers in a mine to create turbulence and intensify the pressure caused by a coal-dust explosion.

Captain Steidle, Carnegie Institute of Technology, opened the discussion following the first lecture by asking what effect the fineness of coal dust had on the

propagation of an explosion. Dr. Wheeler replied that the finer the coal dust, the greater the speed and the greater the violence of the blast. The English standard of fineness for the coal dust used in tests specifies that 85 per cent shall pass through a 200-mesh screen.

J. T. Ryan asked whether gas in a bituminous mine could explode in the presence of coal dust without the latter entering into the blast. He was told that a gas explosion in all probability would raise a cloud of coal-dust which would combine with the gas and air to increase the intensity of the explosion. Though no tests have been made in England to prove this point conclusively, Dr. Wheeler is of the opinion that coal dust figures in practically every explosion.

DOUBTED IF VACUUM WOULD STOP EXPLOSION

Dr. Holbrook inquired whether a vacuum created at the closed end of a gallery would stop the propagation of a coal-dust explosion as it does one involving gas alone. Professor Wheeler did not think so, though he had no results of tests to prove his belief. To a question by G. S. Baton as to the effect of the volatile content of coal dust on the ignition and propagation of a flame, Dr. Wheeler said that higher contents of volatile matter increased the ease of ignition and the speed of propagation.

In Dr. Wheeler's second lecture on the prevention of explosions, he said that to eliminate many of these catastrophes in coal mines the surest procedure is to exclude the use so far as practicable of all potential means of ignition, or so control their use as to render them harmless. Blownout shots are the chief cause of explosions in England. The explosives causing them, unfortunately, have been approved by the Department of Mines. Dr. Wheeler commended the record established in this country in that no explosive approved by the U. S. Bureau of Mines has ignited firedamp on blowing out from a shot hole.

"It is flying in the face of Providence," he said, "to use other than permitted explosives in mines in this country." He asked, "Why the devil do you use that term 'permissible explosive' when you mean 'permitted explosive.'""*

Correctly designed flame safety lamps are incapable of igniting any mixture of firedamp and air, even though the velocity of the current is very high. An exposed filament of an electric cap lamp can ignite any combustible mixture of firedamp and air. Electric cap lamps of modern construction make the possibility of ignition remote unless they are damaged. Trolley wires create a hazard that cannot be harnessed.

Electric motors and controls are a means of ignition. They can be made flameproof by enclosing them within a casing. The English point of view differs from that of the American. The British strive to make a casing pressure- as well as flame-proof. An explosion inside a casing will burst it if it is not made sufficiently strong. Flame- and pressure-proof motors make for clumsy machinery. A hermetically sealed casing is the best assurance of protection against flame and pressure. The English are working on a flanged joint. It has been proved that a $\frac{3}{4}$ -in. slot gives the maximum release of pressure without allowing flame to reach the atmosphere outside the casing. A slot no wider than

*The answer is simple. For the U. S. Bureau of Mines to use the expression would be assuming the power of permitting or prohibiting other explosives, which under constitutional provisions, it does not have except in certain specific mines and on the Indian lands.



Dr. Wheeler, Messrs. Walker and Chapman with American Friends at Bruceton Mine

Taken during an exhibition test at the experimental mine made Friday, March 7. From left to right, John T. Ryan; A. A. Munsch, U. S. Bureau of Mines; Robert M. Lamble, chief, West Virginia Department of Mines; M. Morris, chief of rescue crews,

of that department; J. J. Paul, U. S. Bureau of Mines; Henry Walker, Deputy Inspector of Mines, Great Britain; Dr. R. V. Wheeler, Director of Mines Department, Great Britain; F. E. Cash, U. S. Bureau of Mines; W. R. Chapman, secretary to

Dr. Wheeler; George S. Rice, C. M. Bouton, H. P. Greenwald, A. C. Fieldner, all of the U. S. Bureau of Mines; Edward Steidle, co-operative mining department, Carnegie Institute of Technology, and H. C. Howarth, U. S. Bureau of Mines.

0.01 in. permits of a fair release of pressure. The margin of safety between these two limits is wide. Dr. Wheeler doubts if true frictional sparks are capable of igniting firedamp under mining conditions.

Even after all preventive steps covering the possible means of ignition described in the preceding paragraphs are taken at least two other agents must be made harmless—they are firedamp and coal dust. The former can be rendered harmless by adequate ventilation, but this often increases the hazard of the latter by stirring up dust.

Methane must be in excess of $5\frac{1}{2}$ per cent to propagate flame. A proportion of methane of $2\frac{1}{2}$ per cent is well on the safe side. It is questionable whether it is necessary to dilute methane by ventilation to a limit of $2\frac{1}{2}$ per cent. Some people advocate a further reduction, arguing that a $2\frac{1}{2}$ per cent indication of methane in one place may mean a higher methane content in another. On the other hand, a $4\frac{1}{2}$ per cent limit would give the same warning of danger.

GREAT BRITAIN RELIED ON WATER TOO LONG

No feasible quantity of ventilation will increase the volume of air to such a degree as to reduce the coal-dust percentage below the limit of inflammability. No more than 0.1 oz. of 200-mesh coal dust per cubic foot of air is required to propagate a coal-dust explosion. Many times that quantity is present in bituminous mines. Ventilation consequently does not remove this hazard. Coal dust is not an explosive in the same sense as black powder. It is dangerous only when suspended in the air as a cloud, and may be made innocuous by preventing it from forming a cloud.

Prior to the adoption of stone dusting, the wetting of mines was extensively practiced in England. When applied to the roof and sides of entries, water caused the former to become insecure and greatly increased the hazard of falling rock. The chemical composition of coal dust renders it difficult to wet down with water.

Solutions of several salts will wet it, but the arrangement is not any more practicable than to use alcohol, which also will wet coal dust. The quantity of water required in coal dust to make it comparatively safe is 30 per cent, though some coals may not need so much.

A coal-dust explosion is known to have occurred in a very wet English mine. Two shots within a short period of time and in close proximity to each other were directly responsible. The first shot released a pocket of methane which latter was ignited by the second shot. The flame traveled a short distance as a minor gas explosion and then increased to great violence. An investigation of the explosion showed that a skim of coal dust floating on water caused the continuance of the explosion, yet the entries were "swimming" in water.

EVEN 10 PER CENT OF ROCK DUST MIGHT HELP

In 1886, Sir William Garford suggested the use of rock dust to correct the tendency of coal dust to ignite and propagate flame. He had observed that airways, where practically only rock dust was found, checked explosions which had penetrated wherever coal dust lay.

Whatever efforts are expended in the direction of rock-dusting will do good varying in degree with the quantity of rock dust distributed. The addition of a small quantity of incombustible material will aid in reducing the violence and spread of the explosion. A mixture of coal dust with 10 per cent of rock dust is sufficient to reduce that violence to one-tenth. Pure coal dust in an explosion moves at a speed of 1,070 ft. per minute, producing a maximum pressure of 50 lb. per square inch. Coal-dust with 10 per cent of incombustible matter propagates a flame at a speed of 425 ft. per second creating a pressure of 4.8 lb. per square inch.

The most important English act relative to rock-dusting is that which specifies that the incombustible material in the dust in mines be maintained at 50 per cent by the addition of rock dust as needed. In some

instances, as much rock dust as has been specified may be necessary, in others, more is required. In the United States the mines may not have to maintain so large a percentage of incombustible matter to obtain an equal immunity. An addition of 10 per cent of rock dust is well worth striving for.

Small particles of coal dust are the most dangerous. To be most effective, the rock dust must be at least as fine as the coal dust with which it is mixed. In England 70 per cent of the dust must pass through a 200-mesh screen when it is to be distributed through the mine automatically, whereas when the rock dust is distributed by hand, if only 50 per cent will pass such a screen the dust will comply with the terms of the law.

GRANULES OF COAL MAY REDUCE EXPLOSIVE VIOLENCE

It is conceivable that granular coal mixed with fine coal dust will lessen the violence of an explosion. This conclusion seemed indicated by an investigation into the circumstances surrounding a certain English mine explosion. On the entries of this mine was strewn dust containing 80 per cent of incombustible material. A firedamp explosion at a working place soon spent itself



Rotary Dumps at Stag Canyon Mine

Note the full car on the right. At some mines such a carload would cause the foreman to reprimand the miner who loaded it but at the Phelps Dodge operation the miners are not allowed to build up the coal on their cars. Consequently the spillage, which makes rock dusting largely ineffectual, is avoided. The Phelps Dodge Co. had no rock dusting when this photograph was taken but they sought to reduce the quantity of coal dust in their roadways by ordering that their cars be merely "rounded on top."

along the rock-dusted entries. An investigation revealed the location of the source of the explosion. In its path was a patch of coal dust which was not ignited because it was intermingled with a considerable quantity of coal of the coarser sizes, the largest of which particles were about 1 in. in diameter. The mines in the United States after all may not have to add as much incombustible material as at first is expected.

It is not a difficult matter to reach the necessary saturation of rock dust. At the end of the first year of rock-dusting in a Yorkshire mine, samples at various points were taken yielding the following average percentages of incombustible material: 79.9 per cent on endless-rope haulageways; 67.5 per cent on other haulageways; 80.2 per cent on traveling ways; 68.4 per cent on return airways and 69.4 per cent on cross gates. In Table I is given a self-explanatory quantity study of rock-dusting in a South Wales mine.

Stone dust must be applied wherever coal dust is found in order to narrow effectively the limits of a local coal-dust explosion. Rock barriers are only a second line of defense; dusting is the first. Never should the barriers be used alone.

The health of a miner is not impaired by the use of limestone or a shale free of siliceous granules. Dr. J. S.

Table I—Effectiveness of Applications of Rock Dust in Maintaining Ash Percentage Required

Quantity Lb. Per Lin. Yd.		Number of Applications Per Annum	Quantity of Stone Dust in Lb. Per Lin. Yd. at Each Application	Percentage Ash Maintained
180	Roof, sides and floor	12	7	55 to 65
		36	2½	50
90	Roof and sides	4	22½	70
120	Roof, sides and floor	8	15	50
70	Roof, sides and floor	2	35	70

Haldane made what Dr. Wheeler termed a very favorable approval of the practice so far as health is concerned. The former reported that inhalation of the dust of soft stone is no more injurious than that of coal dust. Limestone is absolutely harmless, and by reason of its white color, it aids greatly in screening the light in the mine from the absorption effects of the coal, 98 per cent of the light that strikes the face being taken up by the coal. Thus limestone improves the illumination. Incidentally, the latter benefit decreases nystagmus, a common ailment of English miners. Gray shales are not so satisfactory.

That is how matters stand in England. They are satisfied for the time being and "are content to leave the security of their mines in the hands of stonedust," while scientists search for a better means of safeguarding mines than this "empirical remedy" affords. Stone dusting has been described by the latter phrase because nobody knows much as to the manner in which it acts.

DOES ROCK DUST MERELY COOL THE FLAME?

A discussion followed this second night's lecture. Dr. Wheeler is not satisfied that he knows just how rock dust prevents the ignition or propagation of coal dust. In answer to Edward Steidle's question on this point, he said, "One theory is that the particles of rock absorb heat and check the spread of flame."

Richard Maize wondered if a combination of suspended coal dust and firedamp below the lower limits of 0.1 oz. per cubic foot and 2½ per cent respectively, would cause an explosion if they could be ignited. Dr. Wheeler didn't know how such a combination might act together. Each of these lower limits is fixed without reference to the other.

A. C. Fieldner thought the audience would be interested in hearing how stone dust is applied. In response, Dr. Wheeler described briefly three common methods: (1) Shoveling by hand from tubs (mine cars) to roof and sides allowing the material to settle on the floor; (2) automatic distribution by dust car attached to the end of a train of tubs, power for blowing being derived from the moving axles of the tubs; (3) compressed air. This is used mostly in South Wales.

In addition to these methods, an unsuccessful attempt was made to apply the dust to the intake air, depending upon it to carry the dust. In one mine an interesting arrangement was devised in which a cloud of rock dust was directed toward a face while the latter was being shot down. This method is effective but hardly practicable.

J. W. Paul inquired as to the maximum quantity of explosive permitted in a single shot. He was told that only explosives on the British "permitted" list may be used and that the largest charge allowed is 18 oz. For coal, it is usually 4 oz.

C. L. Colburn recalled Dr. Wheeler's account of an explosion of a skim of coal dust on the water standing

in the entries of a very wet mine, and then asked what effect rock dust would have in a similar case. Dr. Wheeler said stone dust would absorb moisture and tend to drag down the skin of coal dust which otherwise would float on the water. He also let it be known that he has an aversion to adding more dust to an already dusty mine and would like to see a limited quantity of water added with the rock dust. He frankly admitted that many of his countrymen did not agree with him.

M. D. Cooper asked: "What arrangements are made by British mine owners for preparing or obtaining a supply of rock dust?" The lecturer described briefly the following schemes: (1) Dust ground in individual plants at the mine, using the "mortar-and-pestle" type of mill; (2) dust purchased from a commercial milling plant; (3) a partnership of several mine owners in a group milling plant. A recent development has been the use of a byproduct obtained in the manufacture of alkalines.

In answer to Alphonse F. Brosky's question as to why the fineness of rock dust is so specified that 70 per cent must pass through a 200-mesh when it is applied by machine, whereas only 50 per cent must pass this test when shoveled by hand, Dr. Wheeler said that the finer sizes are less injurious to health and more easily



Edward Steidle
Professor of mining engineering, Carnegie Institute of Technology, Pittsburgh, Pa. Captain Steidle has charge of the co-operative mining department maintained by his institution and fostered by the U. S. Bureau of Mines.

distributed by machines. In hand shoveling, larger sizes tend to clean off coal dust from ledges on the roof and ribs, allowing the smaller sizes of rock dust to settle there free of coal dust. Coarseness in size is more important in hand shoveling than is fineness in machine distribution.

J. T. Ryan asked if it would not be safer to leave coal dust on the floor of an entry than to shovel it up, when unmixed with rock dust, as the operation would raise a cloud of dust, much of which would settle on ribs and roof. Dr. Wheeler agrees that the loading out of coal dust with shovels makes a dangerous condition more dangerous. When rock-dusting is used, the continual addition of both coal dust and rock dust to that already on the floor must ultimately necessitate the shoveling out of the accumulated mass at more or less wide intervals of time. Flotation methods of separation are working

quite successfully to produce a merchantable coal dust and a byproduct that might be used again in the mines. He believes the Trent process well adapted to this separation.

Somebody inquired, "What percentage of the mines in England are using rock dust?" Dr. Wheeler's reply was, "Practically 100 per cent. There are, however, a few mines where this practice is not necessary."

Coal-Mine Accidents in Great Britain Take 1,289 Lives in 1923

In the coal mines of Great Britain there were 1,143 accidents, which caused the death of 1,289 men, in 1923, as compared with 1,026 accidents and 1,105 deaths in 1922, according to a preliminary report issued by the Mines Department. Major accidents of 1923 are shown in Table I.

Table I—Major Accidents at British Coal Mines in 1923

Date	Name of Mine	Nature of Accident	No. Killed
Feb. 22	Wheldale (Yorkshire)	Explosion of firedamp	8
Feb. 24	Medomsley (Durham)	Shaft accident (cage came out of guide due to worn shoes)	8
Apr. 24	Apedale (Staffordshire)	Irruption of water	8
Apr. 26	Trimsaran (Carmarthen)	Haulage accident (breakage of chain)	10
July 28	Maltby Main (Yorkshire)	Explosion of firedamp	27
July 28	Gartshore (Dumbarton)	Explosion of firedamp	8
Sept. 25	Redding (No. 23 pit) Stirlingshire	Irruption of water	40
Dec. 3	Nunnery (Yorkshire)	Haulage accident (breakage of rope)	2

The death rate at coal mines was somewhat higher than in 1922, particularly in the case of haulage accidents. Outside the Scottish Division, the deaths from this cause were about 50 per cent higher in 1923 than in 1922. The death rate at quarries in the Scottish and the Lancashire and North Wales Division was considerably higher than in 1922.

Table II shows the number of deaths caused by accidents in and about the mines of Great Britain (including those on private branch railways and tramways, and in washing coal) during 1923.

Last year, of the deaths from falls of ground, 392 occurred at the working face, 114 on roads while repairing or enlarging, 75 on roads while otherwise working or passing, and 4 in shafts.

Of the deaths from shaft accidents, 14 occurred while descending or ascending by machinery, 3 by falling into shafts from surface, 24 by falling from part way down, 2 by objects falling into shaft from surface, 3 by objects falling into shaft from part way down, and 12 by other shaft accidents, but no fatalities were caused by overwinding or by ropes or chains breaking.

The deaths due to accidents in haulage operations may be classified as under: Ropes or chains breaking, 11; run over or crushed by trams or tubs—mechanical haulage 105, horse haulage 75, hand haulage 23, run-away trams or tubs 73—total 276; other haulage accidents 25.

The deaths from miscellaneous causes below ground may be subdivided as follows: By explosives, 14; suffocation by natural gases, 7; irruptions of water, 52; electricity, 10; by machinery, 15; other accidents, 62.

Of the deaths on the surface, 21 were due to the use of machinery, 50 to accidents on railways, sidings and tramways, 2 to electricity and 41 to other causes. There were no deaths from boiler explosions.

Table II—British Coal-Mine Accidents in 1923 by Districts

	Explosions	Falls of Ground	Shaft Accidents	Haulage Accidents	Miscellaneous Underground	On surface	Total in 1923.	Total in 1922
Scotland	16	62	11	28	65	16	198	180
Northern	2	93	15	52	16	26	204	226
York & N. Midland	37	137	11	63	23	28	299	222
Lancashire & N. Wales	—	64	8	26	18	14	130	110
South Wales	2	172	7	114	20	2	336	276
Mid. and Southern	3	57	6	29	18	9	122	97
Total in 1923	60	585	58	312	160	114	1,289	1,105
Total in 1922	73	551	39	211	125	106	—	—

What Is the Relation of Cost of Production To the Price of Coal?

Efficiency of Management, Physical Conditions, Lost Time, Variation in Payments for Royalties and in Amounts for Depletion, Depreciation and Officers' Salaries Among Factors That Cause Wide Range in Output Costs

BY DAVID L. WING
Washington, D. C.

IN DISCUSSING underlying principles there are many things to be said that relate both to anthracite and to bituminous coal, but when the application of these principles is considered it is necessary often to make it clear just which industry and, in the case of bituminous, just which fields are under discussion. Such a variety of conditions exists that it will be found that what appears to be a similar result in two fields may have been produced by widely different causes.

First, let us consider the chief uses for cost-of-production information. These are two: its use to the operator and its use to the general public in its rôle of coal consumer. The practical use of a good accounting system to the operator in the conduct of his business is obvious and need not be stressed here. Events since 1916 have emphasized to the coal operator especially the importance of having adequate cost accounting to meet the requirements of the government.

In addition to the need for such information imposed on all industries to furnish information required for the federal income and excess profits tax, there also has been the special demand for it resulting from the price-fixing policy followed by the Fuel Administration during the war. The need of fixing prices that would sufficiently stimulate the production of coal, without imposing an undue burden on the consumer, made it essential to obtain adequate information on the cost of producing coal in the various mines in the different fields. It is from the standpoint of the public or consumer's interest in cost of production statistics that I wish to call attention to certain conditions of the problem involved. And I wish to emphasize the fact that in describing these conditions I am not advocating any particular method of solution.

WIDE RANGE IN PRODUCTION COSTS OF MINES

Since 1916, as a result of the strenuous career of the coal industry, a large mass of information on the cost of producing coal has been accumulated. For the years prior to 1916, however, little exists. In a paper that I read last November before the American Academy of Political and Social Science, I listed in some detail the various sources where this cost information can be found. One of the most striking facts shown in these statistics is the wide range in production costs found between mines in the same field and between different fields. The "Great American Average," if used with restraint, is helpful for certain purposes, but it certainly is a deadly expedient as often used in the discussions of the relation of costs of production to coal prices. This is because of the extreme range of those costs in a given field.

Paper read before the Washington Academy of Sciences, January, 1924.

Relatively few people, outside of those directly engaged in the mining of the industry, realize how great this range is. Some years ago, at my first appearance before one of the several Senate committees that investigated the coal industry almost continuously from 1917 to 1922, Senator Reed, of Missouri, sharply challenged my statement that the costs of production in the Pittsburgh field as shown by reports made by operators to the Federal Trade Commission, ranged, during September and October of 1917, from about one dollar to three dollars per ton. He then instructed me, on my return to the witness stand, to explain "how two coal companies, operating side by side, and selling in the same market, come to have such varying costs, one of one dollar a ton and the other of three dollars a ton." As there may be others who might wish to raise a similar question—one that goes to the root of the subject of price regulation, as well as that of reasonableness of prices, unregulated—I will give you my answer.

PHYSICAL CONDITIONS AN IMPORTANT FACTOR

(1) If mines are not under the same management part of the difference may be due to the relative efficiency of the respective managements.

(2) Physical conditions may be widely different in respect to:

Thickness of seam.

Pitch of seam—whether lying horizontally or at a difficult angle.

Purity of coal in seam—no sulphur balls, etc.

Faults and irregularities of seam.

Character of top and bottom of seam (determining the amount of timbering).

Type of operation, whether shaft or drift, and distance of productive seams from surface.

Drainage necessary.

Ventilation necessary.

Age of mine and character of mining—whether advancing rooms or robbing pillars.

(3) Time lost during month due to:

Car shortage.

Accidents to mine.

Labor troubles or labor shortage.

(4) Variations in payments for royalties and in the amounts of depletion, depreciation charges, and officers' salaries.

My experience, since then, in dealing with cost of production figures leads me to add two other important causes of differences. One is the relative use made in different mines of labor-saving machinery, which is expensive to install but which cuts down the labor cost per ton. Another is the relative amount of preparation that must be given to the coal after it comes from the mine before it can be marketed.

Now I must present a few figures, but I will be as brief as possible. First, however, a word as to the character of these cost statistics. The figures are the f.o.b. mine costs, compiled from sworn reports submitted by the operators to the U. S. Coal Commission, on monthly report forms prescribed by it. Many of the operators follow different accounting practices, which makes exact comparison of their figures impossible. The Coal Commission did not attempt to revise the cost figures to obtain greater comparability by reconciling different accounting practices. It preferred to use the figures sworn to by the operators rather than make changes for which adequate information on which to base them was lacking. While not 100 per cent comparable, the figures are undoubtedly sufficiently comparable for most practical purposes.

Since I have already mentioned the Pittsburgh field, I will give the range of costs there in 1921. Six per cent of the tonnage was produced at costs ranging from \$1.50 to \$2.20 per ton, and 9 per cent at costs ranging from \$3 to \$4.50, the costs of the remaining tonnage being spread out between those figures. The average cost was \$2.63 per ton.

Turning to anthracite costs, in 1921 it was found that the cost of fresh-mined coal (not including the product washed from the culm banks) ranged from \$3.75 to over \$12 per ton. That was the extreme range.

About one-quarter of the entire tonnage cost between \$5 and \$5.50, and of the 12 per cent of the entire tonnage which cost from \$6.25 upward, three-quarters was between \$6.50 and \$7.

These are the facts in regard to the range of costs of production. What relation have these facts to the prices charged by the operators? First, let us consider the uses to which the coal is put. As you know, the matter of market prices of coal is not wholly one of the cost of production—it is the resultant of two forces, the supply available at a given price and the demand for it at that price. It is necessary in measuring different factors often to make assumptions which simplify the complexity of the problem. But in any practical application this complexity must be recognized.

The price that the operator can obtain for his coal depends in part on the uses to which it can be put—for example, in metallurgy, for making gas, for blacksmithing, for fuel in households, apartments and office buildings in cities, for making steam for manufacturing or transportation. Also, do not forget that the operator's price is influenced by the availability to consumers of suitable coal from other fields or of other forms of fuel.

Now, what is the bearing of the wide range of costs in the matter of price fixing? Given an emergency such as rose in the summer of 1917, which caused the passage of the Lever Act and the establishment of the Fuel Administration, it becomes necessary to establish an artificial relationship between the cost of production and the operator's price. At such a time the demand for all fuel is so insistent that much of the effect of particular uses on price just described can be disregarded, because all the coal that can reach the

consumer is not sufficient to meet the demand for the use in which it meets most competition—that of making steam.

By governmental authority there is fixed an artificial limit of the maximum price which the operator in a field is permitted to charge. These field prices have to be fixed with relation to the costs of production in that field. The course the price fixer must steer lies between the Scylla of discouraging necessary production and the Charybdis of placing undue burdens on the consumer.

At such a time, in the attempt to fix a reasonable limit for maximum prices, the wide range of costs of production in a given field assumes great significance. The very conditions that have brought about the emergency requiring such action have already submerged, for the time being, the natural regulation on prices

caused by the free play of competitive forces. These, under normal conditions, regulate through the changes of supply to demand.

The wide range of costs enters the problem through the need of using as a price-fixing base not the average cost in a field but a cost above the average. Otherwise the production of too large a proportion of that half of the coal tonnage produced at a cost above the average will be checked. During the war the following plan was adopted in fixing maximum

coal prices: The first bituminous coal government prices were fixed by President Wilson's proclamation of Aug. 21, 1917, before the establishment of the Fuel Administration.

There was then in the possession of the Federal Trade Commission fairly reliable typical costs of production for nearly every important bituminous field east of the Mississippi. These costs were almost all in the form of what I may call average high and average low for the fields—what really amounted to ranges of the costs grouped around the 25 per cent and 75 per cent points of a percentage scale of costs ranging from low to high. They did not indicate the extreme ranges of costs. By President Wilson's direction, I applied the margin of 25c. per ton, which he decided was a fair margin, taking into consideration the conditions at that time, not to the *average field cost* but to the *higher cost*, which in most cases worked out at about the 75 per cent mark.

Later, under the Fuel Administration, the Engineers' Committee, using the thousands of detailed monthly cost reports made by the operators to the Federal Trade Commission as a basis, after a careful study divided up the original price-fixing districts, and established for each price-fixing district their so-called "bulk line cost," which was a price basis established at the 80 per cent mark. To this base line the margin which Dr. Garfield approved for that field was added, to obtain the field price.

In both cases it was necessary to take into account the wide range of costs and to establish field maximum prices which returned to some of the lowest-cost mines enormous profits (subject, of course, to the income and excess profits tax), while some of the high-cost produc-

THE matter of the market price of coal is not wholly one of the cost of production—it is the resultant of two forces, the supply available at a given price and the demand for it at that price. It is often necessary in measuring different factors to make assumptions which will simplify the problem. But in any practical application, the complexity of this question must be recognized.

tion, which had been stimulated by the runaway market prior to price fixing, was eliminated. The loss of this high-priced tonnage, however, was more than made up by the increased production of the lower-cost mines, stimulated by their large profits and helped by more adequate transportation facilities.

It must be borne in mind that the crisis which brought about the price regulation in 1917 was primarily caused by the inability of the coal to reach market, not by the lack of mining capacity or mining labor to produce coal enough to satisfy the abnormal demand.

A word about margins is necessary. The margin to which I have referred in connection with price fixing is not strictly a margin of *profit*. It is the figure which is obtained by subtracting the average per ton cost f.o.b. mine from the average sales realization received by the operator for all his tonnage sold during the period under consideration—month, quarter or year. From this margin must come federal taxes and interest on borrowed money, before the amount available for the owners of the business—profit in the sense commonly used—is known. Even then it cannot be translated into terms of per cent return on the investment until the investment per ton is known. And obviously this investment varies widely from operator to operator.

LABOR-SAVING MACHINERY LOWERS COST PER TON

Take, for example, two operators operating side by side under similar mining conditions. One operator uses pick mining and mule haulage; the other has a mine well equipped with mining machine, loading machines and electric haulage, all devices which cut down the amount of human labor involved in mining a ton of coal. The first operator will show a high labor cost per ton—because he uses human labor to hew down the coal, to load the mine cars, and to haul these cars with mules which require the guidance of many mule drivers. This means, of course, a much larger sum paid in wages for an equal output of coal than is paid by the operator who has the heavy investment in labor-saving machinery.

Under the accounting rules, the expense of the labor goes into the cost of operation. The cost of investment in labor-saving machinery, however, does not show in the cost of operations to any such extent. It is reflected in a relatively slight degree in the depreciation charge, that is, the allowance for the wearing out of all equipment in order that a fund can be accumulated for its replacement. But no allowance enters into the operating cost for the use of the heavy capital investment; no return on the money tied up all this time in this expensive labor-saving equipment. Thus the first operator might show a small margin because of his high cost brought about by his lavish use of human labor, while the second operator might show a large margin, due to his use of labor-saving equipment. And yet their ultimate return on the money invested might be the same. In any comparison of costs and margins these factors must be taken into account.

A word about the relation of large margins to high prices. It is true that in many cases individual operators have obtained large margins by obtaining prices far in excess of the average market prices. But it is equally important to remember that both in the anthracite and in the bituminous industry, operators also are to be found who have sold their output at prices below the average for the field and yet have obtained mar-

gins much in excess of the average margins for the field, whether considered in cents per ton, per cent of sales realization, or f.o.b. mine cost. The explanation lies in the low costs of such operations, due either to the natural conditions of their mines or to their heavy investment in labor-saving equipment. As concrete illustrations often are of more value than much generalization, the following may be of interest:

In a certain tabulation made for the Calder committee, and presented at the hearings before the La Follette committee—both Senate bodies investigating the coal situation—there appear for certain operators figures showing their investments, costs, sales realizations and margins during 1920. I wish to call attention to the figures of two of these operators, both in the Smokeless field in West Virginia. For the 21 operators shown, the average investment per ton was \$3.83, the average cost for the first 9 months of 1920 was \$2.87, sales realization \$4.64, and margin \$1.77 (which was equal to 62 per cent of the cost). The extreme range of margins shown for these 21 operators, all of whom had an annual production exceeding 100,000 tons, was from 56c. to \$3.90. They had been selected for the tabulation because of their relatively large margins between June and September, 1920.

Operator No. 1 had a production of about 370,000 tons per year (a cost of \$2.03, a sales realization of \$3.44, and a margin of \$1.41). His sales realization was 26 per cent below the average of the 21 operators, yet his margin was 69 per cent as large as his cost, as compared with 62 per cent, the average for the 21 operators. His investment per ton was \$6.07, as compared with the average of \$3.83, and his rate of margin received to investment was 21 per cent, as compared with the average of 47 per cent.

HIGH MARGIN NOT ALWAYS FROM HIGH PRICES

Operator No. 14 was a producer of about 250,000 tons per year. He showed a cost of \$2.01, a sales realization of \$4.22, and a margin of \$2.21. His sales realization was 9 per cent below the average of the 21 operators, yet his margin was 110 per cent as large as his cost, as compared with the average of 62 per cent. His investment was \$3.57 per ton, as compared with the average of \$3.83, and his rate of margin received, to investment, was 92 per cent, as compared with the average of 47 per cent.

It should be remembered that these 21 operators were picked on the basis of large margins shown for the four months of 1920 when a runaway market was at its height. Their figures are not necessarily typical of the whole field. For this Smokeless coal region, the Federal Trade Commission published 1918 costs for 176 operators, and the Coal Commission, for 1921-22, costs for 144 operators. But the example I have given illustrates the fact that high margin does not necessarily imply that it is derived from charging prices above the average level. And there are cases in anthracite as well as in bituminous coal where a sales realization that produces a relatively high margin actually is *below* the mine cost of a substantial part of the production of the field.

In closing I wish to emphasize the fact that in proportion as accurate and comparable information on costs and investments becomes available, it will be possible to ascertain more surely the relationships that should exist, for the welfare of the industry and the consuming public, between costs, profits and prices.

News Of the Industry

Castlegate Blast Due to Contact of Gas With Open Light, Says Preliminary Report

**Fireboss Believed to Have Attempted to Remove Firedamp from Room—
Not a Man Survives—All but One Body Recovered—
Compensation May Cost \$700,000**

Special Dispatch to Coal Age

Salt Lake City, Utah, March 17.—It is estimated that the Utah Fuel Co.'s Castlegate disaster will cost \$1,500,000 in compensation, repairs to mine, labor in recovery of bodies of victims and loss in operation during the next month. The compensation is now placed at \$700,000 instead of at \$1,000,000. The figures given are a rough estimate.

According to a statement issued by a joint committee of federal, state and company mine officials, following a preliminary and far from complete examination of the mine, the explosion appears to have been caused by the attempt of a fireboss to remove a small amount of gas from No. 2 room of the sixth left dip entry on the morning of the explosion. It was stated that indications found in No. 2 room of this entry pointed to the fact that gas had come in contact with an open light, immediately exploding, sending a wave of intense heat throughout the underground workings, which ignited other smaller bodies of gas, killed the miners and sent air rushing toward the main portal with such velocity that it was completely wrecked and pipes and timbers blown clear across the canyon.

To Seek Cause Definitely

Efforts will be made to trace the cause of the disaster more definitely, but following a day spent in the workings, Daniel Harrington, U. S. Bureau of Mines; B. W. Dyer, chief mine inspector; John Crawford, coal mine inspector, F. N. Cameron, vice-president and general manager of the Utah Fuel Co., and R. M. McGraw, superintendent, the above statement was issued. The report adds that all precautions appear to have been taken, that the rooms were well sprinkled, and that it will be some time before a definite decision can be made.

But one body now remains in the mine, and efforts to recover it are being continued.

More than 200 men trained in rescue work were gathered from mining camps within 30 miles of Castlegate on the day of the explosion. All sorts of obstacles hindered them. The mouth of the slope was choked with debris, there were many roof falls, and such volumes

of gas, soot and water were encountered that the first three days' heart-breaking labor, during which George Wilson a member of the Standard Coal Co.'s rescue team of Standardville, Utah, was asphyxiated, produced only 57 bodies. Day by day other bodies were brought out by the score until last Saturday when the total had reached 168. It was concluded by that time that the total number in the mine was 171 instead of the earlier estimate of 173, and that, therefore, only three more were to be found.

Although many of the bodies were mutilated beyond identification, some were found with watches ticking in their pockets. This apparent miracle is explained by a company official who thinks the jar of picking up the bodies would be enough to start a watch that had been stopped by shock. In many

cases, watches stopped at the exact moment of the explosion. By the end of last week, of course, the earlier hysteria in Castlegate had been succeeded by that funeral silence which always settles down over mining camps after such appalling shocks. Interment of dozens of men daily became a simple ceremony. A great ceremonial of sorrow, however, is planned for a day two weeks hence.

The first movement to raise a relief fund throughout Utah has been stopped. There appears no need for it. The company, which is a self-insurer under the law, expects to pay out about \$1,000,000 in workmen's compensation to the survivors.

Moderate Property Loss

The property loss to the company is said to be moderate, considering the fearful force of the blast. Many entries must be cleared, water lines and tracks relaid, some debris removed, and the mouth of the slope rebuilt, but outside of that the rehabilitation of the mine may not be extensive. While part of the fan house was blown out, the fan itself is said to be in easily repairable condition.

The main hoist also was damaged. A quantity of coal at the entrance of the mine was partly coked by the fierce



Hole Torn in Mountainside by Force of Explosion

Where one of the workings came near the surface the blast blew aside the light cover making an opening to the mine. The force was so terrific that not a single man in the mine lived to tell the tale. Fortunately the mine is so located with regard to the tippie that the men at work on the outside were not injured.



Rescue Squad Entering Castlegate Mine

Plenty of evidence of violence can be noted. Telephone and electric light poles, timber and pipes were blown across the valley, which is almost a mile in width. The second explosion blew a wall out of the fanhouse and the third partly wrecked the office building of the company.

blast which swept through the workings. Small fires were started in gob piles at various points underground but these have all been extinguished.

The dust in No. 2 mine of the Utah Fuel Co., at Castlegate, has been recognized as "the most abominable to contend with that has yet been tested by the Bureau of Mines." William Littlejohn, general superintendent of the company's operations, told the Rocky Mountain Coal Mining Institute about it at the February meeting of the Institute, in Denver. The danger of it, he said, was so grave that ironclad rules of protection against it were rigidly enforced in the mine. As this was written, nothing definite was known as to the part that dust played in the fearful tragedy of March 8, but Mr. Littlejohn's discussion of it, voiced three weeks before the explosion, is interesting.

Drench Places Before Shooting

Mr. Littlejohn said rules required that every working place be drenched before shooting. If a miner failed to do this, the shotfirer would refuse to shoot the place, he said. The use of permissible powders in the mine has caused enough flame to fire both the dust and gas feeders, he said. So precautions are taken against both. Here is a transcript of part of Mr. Littlejohn's discussion of a safety paper at the Institute meeting:

"It is my opinion there is no such thing as 'flameless powder.' We are using what is termed 'permissible powder' exclusively, and I know personally, having visited some of our working places and seen some very marked indications of the igniting of feeders by flame after shooting that permissible explosives do flame. We have two mines in our operations where we have to get the inspectors to go back and examine the working places for feeders.

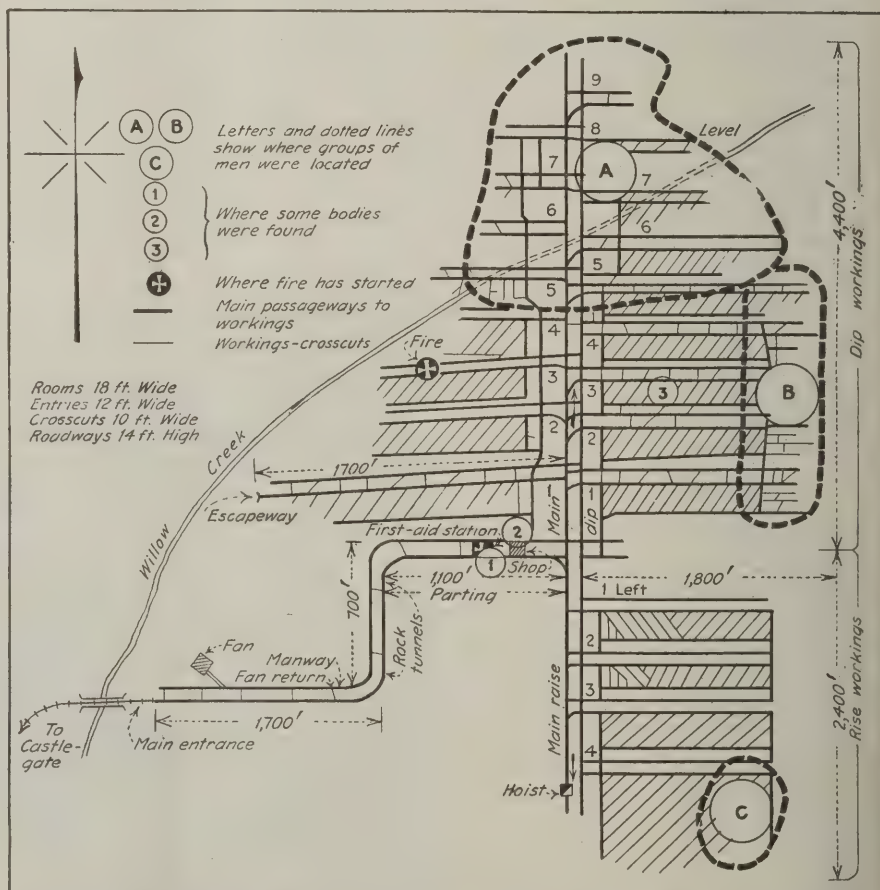
"It was an examination of No. 2 mine at Castlegate which caused us to change our methods. We found an entry which had been cut, drilled and sumped ready to shoot. When the shot inspectors returned after firing shots in this place they detected a strong

odor of burning. They sent for me and I went down there and made a personal examination. The whole situation was just as plain as daylight. We had eight shots, four in the entry and four in a crosscut. Unquestionably the four shots when they went off in the entry ignited dust. Unfortunately,

there was a shot right in the crosscut and evidently a tongue of flame projected and met the dust coming back from the face and ignited it. We got very distinct traces about 65 ft. back from the face. Fortunately, our mine was well sprinkled and it prevented a conflagration.

"We have a hard and fixed rule. Every miner must sprinkle his place. He is provided with a hose for this purpose. We have a strict rule and we live up to it. I want to say that we have—brother Harrington [Bureau of Mines' engineer] tells me—the most abominable dust to contend with that has yet been tested by the Bureau of Mines. If a miner goes home at night without sprinkling his place, the place is not shot. The shot inspector's instructions are to disconnect and don't shoot."

Mr. Littlejohn explained that he and several other mining men had devised sprinkler cars, two of which are regularly used in No. 2 mine. Each of these is a 1,200-gallon tank with a force pump and an arched pipe in front. The perforated pipe which throws the water is so arranged, he said, that roof and ribs are well washed down and even crossbars are soaked. "We sprinkle sides and roof regularly," he finished. "Mr. Harrington can tell you our sprinkling regulations are favorably known."



Skeleton Map Shows Where Men Were at Work When Explosions Occurred

The mine was developed according to the most up-to-date methods and every precaution except stone dusting was tried. The management at the mines initiated for America the practice of using non-combustible tamping and shooting coal electrically from a point outside the mine. It will be said that "another model mine has exploded"; but with this mine there is this difference: The management knew that it had a dangerous coal to deal with and that the air in the mine was so dry as to soak up water like a sponge, and consequently was never any too confident but was always looking around for additional means of protection.

District No. 2 Indorses Brophy Report In Stormy Convention at Altoona

About the only thing accomplished in the first five days of the convention of District No. 2, United Mine Workers which assembled in the Mishler Theater, Altoona, Pa., on Tuesday, March 11, and adjourned at noon on March 15 until Monday, March 17, was the indorsement of President John Brophy's policy relative to continuing the strike up to August, 1923, in the Somerset district, the threshing out of the controversy between President Brophy and T. D. Stiles, editor of the *Penn Central News*, and an address by Philip Murray, International vice president of the miners' union.

The controversy started over prolonging the strike in the Somerset region. Mr. Stiles took issue in his journal with the president on the policy he was pursuing, with the result that an injunction was obtained in the courts, tying up the labor paper and its business. When Mr. Brophy submitted his report, an open battle was waged, during which President Brophy, Vice President Marks and Mr. Stiles in turns engaged in a wordy battle which ended on Friday evening, when, by an almost unanimous vote of the delegates, Brophy was upheld in his stand.

Four hundred miners employed by the Vinton Colliery Co., at Vintondale, went on strike against a wage reduction and organized a local union on Monday. Brophy sent a telegram to Governor Pinchot requesting him to prevent eviction of miners from company houses. Educational and co-operative store movements occupied the attention of the convention Monday and Tuesday aside from a renewal of Stiles' defense of the *Penn Central News*.

Local Union No. 861, of Cresson, sent a resolution to the convention demanding impeachment of President Brophy, John Ghizzoni and John Kerr, who were responsible for the issuance of the injunction against the *Penn Central News*. This resolution went down when the convention accepted the Brophy report.

Miners at Marsteller sent a resolution which read: "Sign no scale agreement with the operators unless they agree to abolish the car push in District No. 2, said agreement to become effective not later than six months after said scale is signed." This will be considered at the conference with the operators on March 20.

It was decided to meet with the operators of the district in Philadelphia, instead of Altoona, on Thursday, March 20. Following are the men elected as members of the scale committee:

Territory 1, William Welch, Nant-y-Glo; Patrick McDermott, Hastings; territory 2, Harry Crago and H. E. Johnson, Philipsburg; territory 3, David Cowan, Portage; Faber McCloskey, Gallitzin; territory 4, Arthur Tayler, Robertsdale; Leonard Cleves, Defiance; territory 5, Herman Carletti, Punxsutawney; James Mottey, Elenora; territory 6, Peter Ferrara, Indiana; James McCarthy, Chambersville; territory 7, William Ackley and J. P. Nelson,

Madera; territory 8, Tony Badiala and D. P. Kirk, New Bethlehem; territory 9, S. J. Hudvinski, Morris Run, and J. G. Haskins, Blossburg.

In his address before the convention, Vice-President Philip Murray emphasized the importance of maintaining contractual obligations.

"We believe that a three-year contract will do much to stabilize the mining industry and that it is the best wage contract that has ever been adopted, both for the miners and for the industry," is the way Mr. Murray put it in speaking of the Jacksonville agreement. He declared that many new operators have come into the industry in late years, with the result that the industry is economically unsound and marked by cut-throat competition, with wage reductions in the non-union fields. He said: "Many of these operators are unable to pay their men and failures among them are frequent and they have thrown the whole industry out of gear."

The report of Secretary Richard Gilbert was a voluminous affair, every item being of interest to the miners of the district. The report shows a membership in the district of 42,799, a decrease of 6,974, due, he said, to conditions in the Somerset field. There are 235 local unions, a decrease of 25. The tax paid in 1923 amounted to \$1,108,892.98, while assessments totaled \$661,170.26. There was paid out in strike donations from April, 1922, to December, 1923, \$1,326,809.87.

The number of checkweighmen employed during the year was 412, and the amount of wages paid was \$498,711.63. Death claims were paid for 424 members and 232 widows or widowed mothers to the amount of \$108,000.

The receipts from all sources during the year, including the balance from 1922, were \$1,909,873.28, and the expenditures were \$1,542,348.63.

To Discuss Mine Problems at A. I. E. E. Convention

The spring convention of the American Institute of Electrical Engineers, to be held at Birmingham, Ala., April 7-11, will devote a session on April 10 to coal-mine problems. The papers to be read and discussed at this session are as follows: "Electrical Safety in Coal Mines," L. C. Illsley, U. S. Bureau of Mines; "Automatic Substations for Mines," C. E. Von Sothen, General Electric Co.; "Tests on Mine-Hoist Control," F. L. Stone and F. R. Grant, General Electric Co.

Sign 3-Year Agreement In Washington State

The union operators in the State of Washington and the United Mine Workers agreed Saturday, March 8, to a renewal of the existing wage contract for a period of three years from April 1, 1924.

British Miners Reject 10 per Cent Wage Rise; Ask 20 per Cent Advance

Delegates representing 750,000 British coal miners have unanimously rejected the mine owners' offer of an increase of 10 per cent in the minimum wage, which would be 30 per cent above the 1914 level, demanding an advance of 20 per cent in the present scale. Negotiations have been broken off and the Miners Federation will concentrate its efforts on the labor government and Parliament to obtain accession to their demands by means of the minimum wage bill which will come before Parliament March 21. If this move does not meet with success the miners' delegates will assemble on March 26 to decide on a ballot for a nationwide strike of coal miners.

Wage Troubles Vex Eastern Kentucky Fields

It is reported from Whitesburg, in Letcher County, eastern Kentucky, that there have been some sweeping reductions of 20 per cent posted in wage scales in the greater portion of the Elkhorn or northeastern Kentucky coal territory. Louisville coal men assert that there has been a lot of rate reducing in eastern Kentucky, until it is uncertain as to whether wages are now at the 1917 wage scale or below. Indications are that some of the non-union districts are below that figure.

Southeastern Kentucky, which is not fully unionized, has balked on signing a three-year contract, or operating on the present wage scale, feeling that it is suicide to do so in view of the competition from the eastern and north-eastern sections of the state, where the most powerful combinations are located. The non-union sections of eastern Kentucky also are largely responsible for the feeling of western Kentucky in opposition to a three-year scale or renewal at the 1919 basis.

Deadlock in Wage Parley Of Western Kentucky

Apparently there is a deadlock between committees representing District 23, United Mine Workers, in western Kentucky, and the Western Kentucky Coal Operators' Association, in the conference at Louisville to draw up an agreement to take the place of the one expiring on March 31. The miners, it is said, are holding out not only for a renewal of the expiring two-year scale agreement but for a three- or four-year agreement at the existing scale. The operators want a reduced scale and a contract of not more than one year, or two years at the outside, it is said.

Operators assert that with the non-union fields running coal freely, and adverse traffic or freight rate conditions, the western Kentucky field is at a disadvantage, and can't successfully pay the Central Competitive scale of 1919 and operate. The union leaders, it is said, are holding firmly.

The meeting began on March 11 and adjourned on March 14, to resume on Tuesday or Wednesday of this week.

Agreement Near at Baltimore

Agreement on a wage scale seems near between the Northern West Virginia Coal Operators' Association and the United Mine Workers as *Coal Age* goes to press. The conference, which began March 11 at the Southern Hotel, Baltimore, adjourned March 15, to meet again March 19.

George S. Brackett, vice-president of the operators' association, said the joint subcommittee had reached an agreement on many disputed points on working conditions on Saturday morning. At the conference on Wednesday it is expected that the subcommittee will be ready to submit its report, when it is hoped that an agreement will quickly be reached.

Judge Williams Advises Issue Of Trade Statistics

The essentiality of the trade association and of trade statistics was pointed out in an address by Nathan B. Williams, associate counsel of the National Association of Manufacturers, at the annual convention of the Refractories Manufacturers' Association at St. Louis, March 19. Among other things, Judge Williams said:

"Trade associations are tools of industry. There are those who would outlaw them. Being tools of industry, they must be kept in condition to perform their proper and useful functions.

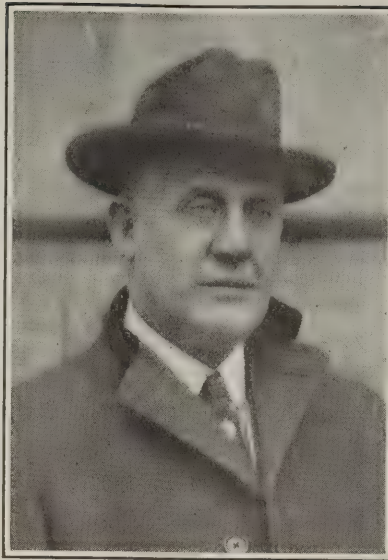
"The trade association is the primary source for accurate information respecting a particular industry or trade. By means of the association not only is the industry and its constituent elements informed but the public as well is made aware of that essential information which must necessarily be known in order that both business and government may function successfully. The trade association is the legitimate, the obvious and the fundamental agency to gather, prepare and disseminate this information.

"The collection and publication of unidentified current trade statistics are not unlawful. Trade statistics and other trade information may be misused, and when so misused, subject those who perform such illegitimate use to the pains and penalties of the laws in such cases made and provided.

"In my judgment legitimate trade associations should continue their statistical and other activities without reference to the correspondence between the Attorney General and the Secretary of Commerce, and in conducting their activities be careful not to transgress the well-known inhibitions of existing law, in that they not misuse their statistical and other trade information in promotion and furtherance of any agreement or conspiracy to fix prices, limit production, restrict sales, divide territory, or otherwise restrain lawful competition in commerce.

"Accurate and complete cost accounting is vitally necessary to all business, not merely as a guide to business conduct but in complying with state and federal income tax laws.

"Government is but the organized expression of the intelligent judgment of the citizen. The trade association should be the means, the opportunity,



Alexander Howat

Indicted and imprisoned for calling a strike. U. S. Supreme Court refused to accept Mr. Howat's plea that Kansas had no right to pass the Industrial Relations Court Act making coal mining an essential industry.

and the vehicle for such expression. In just the degree that those who have most at stake in society, most to be preserved by orderly, reasonable and intelligent government, see to it that that government measures up to the requirements demanded in the successful conduct of business enterprise, will our institutions and security be protected and our institutions, social, political, and industrial, be promoted and preserved."

British Mine Safety Expert Studies Coal Industry Here

Dr. R. V. Wheeler, who is in charge of the British government's research dealing with safety in coal mines, is being given some impressions of the American coal industry on a trip arranged by the Bureau of Mines. He is accompanied by George S. Rice, chief mining engineer of the bureau. The limited time at Dr. Wheeler's disposal necessarily has made the trip a hurried one.

Dr. Wheeler, Mr. Rice and members of their party were entertained at a luncheon in Chicago March 11. The day following was spent at the bureau's station at Urbana, Ill. March 13 and 14 were spent in inspecting mines in the region near Benton, Ill. St. Louis was visited on March 15. The party reached Detroit March 17 and visited the lead bath process at the Ford plant and inspected some of the processes of the Combustion Engineering Co. The remainder of the party's itinerary is as follows: March 18, Niagara Falls; March 19, Schenectady; March 20, Scranton; March 21, Wilkes-Barre; March 22, conference in Washington at the U. S. Geological Survey on the constitution of coal and its microscopic examination; March 23, Washington; March 24, 25 and 26, southern West Virginia; March 28, conference in New York with Dr. R. B. Moore and at the Trent process plant. Dr. Wheeler will sail March 29 on his return to England.

Trade Commission Authority Limited, Says Supreme Court

The Federal Trade Commission has no authority to demand all documents and papers from a corporation in an effort to obtain evidence of unfair practices but must confine its demands to such documents as are evidence, the U. S. Supreme Court held March 17 in a decree which further restricts the commission from so-called "fishing expeditions" into business.

The decision, which was read by Justice Holmes, was in the appeals of the commission from decisions of the district courts in sustaining objections of the American Tobacco Co. and P. Lorillard Co., Inc., to obeying a general order of the commission to produce "all records, contracts, telegrams," etc., in connection with tobacco purchases and sales in 1921. The order was in response to complaints lodged with the commission and also in response to a Senate resolution directing an inquiry by the commission into tobacco sales and other affairs, with particular reference to prices paid producers.

In its decision, the Supreme Court, upholding the action of the lower courts, said:

"It is contrary to the first principles of justice to allow a search through all the respondents' records, relevant or irrelevant, in the hope that something will turn up. The right of access given by the statute is to documentary evidence—not to all documents but to such documents as are evidence. The analogies of the law do not allow the party wanting evidence to call for all documents in order to see if they do not contain it. Some grounds must be shown for supposing that the documents called for do contain it.

"The investigations and complaints seem to have been only on hearsay or suspicion—but even if they were induced by substantial evidence under oath the rudimentary principles of justice that we have laid down would apply. We cannot attribute to Congress an intent to defy the Fourth Amendment or even to come so near to doing it as to raise a serious question of constitutional law."

The opinion did not discuss whether Congress could go this far if it tried.

Johnson Immigration Bill Reintroduced in House

The Johnson Immigration bill was reintroduced in the House of Representatives at Washington March 17, retaining the 1890 census as a basis for a 2-per cent quota, but otherwise revised to meet the suggestions of Secretary Hughes relative to treaties and administrative features. By retaining the 1890 census the Japanese clauses remain unchanged.

As the 3-per cent quota law will expire June 30, enactment of permanent legislation is hoped for before adjournment, which is expected about June 1. Hearings before the committees of both houses of Congress have dragged for so long, however, that its enactment will seem seriously threatened.

Rapid Growth of Interconnection of Power Means Much to Coal Industry

Studies Prompted by Secretary Hoover Reveal Amazing Progress in Linking Up of Electric Lines—Ruling in Industrial Court Case May Have Far-Reaching Effect

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Special studies being made of the superpower situation at the instance of Secretary Hoover reveal that the progress in interconnection of electric lines is proceeding at an amazing rate. The extent to which interconnection has been taking place has not been appreciated entirely because this is the first time that data covering this situation throughout a large area have been brought together at one place. The information submitted by the states has been combined with that of the federal government and mapped. These maps, which are being prepared by the Federal Power Commission, are destined, it is believed, to be the focusing point of a large amount of attention during the next few months.

The rapid trend toward interconnection has an important bearing on the coal industry. Its chief importance unquestionably is that it is making for consolidations and concentrations within the industry, which is moving more and more rapidly toward a vast public service. The ruling of the Supreme Court of the United States in the Kansas Industrial Court case has an important bearing in that connection. In that decision, the court implied that the only kinds of businesses in which the state may step in and compel arbitration, the acceptance of awards and other drastic forms of regulation are those universally regarded as public utilities. The next few years, in the opinion of high authority in Washington, is certain to show great integration of coal mining and power production. If this does not result in outright ownership, it will be effected by the strongest types of contracts.

The survey now in progress shows that the great electric utilities are pushing out their lines with great rapidity and are displacing large numbers of steam plants operated as a part of the individual establishment. It already is indicated, according to the engineers who are studying this problem, that some day in the future the great service of supplying power will be located largely in great plants as near the source of coal supply as a supply of condensing water will permit. The great agencies which will distribute this power are not going to invest millions of dollars in steam plants without insuring themselves absolutely as to coal supply. The steel companies have long followed the policy of purchasing reserves of coke and coal. It is certain that these great central stations are going to safeguard their supplies of steam coal in much the same fashion. In that connection it may be remarked that the study of interconnection has progressed far enough to indicate that chief reliance in the industrial area of the Atlantic

seaboard must be placed on electricity generated at steam plants.

With enormous pools of power in concentrated ownership and with the bituminous-coal deposits in the hands of relatively few interests, it is obvious that coal will be brought more and more into the class specified by the Supreme Court as being properly subject to regulation.

Dorchy Decision Significant

Since the Kansas Industrial Court case has such significance to the coal industry, it may be well to point out here that the court's decision on March 10 in the case of August Dorchy versus the State of Kansas is in no way a reversal of the position taken in the Kansas Industrial Court case. The industrial court case was decided last June. In that decision the Supreme Court held that the scheme of compulsory arbitration in essential industries is unconstitutional on the ground that to fix wages or prices of products is a deprivation of the right of contract guaranteed by the Constitution. In that decision, the court made the famous parenthetical statement that since the adoption of the Constitution "it never has been supposed that the business of the mine operator or the miner was clothed with such a public interest that the price of his product or his wages could be fixed by state regulation." It then went on to imply that an industry must be absolutely in the public-utility class before it could be subject to regulation and that when capital or labor enter such public-utility services they give an implied pledge for continuous service.

Before that decision was handed down, August Dorchy and Alexander Howat had been put in jail by the Kansas Industrial Court for having called a strike at a Kansas coal mine. The case was appealed by the union to the Supreme Court of Kansas. That tribunal upheld the state law. The union then appealed to the U. S. Supreme Court. All of this took place, however, before the Supreme Court's decision in the Kansas Industrial Court case. The Supreme Court of the United States realized that the decision of the Supreme Court of Kansas would have been affected had its opinion been available when the Dorchy case was before it. All that is done in the Dorchy case is to return it to the Supreme Court of Kansas so that that tribunal may have an opportunity to pass on it in the light of the Supreme Court's action in the preceding case.

The language of the decision can be construed to mean that the state court may still hold that the Kansas Industrial Court has the power to jail a man for inciting a strike even though it has not the power to compel arbitra-

Miner to Represent King At Holyrood Castle

The British Government has decided to appoint James Brown, Socialist member for South Ayrshire to the post of Lord High Commissioner to the General Assembly of the Church of Scotland. Brown, who is a coal miner, will leave his £10-a-year cottage to dwell for a few weeks each year in historic Holyrood Castle, home of the royal Stuarts. Royal salutes will be fired in his honor, and his wife, a former mill girl, will be addressed as Your Grace. And when it is all over they will go back to their cottage of two rooms and kitchen.

For two and a half centuries the post has been held by the Scottish nobility. It is the duty of the Lord High Commissioner to act as representative of the King during the General Assembly of the Church of Scotland and to occupy the state apartments of Holyrood Palace during that time.

tion. Whether the state court will insist on its former view, in spite of the Supreme Court's decision, remains to be seen. So far as the layman can penetrate the mysteries of the legal mind, it seems apparent that the Supreme Court still believes that the production of bituminous coal is not a public business and that the public cannot interfere to fix the price of the commodity or to compel men to cease striking. Whatever the court may have said about the relatively unimportant mines of Kansas probably would not be repeated were it dealing with a great service of coal and power such as those toward which we are headed in the North and East. The opinion is held in impressive quarters that regulation must be taken into account as we trend toward superpower.

Michael F. Burns Retires From Coal Company

Michael F. Burns, president of Burns Brothers Coal Co., of New York City, and head of the company since its organization, retired from the corporation March 12, when he presented his resignation to the board of directors, effective April 1. A special meeting of the board of directors of the company was called for 3 p.m. to consider Mr. Burns' action.

Differences of opinion regarding the management of Burns Brothers' affairs are understood to have existed since an attempt was made last year to nationalize the company by expanding its operations to other cities. This failed at the time, but it is believed that it may be taken up again should a new president be elected who is friendly to the interests not overfriendly to the present management.

Frank L. Burns, a son of M. F. Burns, is still with the organization.

Brydon Urges Legislation Against Labor Monopoly

Addressing the League for Industrial Rights, at the Waldorf-Astoria, New York City, March 7, on "The Trend of Labor in the Coal Industry," John C. Brydon, president of the National Coal Association, traced the growth of the United Mine Workers, paying particular attention to that organization's course toward militancy.

"The change from craft unionism to industrial unionism, the abandonment of the principle of arbitration of industrial disputes, and the increasing denial of the rights of capital, operating as they do, not in the coal industry alone but in the American Federation of Labor as well," said Mr. Brydon, "are dangerous.

"The institutions of this country have always been hostile to the existence of monopoly, whether of capital or of labor. Any system which has for its object the setting up of a monopoly of labor, subject to no control other than the whims of its politically chosen leaders, and which denies the right to work to any man who does not subscribe to the tenets and contribute to the funds of that organization, is an anomaly in the American scheme of things. It is toward this goal that unionism in the coal industry is tending, and I think you will agree with me that this is a most unfortunate circumstance.

"Abolition of the United Mine Workers would be a serious mistake. I believe in the right of man to organize and bargain collectively, provided they can find employers who will contract with them in that manner. I also believe that an individual has the right to stay out of an organization and has the right to work under such conditions if he chooses, and I believe further that the employer has the right to choose whether he will contract with the union or not.

"The best solution of the problem is by the effective force of public opinion, which will outspokenly condemn these undesirable developments.

"There are at least two lines along which the force of this aroused public opinion should make itself felt. In the first place, it should insist upon such legislation as will make the United Mine Workers legally responsible for living up to their contracts. At the present time the scale contracts in the coal industry really bind only one party, the operator; and there is an almost unbelievable record of strikes in violation of contract. If the United Mine Workers are to be allowed to continue to make wage contracts for 60 per cent of the bituminous coal industry, they must be made to live up to those contracts.

"In the second place, if the miners' organization is to continue to wield the vast power which results from nationwide combination, it must be made to recognize the principle of arbitration. The expiration of wage contracts must not be a signal for the employment of the tremendous economic power of that combination against the public. If such combination is to be permitted, it is essential from the standpoint of the

Label: Laugh Here

The pre-prohibition story about how he put whiskey in a fan water gage to keep it from freezing was not the only funny one E. H. Weitzel, general manager of the Colorado Fuel & Iron Co., told the Rocky Mountain Coal Mining Institute at its February meeting. There also was the one about the mine boss who was having trouble at home and who decided to "take her some flowers and call her 'dear' again." He did. She misunderstood. "Ain't it enough for Mabel to skin her leg and Mary to take the measles and the soup to burn today," she bleated, "without you comin' home drunk?"

public interest that it carry certain limitations. Chief of these limitations must be the recognition of the principle of arbitration as a means of settling industrial disputes. An aroused public opinion can bring this reform about; and it must be brought about, if the interest of the public is to be protected."

Strike Looms in Alberta

Negotiations on a new wage scale in District 18 (Alberta) between operators and district officials of the United Mine Workers were definitely broken off Saturday, March 15, the conferees being unable to come to an agreement. As the present agreement expires April 1, the possibility of a strike is uncomfortably close.

Consolidation in the Wind At St. Louis

A consolidation of the Southern Coal, Coke & Mining Co., with six Illinois mines, and the Donk Brothers Coal & Coke Co., with four, is the talk of the coal and financial circles of St. Louis, Mo., where both companies have headquarters. The deal has not been completed, however, and nobody knows yet whether it ever will be, logical though such a grouping would be in some particulars.

An important official of one of the companies said on March 14: "We cannot deny, of course, that a merger has been in contemplation. The details have not been finally concluded, however, and we must await such conclusion before we can give out anything concerning the subject."

It was reported that the Consolidated Coal Co. of St. Louis, headed by Kingdon Gould, of the Missouri Pacific Ry. interests, also was figuring in this consolidation, but W. J. Jenkins, vice-president and general manager, nailed this with a flat denial.

Most of the properties involved in the proposed consolidation are in the Standard district of Illinois immediately east of St. Louis, where few mines earned any money during the past year and where many companies are having hard sledding. Other consolidations and sales of mines are reported as taking form among such mining companies.

Pennsy to Take Over N. & W.; Three Want Virginian

A conference of committees representing the Norfolk & Western and the Pennsylvania railroads will be held soon to consider the leasing of the Norfolk & Western to the Pennsylvania, N. B. Maher, president of the Norfolk & Western, having announced that the first definite steps in the transaction had been taken by the Pennsylvania road.

"Following a special meeting of the directors of the Norfolk & Western," Mr. Maher said, "a communication was received from the president of the Pennsylvania R.R. suggesting the advisability of the lease of the Norfolk & Western by the Pennsylvania on terms which would preserve the operating identity of the Norfolk & Western.

"The Norfolk & Western was authorized to appoint a committee of the board to confer with a similar committee of the Pennsylvania R.R. board to see if such a lease could be negotiated and to report back to the board. If terms can then be agreed upon the matter would then be presented to the Interstate Commerce Commission."

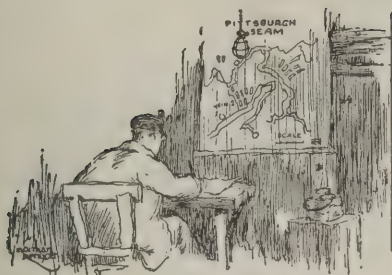
A report was circulated that the Pocahontas Coal & Coke Co. might be segregated from the Norfolk & Western R.R. before putting into effect the lease. It was stated also that a number of other operating changes would have to be made on the Norfolk & Western before leasing the property to the Pennsylvania.

The Baltimore & Ohio and the New York Central are bidding against each other for the lease of the Virginian Ry., each of the systems desiring to get control of the valuable coal fields on the line of the Virginian. The Chesapeake & Ohio R.R. also is anxious to obtain control of the Virginian, but it is said that the propositions from the New York Central and Baltimore & Ohio are more attractive to the heirs of the late H. H. Rogers, who founded the road.


As the leasing of the Norfolk & Western by the Pennsylvania is believed to be only a matter of days, the Baltimore & Ohio is eager to obtain the Virginian because it is feared that this road eventually may be taken over by the Pennsylvania. The Virginian is the Norfolk & Western's greatest competitor and has cut into the profits of that system by building great coaling piers on Hampton Roads. The Baltimore & Ohio almost closed a lease with the Virginian a year ago, but negotiations were broken off when a daughter of the late H. H. Rogers refused to relinquish her holdings.

Trade Commission Hampered By Lack of Funds

Lack of funds and personnel has hampered the work of the Federal Trade Commission according to report to the U. S. Senate March 11 in which the commission announced that it will not be able to carry on its work unless relief is extended. The work of the commission in conducting its numerous investigations into unfair trade practices is six months in arrears, the report stated.



Problems In Underground Management



Lining a Shaft With Precast Concrete

Shaft Relined from Bottom Up—However, Cross-Buntions or Side Slabs Embedded in Rock Will Support Weight When Lining Is Being Extended Downward

By A. B. DOWELL
St. Louis, Mo.

In the retimbering of a shaft for the Cameron Coal Co., near Pittsburg, Ill., precast reinforced concrete slabs were used in place of timbers to form the curbing or lining of the shaft.

The shaft thus retimbered was 258 ft. deep and measured 10 x 18 ft. in the clear. In Fig. 1 is shown a view of the headframe and engine house adjoining, taken during the progress of the work. For certain reasons the relining of the shaft was started from the bottom, and a few of the slabs are seen in the foreground ready to be lowered into the shaft.

When this plan is adopted, a good foundation is sought for the first slab placed in position. Only such of the old timbers were removed as was necessary to make room for the concrete slabs, which are built up one on top of another. As each set of slabs forming a course is placed in position, the space behind is well packed and rammed with sand or other loose material that will form a solid support for the strata.

CAN LINE UPWARD OR DOWNWARD

The relining of a shaft may be commenced at the top and proceed downward, although there is some advantage in starting the work at the bottom and building up. This order of

procedure affords a better opportunity for packing the loose material behind the slabs as they are placed in position. In the sinking of a new shaft, the work must naturally start at the top and be carried downward as the excavation proceeds. It is important then to furnish adequate support for the lining during the progress of the work. This is best accomplished by providing cross-buntions embedded at suitable intervals in the solid strata, or by extending the slabs so that they will rest in niches of similar character.

In Fig. 2 is shown a large number of concrete slabs that have been cast in the required shape ready to be taken to the shaft. In the left foreground can be seen a few courses of these slabs built up in the form in which they will stand when in position. It will be observed there are two hoisting compartments separated by an open partition that serves to strengthen the longer slabs in the face of the shaft and provides support for the cage guides. At the farther end is seen a smaller compartment, which forms the manway and in which the column pipes for the pumps and power cables can be installed.

These precast concrete slabs were manufactured under the Dowell patent. The concrete mixture was formed of



Fig. 2—Concrete Forms in Storage

From the structure in the foreground, laid up merely for exhibition purposes, an idea may be formed of the way in which the concrete units are arranged in the shaft.

the best quality of portland cement, one part; clean sharp sand, two parts; and selected gravel, three parts. Steel rods are used for reinforcing the slabs.

AS READILY HANDLED AS TIMBERS

After the concrete liners had been precast on the surface, they were handled much as timbers would be if used for the same purpose. The slabs form a tight skin-to-skin casing and when properly sealed, this lining affords an absolutely dry shaft, water being entirely excluded. In the instance mentioned, the shaft was very wet, but that did not materially interfere with the work of placing the slabs.

In order to obtain a watertight lining, proper care should be taken in sealing the joints. The construction or precasting of the concrete slabs is practically the same, in cost, as the framing of the necessary timbers; and the cost of handling and installing the slabs does not exceed that of handling the same quantity of timber curbing.

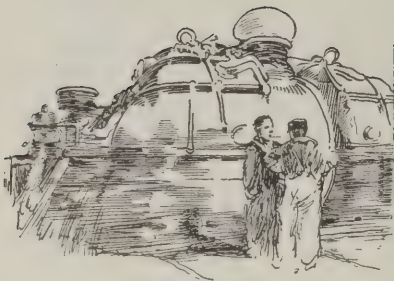
One of the chief advantages of the use of reinforced concrete slabs is the durability of the work when the installation has been properly performed. The natural hazards relating to shaft lining are reduced to a minimum and the construction provides a smooth surface that practically eliminates the danger of wrecks in the shaft caused by the catching of the cage in loose timbers.

By the use of the precast method the cost of building forms in the shaft is saved and the work of lining greatly simplified. The building trade after many attempts to cast concrete in place now uses it only where the work is heavy or the wall is readily braced exteriorly as for instance in lining a cellar or building a house foundation.

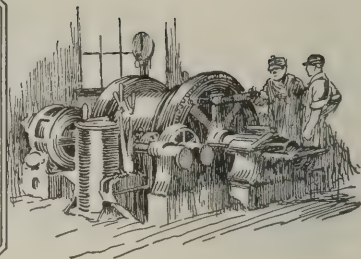


Fig. 1—Hauling Precast Units to Cameron Shaft Near Pittsburg, Ill.

The concrete units shown are buntions which stiffen shaft walls and sustain the cage guides. As the slabs and buntions are cast on the surface with all conditions favorable each unit is more nearly perfect as to reinforcement and freedom from voids than concrete not so constructed.



Practical Pointers For Electrical And Mechanical Men



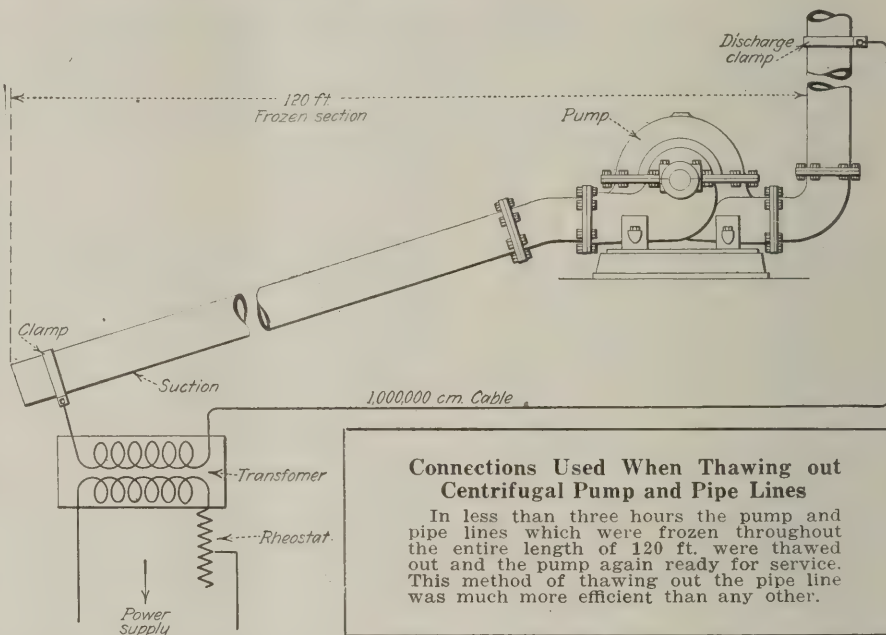
Thaw Frozen Water Pipes By Electricity

Temperatures in the mines are generally considered to be nearly constant throughout the whole year. However, every one who has ever been in a mine knows that there are certain places where the mine temperature is the same as that outside. This is especially true where the coal bed is not very deep, or where the ventilating air enters the mine.

The foot of a hoisting shaft is another such place, and because it is often located in the basin of the coal bed it is not infrequent to find that water can be easily collected there. Consequently pumps used to pump this water operate under conditions which are very similar to those outside and may become frozen.

Coal companies which own many of the houses located around the mine frequently find themselves very busy during the winter months in thawing out frozen water lines.

For just such conditions as these, our company designed and built a transformer to be used for thawing out frozen pipe lines. Incidentally, this same transformer has been very serviceable whenever we desired to make high current tests on equipment. The transformer was built in our own



Connections Used When Thawing out Centrifugal Pump and Pipe Lines

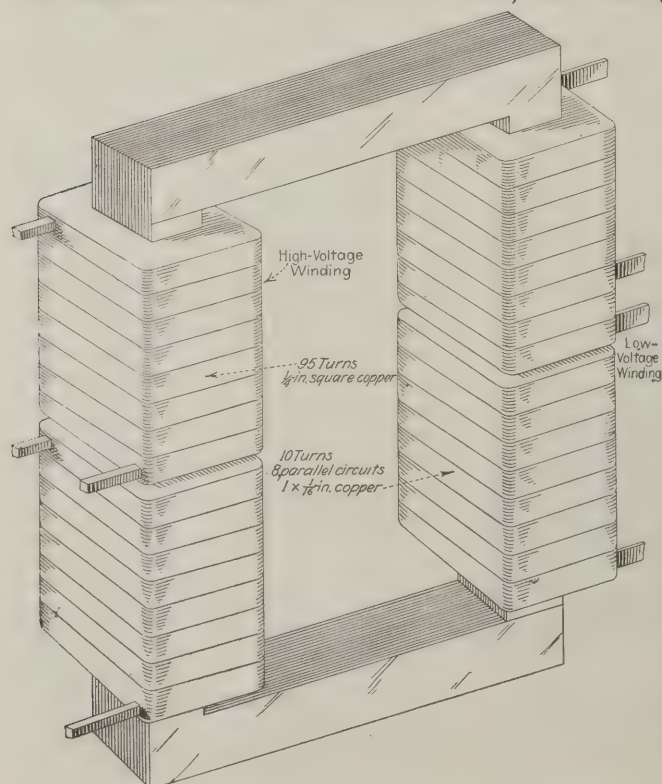
In less than three hours the pump and pipe lines which were frozen throughout the entire length of 120 ft. were thawed out and the pump again ready for service. This method of thawing out the pipe line was much more efficient than any other.

shops and is constructed with a core having a section 4 in. x 4 in. The long side of the core is 32 in. and the short side 12 in. The high-voltage winding is made up of two coils, each having 95 turns of $\frac{1}{8}$ in. square copper. The low-voltage winding is made up of two coils, each having eight parallel cir-

cuits of 10 turns of 1 in. x $\frac{1}{8}$ in. flat copper. The high-voltage winding was designed for either 110 or 220 volt, and the low-voltage winding designed to give about 1,000 amperes at 25 volts, or 2,000 amperes at 12.5 volts.

A few days ago, a 400-gal. centrifugal pump, located at the foot of one of our mine shafts became frozen. Upon investigation we found that the suction and discharge lines were also frozen for a distance of 120 ft. Our high-current transformer was placed on a truck and hauled to the mine where it was lowered in the shaft to the pump. Here it was set up and the secondary was connected to the suction and discharge line by means of 1,000,000 cm. cables. With a control resistance in the high-voltage circuit, the transformer was connected to one phase of the three-phase pump motor circuit, and the work of thawing out the pump and the 4-in. pipe line was started. The transformer was connected to deliver about 1,000 amperes, and the voltage applied to the high-voltage coils was regulated by means of a rheostat. Three hours from the time the transformer was connected to the power supply, both the pump and pipe lines were thawed out and again made ready for service. It can readily be seen that the cost of this work was very little compared with the cost of dismantling the pump and disconnecting pipe line, to say nothing about the possibility of breaking parts of the pump.

On many occasions, this same transformer has been used to thaw out



Transformer for High Currents

This transformer has two separate windings on both the high-voltage and low-voltage side. By proper connection it can be used on either 110- or 220-volt circuits, to deliver 1,000 or 2,000 amperes. Aside from being very useful in thawing out frozen pipe lines, it is frequently used for making high current tests. A transformer such as this can be used to thaw out frozen water lines around the mines and company houses and also to make high current tests on electrical equipment and circuits.

water service lines in some of the company's houses. With this transformer, our men have thawed out pipes in twenty different houses in less than five hours. To facilitate the work the transformer was hauled around on a truck and connected to a large lighting transformer.

F. F. MACWILLIAMS,
Power Department.
Pennsylvania Coal & Coke Corp.,
Cresson, Pa.

Renewal of Fuses Made Safer
On Transformer Circuits

While replacing the blown-out fuses on a mine-lighting transformer a man was injured and our company accordingly was prompted to devise a standard method for mounting and fusing such transformers.

We had previously issued instructions covering the replacing of fuses and had also designed our structures to be as safe as they could be made within reason. However, in the words of one of our inspectors, we felt we were obliged to make this work "unreasonably safe." As a result a complete new code of instructions was drafted and a new standard mounting adopted

The accompanying illustration shows how the transformer is mounted and how the connections are made from the high-voltage circuit through choke coils, fuses, and transformer to the secondary distributing lines. The most important safety feature is the West-

Table of Fuse Wires for 2,300-Volt Lighting Transformers

Kva. Capacity	Maximum Primary Amperes	Size of Aluminum Fuse Wire	Size of Copper Fuse Wire	Size of Iron Fuse Wire	Lead Fuse (Amp. Capacity)
1.5	1.4	40	40	35	2
3	2.8	36	38	31	3
5	4.6	33	35	28	5
7.5	6.8	31	33	26	7
10	9.2	29	31	24	10
15	13.6	27	29	22	15
25	22.8	24	26	19	25

inghouse Type "OD" safety fuse box and its position on the pole. It will be noticed that this equipment is located on the opposite side of the pole from the transformer. This arrangement makes it necessary for the person renewing a fuse to climb the pole or set up a ladder on the side of the pole where he will be safe.

The fuse is enclosed in a box and arranged in such a manner that the opening of the box breaks the electrical circuit. The fuse clips which hold the fuse are on the inside of the door and the fuse is in contact with the line circuit only when the door of the fuse box is closed. With this arrangement, when the use is replaced, it is inserted between two "dead" clips instead of two "live" ones which is the usual practice.

This new plan is not expensive because the fuse box serves the double purpose of a switch and a fuse compartment. Men at the mines have accepted the plan with much favor and look upon the work of renewing a fuse with little or no fear because they know they are not required to place

themselves in danger of coming in contact with any "live" parts.

To make certain that these transformers are not fused unreasonably above their full capacity, each mine electrician and electrical worker is supplied with a copy of the accompanying table. This table shows what size aluminum, copper or iron wire should be used to fuse a transformer. The last column shows the ampere rating of the lead fuse wire which also may be used. In the calculation of the table it will be noticed that a liberal overload has been allowed.

O. E. KENWORTHY.
Wilkes-Barre, Pa.

Composition of Insulation
For Mine Hangers

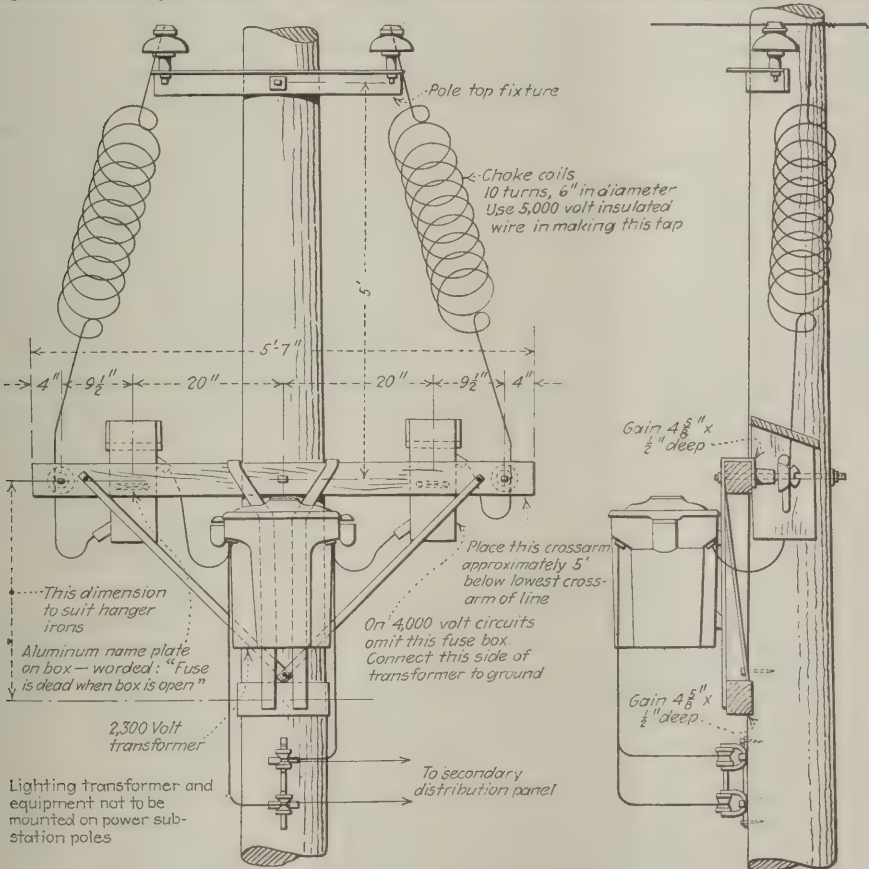
In answer to a request for information on the composition of the material used in mine suspensions, a large manufacturer of mine trolley equipment tells us the following:

The insulation used in the manufacture of mine hangers is a preparation whose constituents may be divided into three general classes: organic binders, inorganic binders and fillers.

The organic binders give the material its moldable properties, its moisture resistance, and its toughness, and are electrical insulators in themselves. Among these organic binders are phenol-formaldehyde compounds, shellacs, copals, and a number of other resins. In the manufacturing process these binders are very difficult to manipulate, and must be very carefully controlled, because they are extremely sensitive to heat.

The inorganic binders are generally fibrous in their nature; chief among these is asbestos. Great care must be exercised in the selection of a fiber, for there are many grades varying markedly in mechanical strength. The principal property desired of the fiber is length and toughness. The fibers are intimately mixed with organic binders, thus preventing them from functioning as a wick. The tensile strength of the compound depends a great deal upon the grade of fiber.

Fillers are usually mica, talc, very short asbestos, kieselguhr, or barium sulphate. These materials are all heat insulators, giving the compound a very high heat resistance. Like the asbestos, they are also very resistant to all acids, thus rendering the material particularly good for service in mines where damp acid conditions are so often found which make the insulation problem a very difficult one. These materials must be carefully and thoroughly mixed and moulded so that an insulating substance of uniform quality may be produced.

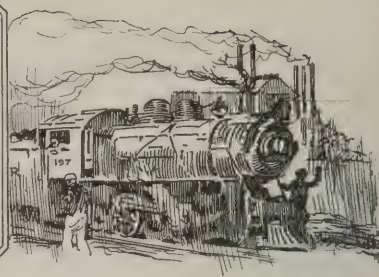


Lighting Transformer So Located on Transmission Line Pole
As to Be Safely and Easily Fused

The connections to the high-voltage wires are made through choke coils which protect the transformer from heavy surges or lightning disturbances. With the fuse boxes located on the opposite side of the pole from the transformer it is hardly possible for anyone to come in contact with the high-voltage wires or even with a ground connection.



Production And the Market



Flat Condition of Market for Bituminous Coal Causes Pronounced Tumble in Scale of Prices

Though the tendency of coal prices shows an even more marked downward course, consumers evince no disposition to recede from their recent policy of keeping out of the market and awaiting developments. In the absence of an impelling motive to buy, such as the menace of a nation-wide strike, buyers see no incentive to making commitments. The outcome of wage negotiations at Louisville, Baltimore and Philadelphia has been largely discounted by the agreement arrived at in Jacksonville last month.

The move of the Pennsylvania R.R. to lease the Norfolk & Western, followed quickly by efforts on the part of the New York Central, the Baltimore & Ohio and the Chesapeake & Ohio to gain control of the Virginian Ry., are fraught with interesting possibilities, not only on account of the immense coal traffic handled by the lines whose control is sought but because of the possible effect on the movement of West Virginia coal to New England. If the Pennsylvania and New York Central obtain control of the N. & W. and Virginian, developments in the movement of coal from the West Virginia field all rail as well as via Hampton Roads will be watched with more than ordinary interest.

Coal Age Index declined 2 points to 179, as of March 15, the corresponding average price being \$2.16. This compares with \$2.18 on March 8.

Midwest Price Cut Has Evanescent Effect

Price cuts in the Middle Western markets had an inspiring effect that was only fleeting, as they soon lapsed into a state of lackadaisical indifference. Scattered inquiries for contract coal have appeared, two railroads having placed half-million-ton contracts. The prevailing policy is to hold out, live off stockpiles and

wait for a lower market. Cold weather for a few days caused domestic business to perk up in southern Illinois and at St. Louis, but about half of the mines in the Williamson and Franklin County field are idle or will be by April 1.

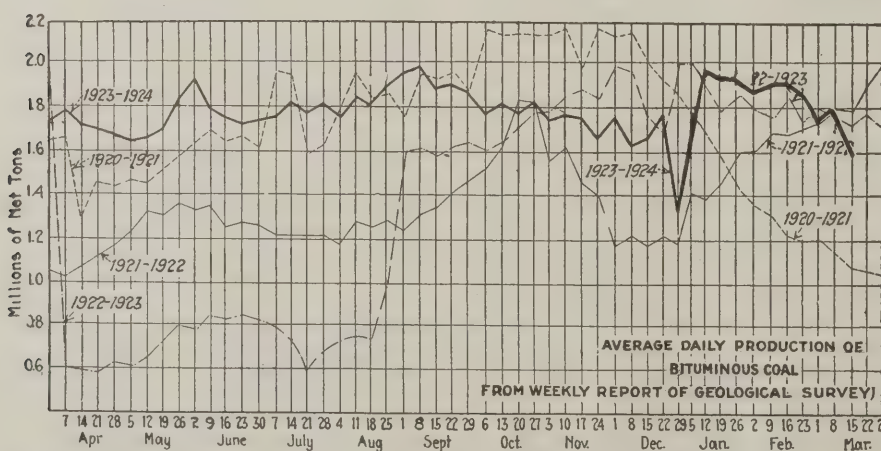
Kentucky Markets Scrambled

As a result of wage cuts in eastern Kentucky screenings are offered in quantities at 75c. per ton, which has demoralized the market. Prices are weak also on steam coals and small prepared sizes. A possible strike in western Kentucky has caused some large consumers of pea and slack to place inquiries. Opening of lake business provides a ray of hope for some, though the absence of national labor or rail troubles is likely to cause buying to be slow.

Northwestern markets are practically dead, buying being from hand to mouth—by utilities to tide them over a water shortage. Some of the docks are working only three or four days a week, something hitherto unheard of at this time of year. Softness is the prevailing note in Ohio markets, the record of interchange of cars at Cincinnati showing a cluttering of the marts.

Dullness continues to pervade New England and the other seaboard markets as far south as Birmingham, consumers being well stocked and content to rely on their reserves for a while.

Production of bituminous coal during the week ended March 8 amounted to 9,596,000 net tons, according to the report of the Geological Survey, a decline of 1,104,000 tons compared with the previous week. Output of anthracite increased slightly, 1,882,000 tons being produced, compared with 1,866,000 tons in the previous week.



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Feb. 23.....	10,324,000	10,367,000
March 1 (a).....	10,946,000	10,700,000
March 8 (b).....	10,628,000	9,596,000
Daily average.....	1,771,000	1,599,000
Coal year.....	396,316,000	513,058,000
Daily average coal year	1,374,000	1,788,000

ANTHRACITE

Feb. 23.....	1,838,000	1,655,000
March 1 (a).....	2,104,000	1,866,000
March 8 (b).....	2,049,000	1,882,000
Coal year.....	50,295,000	87,373,000

COKE

March 1.....	402,000	319,000
March 8.....	366,000	326,000
Calendar year.....	3,476,000	2,743,000

(a) Revised from last report. (b) Subject to revision.

Midwest Cuts Prices

The flat market on all coals compelled a change March 13 in the southern Illinois scale of prices. Franklin County association operators dropped lump and egg from \$3.75 and \$3.50 to \$3; No. 1 nut to \$2.75, and No. 2 to \$2.50. Saline County producers, next door to Franklin County, said they would try to maintain the same circular, though they normally are 25c. under it. At the end of the week this cut had shown only a little inspiring effect on the market. Nothing seems to wake it. Spring weather is here after a little business during several late snows, and domestic coals are all bought in smallest quantities.

A few inquiries for contract coal are circulating the trade at Chicago from scattering railroads and industries of various sorts, but they are not numerous. The general policy still is to hold out, live on storage piles and wait for a lower market. At least two half-million ton railroad contracts in the Midwest have been signed for southern Illinois at \$2.50, however.

Steam business is by no means keen, even though production in Illinois and Indiana keeps dropping and the volume of screenings gets smaller and smaller. Southern Illinois producers are making a stout effort to push the

price of screenings to \$2.25, but about \$2.10 is the top thus far, with most of the trading at \$1.90@\$. Indiana Fourth Vein screenings are at the same level. Central Illinois, with practically no volume but with a short haul to Chicago's great steam market, runs along at \$1.75@ \$1.80.

Cold weather for a few days in Southern Illinois stimulated activity in domestic sizes, principally lump, although egg and nut are heavy. Practically all mines have unbilled coal on track. Steam shows a little activity, but it is not progressing as might be expected, although with warmer weather there is every indication that it will advance. Railroad tonnage is reported light. Cars are plentiful and are moving well and mines are getting from two to four days a week, as a rule. Several mines have been idle and some have suspended indefinitely. It is estimated that one-half of the mines in the Williamson and Franklin County field are idle or will be by April 1—indefinitely.

St. Louis Does Some Business

Cool weather caused some domestic activity and dealers are pretty well loaded up with small orders on the cheaper grades. High grade is not popular and anthracite and smokeless are moving slowly, but coke shows up somewhat

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest								
Market Quoted	Mar. 19 1923	Mar. 3 1924	Mar. 10 1924	Mar. 17 1924†	Market Quoted	Mar. 19 1923	Mar. 3 1924	Mar. 10 1924	Mar. 17 1924†				
Smokeless lump.....	Columbus.....	\$7.00	\$4.10	\$3.85	\$3.75@	\$4.00	Franklin, Ill. lump.....	Chicago.....	\$3.85	\$3.35	\$3.25	\$2.75@	\$3.00
Smokeless mine run.....	Columbus.....	4.50	2.10	2.10	2.00@	2.25	Franklin, Ill. mine run.....	Chicago.....	3.35	2.35	2.35	2.25@	2.50
Smokeless screenings.....	Columbus.....	4.25	1.55	1.55	1.45@	1.70	Franklin, Ill. screenings.....	Chicago.....	2.35	1.95	1.80	1.90@	2.10
Smokeless lump.....	Chicago.....	6.35	3.60	3.60	3.50@	3.75	Central Ill. lump.....	Chicago.....	3.10	2.85	2.85	2.60@	2.75
Smokeless mine run.....	Chicago.....	4.00	2.35	2.20	2.15@	2.25	Central, Ill. mine run.....	Chicago.....	2.60	2.10	2.10	2.00@	2.25
Smokeless lump.....	Cincinnati.....	7.00	3.50	3.35	3.00@	3.60	Central, Ill. screenings.....	Chicago.....	1.60	1.70	1.60	1.60@	1.80
Smokeless mine run.....	Cincinnati.....	4.85	2.50	2.40	2.00@	2.60	Ind. 4th Vein lump.....	Chicago.....	3.60	2.85	2.85	2.75@	3.00
Smokeless screenings.....	Cincinnati.....	4.75	1.75	1.60	1.50@	2.00	Ind. 4th Vein mine run.....	Chicago.....	2.85	2.35	2.35	2.25@	2.50
Smokeless mine run.....	Boston.....	7.10	4.70	4.70	4.60@	4.75	Ind. 4th Vein screenings.....	Chicago.....	2.10	1.85	1.80	1.75@	2.00
Clearfield mine run.....	Boston.....	3.05	1.95	2.00	1.65@	2.60	Ind. 5th Vein lump.....	Chicago.....	3.10	2.60	2.60	2.50@	2.75
Cambria mine run.....	Boston.....	3.85	2.60	2.60	2.25@	3.00	Ind. 5th Vein mine run.....	Chicago.....	2.10	2.10	2.10	2.00@	2.25
Somerset mine run.....	Boston.....	3.35	2.25	2.20	2.00@	2.75	Ind. 5th Vein screenings.....	Chicago.....	1.60	1.60	1.60	1.60@	1.80
Pool 1 (Navy Standard).....	New York.....	4.35	3.00	3.00	2.75@	3.25	Mt. Olive lump.....	St. Louis.....	3.10	2.85	2.85	2.75@	3.00
Pool 1 (Navy Standard).....	Philadelphia.....	4.55	3.00	3.00	2.75@	3.25	Mt. Olive mine run.....	St. Louis.....	3.10	2.50	2.50	2.50@	2.75
Pool 1 (Navy Standard).....	Baltimore.....	3.60	2.25	2.25	2.00@	2.40	Mt. Olive screenings.....	St. Louis.....	1.35	1.55	1.55	1.50@	1.60
Pool 9 (Super. Low Vol.).....	New York.....	3.80	2.30	2.30	2.10@	2.50	Standard lump.....	St. Louis.....	3.10	2.75	2.70	2.65@	2.75
Pool 9 (Super. Low Vol.).....	Philadelphia.....	3.50	2.05	2.05	2.15@	2.60	Standard mine run.....	St. Louis.....	2.25	1.95	1.95	1.90@	2.00
Pool 9 (Super. Low Vol.).....	Baltimore.....	3.10	2.00	2.00	1.75@	2.15	Standard screenings.....	St. Louis.....	1.25	1.15	1.15	1.25@	1.35
Pool 10 (H.Gr. Low Vol.).....	New York.....	3.10	2.00	2.00	1.75@	2.15	West Ky. lump.....	Louisville.....	2.80	2.85	2.85	2.75@	3.00
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	3.15	1.85	1.85	1.70@	2.00	West Ky. mine run.....	Louisville.....	1.85	1.70	1.70	1.50@	1.90
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	3.25	1.80	1.80	1.85@	2.00	West Ky. screenings.....	Louisville.....	1.65	1.30	1.30	1.25@	1.40
Pool 11 (Low Vol.).....	New York.....	2.55	1.60	1.60	1.25@	1.60	West Ky. lump.....	Chicago.....	2.85	2.60	2.60	2.50@	2.75
Pool 11 (Low Vol.).....	Philadelphia.....	2.55	1.65	1.65	1.55@	1.75	West Ky. mine run.....	Chicago.....	1.80	1.60	1.45	1.25@	1.60
Pool 11 (Low Vol.).....	Baltimore.....	2.35	1.65	1.65	1.70@	1.80							
High-Volatile, Eastern					South and Southwest								
Pool 54-64 (Gas and St.).....	New York.....	2.35	1.60	1.60	1.40@	1.65	Big Seam lump.....	Birmingham.....	3.85	3.85	2.50@	2.75	
Pool 54-64 (Gas and St.).....	Philadelphia.....	2.25	1.60	1.60	1.50@	1.75	Big Seam mine run.....	Birmingham.....	1.80	1.80	1.75@	1.85	
Pool 54-64 (Gas and St.).....	Baltimore.....	2.40	1.60	1.60	1.70@	2.00	Big Seam (washed).....	Birmingham.....	2.10	2.10	2.00@	2.25	
Pittsburgh sc'd gas.....	Pittsburgh.....	4.05	2.55	2.55	2.50@	2.65	S. E. Ky. lump.....	Chicago.....	4.60	3.10	3.10	2.75@	3.00
Pittsburgh gas mine run.....	Pittsburgh.....	2.35	2.10	2.10	2.00@	2.25	S. E. Ky. mine run.....	Chicago.....	2.85	1.85	1.85	1.75@	2.00
Pittsburgh mine run (St.).....	Pittsburgh.....	2.60	1.50	1.35	1.40@	1.50	S. E. Ky. lump.....	Louisville.....	5.05	3.25	3.00	2.75@	3.25
Pittsburgh slack (Gas).....	Pittsburgh.....	4.25	2.60	2.60	2.40@	2.70	S. E. Ky. mine run.....	Louisville.....	2.75	1.75	1.75	1.50@	2.00
Kanawha lump.....	Columbus.....	2.60	1.60	1.50	1.40@	1.65	S. E. Ky. screenings.....	Louisville.....	2.50	1.30	1.05	.75@	1.15
Kanawha mine run.....	Columbus.....	2.05	1.10	1.05	1.00@	1.10	S. E. Ky. lump.....	Cincinnati.....	3.60	3.00	2.75	2.75@	3.00
Kanawha screenings.....	Cincinnati.....	3.75	2.85	2.85	2.75@	3.00	S. E. Ky. mine run.....	Cincinnati.....	2.75	1.60	1.60	1.35@	1.60
W. Va. lump.....	Cincinnati.....	3.35	1.55	1.50	1.35@	1.50	S. E. Ky. screenings.....	Cincinnati.....	2.35	1.00	.90	.70@	1.00
W. Va. steam mine run.....	Cincinnati.....	3.00	1.55	1.50	1.35@	1.50	Kansas lump.....	Kansas City.....	4.50	5.00	5.00	4.50	
W. Va. screenings.....	Cincinnati.....	2.35	1.05	.90	.75@	1.00	Kansas mine run.....	Kansas City.....	3.50	3.50	3.50	3.25	
Hocking lump.....	Columbus.....	3.75	2.60	2.60	2.40@	2.70	Kansas screenings.....	Kansas City.....	2.60	2.25	2.25	2.50	
Hocking mine run.....	Columbus.....	2.35	1.85	1.85	1.75@	2.00							
Hocking screenings.....	Columbus.....	1.95	1.10	1.15	1.00@	1.10							
Pitts. No. 8 lump.....	Cleveland.....	3.70	2.35	2.35	2.90@	2.75							
Pitts. No. 8 mine run.....	Cleveland.....	2.70	1.80	1.80	1.75@	1.90							
Pitts. No. 8 screenings.....	Cleveland.....	2.50	1.35	1.30	1.25@	1.35							

* Gross tons, f.o.b. vessel, Hampton Roads.
† Advances over previous week shown in heavy type, declines in italics.

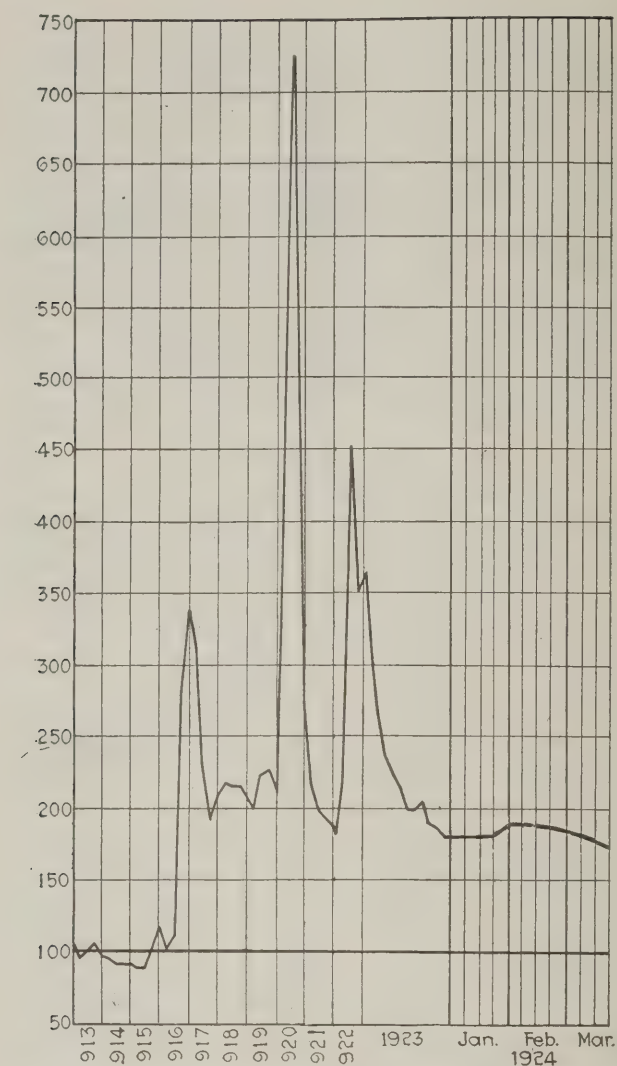
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

Market Quoted		Freight Rates		March 19, 1923		March 10, 1924		March 17, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34		\$9.00	\$7.75@	\$8.25	\$8.00@	\$9.25	\$8.00@
Broken.....	Philadelphia.....	2.39			7.90@	8.10	8.75@	9.25	8.75@
Egg.....	New York.....	2.34		9.25@	8.00@	8.35	8.75@	9.25	8.75@
Egg.....	Philadelphia.....	2.39		9.25@	8.10@	8.35	8.75@	9.25	8.75@
Egg.....	Chicago.....	5.06		12.00@	7.20@	8.25	7.50@	8.80	8.00@
Stove.....	New York.....	2.34		9.25@	8.00@	8.35	9.25@	9.75	8.75@
Stove.....	Philadelphia.....	2.39		9.25@	8.15@	8.35	9.85@	11.00	8.90@
Stove.....	Chicago.....	5.06		12.00@	7.35@	8.25	7.95@	9.25	8.00@
Chestnut.....	New York.....	2.34		9.25@	8.00@	8.35	9.25@	9.75	8.75@
Chestnut.....	Philadelphia.....	2.39		9.25@	8.15@	8.35	9.85@	11.00	8.90@
Chestnut.....	Chicago.....	5.06		12.00@	7.35@	8.35	7.95@	9.25	8.00@
Range.....	New York.....	2.34			8.25		9.00		9.00
Pea.....	New York.....	2.22		6.30@	6.15@	6.30	6.15@	6.65	6.15@
Pea.....	Philadelphia.....	2.14		7.00@	6.15@	6.20	6.35@	6.60	6.35@
Pea.....	Chicago.....	4.79		7.00@	5.49@	6.03	5.40@	6.05	5.40@
Buckwheat No. 1.....	New York.....	2.22		3.75@	4.00@	4.10	2.00@	2.75	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14		4.00@	2.25@	3.00	3.50		3.50
Rice.....	New York.....	2.22		2.25@	2.75@	3.00	1.75@	2.25	2.50
Rice.....	Philadelphia.....	2.14		2.75@	2.75@	3.00	1.75@	2.25	2.50
Barley.....	New York.....	2.22		1.40@	1.50@	2.00	1.50@	1.75	1.50
Barley.....	Philadelphia.....	2.14		1.40@	1.25@	1.50	1.25@	1.50	1.50
Barley.....	New York.....	2.22			2.10		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924	1923
Index	March 17 179	March 19 263
Weighted average price	March 10 \$2.18	March 3 \$3.19
	March 3 \$2.21	

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

better. Local steam is fairly active in carloads but wagon trade is beginning to ease up. Country domestic has shown considerable activity the past week, for cheaper grades principally. A little inquiry is made for anthracite chestnut. Country steam is not good. There is no change in retail prices.

Kentucky Prices Drop Too

Business over the past few days in Louisville has been unsatisfactory. Wage reduction in some parts of the eastern Kentucky field has resulted in screenings being offered in quantities at 75c. a ton, and mine run at \$1.15@\$1.35 a ton, which has demoralized the market. Prices are generally weaker on steam coals and small sizes of prepared, and it is asserted that there isn't much coal commanding over \$3 a ton at the most.

In view of the possibility of a strike in western Kentucky a few of the large consumers of pea and slack size screenings have been placing inquiries for supplies. Opening of lake business next month will aid the eastern Kentucky section, but without any pending national strikes or railroad troubles buying will be slow.

Lack of production of prepared sizes in western Kentucky is resulting in a firm market on screenings and rela-

tively light offerings. The present market is quoted at \$1.25@\$1.40, and is likely to go up unless some lump business is offered. Lump is \$2.75@\$3 and egg, \$2.50@\$2.75. Some mines have no screenings to sell and are only quoting screenings where the buyer will take prepared. Some operators are reported to be installing crushers, in order to crush mine run or nut and slack into pea and slack, to take care of the steam demand for fine coal. Western Kentucky is expected to go non-union after April 1, except possibly a region in Muhlenberg County where unionism is stronger.

Northwest Trade Is Flat

The coal market at Duluth is more than quiet. It is practically dead, with the exception of a few orders from the public-utility companies, which are buying often, from hand to mouth, because of the shortage of water flow for hydraulic plants. It begins to look as if the public-utility companies will be the savers of the day, as little snow is on the ground and their unusual wants may cause the docks to get rid of their surplus supplies. To illustrate the quietude, some of the docks are working only three or four days in the week. This is practically unheard of at this time of the year.

Prices went down and up during the week. The Superior Coal & Dock Co., which has discontinued because its parent concern in the East, the Maynard Coal Co., is in the hands of a receiver, lowered the price of Hocking 25c. to \$5.75, and other companies followed suit. This was done, of course, in an effort to clear stocks. The dock closed, however, and prices went back to list.

Shipments of the docks during February ran slightly higher than expectations, with 17,188 cars reported. This was principally railroad coal that was hauled to depots for use in case of a cold snap. In January 25,984 cars went out and in February last year 13,969 cars. Dock men expect poor shipments this month.

The demand for coke has fallen off, as also has that for hard coal. Mild weather is the cause. However, the briquet business has picked up some.

All is quiet in coal circles at Milwaukee pending the readjustment downward of soft-coal prices. Dockmen will have to follow Western coal down if they expect to reduce their unusually large spring surplus before new coal begins to arrive.

Kansas Prices Down 50 Cents

The price of Kansas lump and nut was cut 50c. a ton March 10. Present quotations are \$4.50 for lump and \$4 for nut. Mine run is quoted generally at \$3.25, although it still is listed by some operators at \$3.50. Screenings are \$2.50. The slash on lump and nut was due chiefly to the nearness of the end of the season. The accumulation of "no bills" of the two sizes was increasing, although operating time had been cut to three days a week. The reduction, coupled with a return of cold weather at the same time, has reduced the surplus, but the relief is expected to be of short duration.

The coal market in Colorado was fairly busy during the past week. Mines worked a little better than half time. Seasonable weather has again set in throughout the regions where this coal is marketed and with the recent extreme cut, business is expected to pick up.

Utah operators report business quiet. Mines are working less than two days a week. The demand for lump is falling off although retailers have been enjoying a little business during the past week as result of a cold snap. Industrials and larger consumers continue to clamor for slack. Prices are unchanged and labor conditions are settled.

Ohio Markets Soft from Oversupply

J. A. Morris, district manager for the American Railway Association at Cincinnati reports that 12,453 cars of coal interchanged at Cincinnati last week, an increase of 223 over the previous week and an increase of 2,411 compared with same week last year. This is the heaviest interchange of coal on record in this terminal, except for one week in the month of June, 1922, when 13,825 cars of coal were interchanged, but this included 2,410 cars of coal en route to the lakes. No better means of explaining the softness and shallowness of conditions here could be found.

There is practically no demand for any particular kind of coal. From the low volatile to the lowliest of any "black

dirt" offerings neither price nor energy seems to move sales. There are still a large number of rejections and those operators who have been turning out tonnage persist in cluttering the immediate markets by shooting their free tonnage on consignment.

Dullness characterizes the Columbus market. Domestic business is exceedingly spotty and little activity from that source is now expected, as this trade is now purely a weather proposition and dealers are loath to increase stocks. The fancy grades, such as Pocahontas and other smokeless grades are selling fairly well, although prices are showing some softness. Steam trade is almost at a standstill, as the larger consumers are using reserves accumulated prior to the wage settlement. They are gradually working to a normal basis. There has been considerable distress coal in steam sizes and these were sacrificed at rather low prices. Utilities are not buying to any extent and railroads are taking only their usual requirements. Screenings have been rather dull, as stocks have been heavy and prices in some instances went very low. Production in all Ohio fields has fallen to about 20 per cent of capacity as a result of the falling off in demand. Some stir is shown in the lake trade, one large Ohio producer having started to load boats in the Toledo harbor.

Hesitancy continues to dominate the Cleveland coal market. Consumers are not purchasing, but are awaiting further depletion of coal put in prior to mid-February, when all apprehension was removed in so far as mining cessation was concerned. Despite the dull market, spot prices are holding firm at recent levels, with the slight exception of $\frac{3}{4}$ -in. lump, some sales of which are reported at \$1.90 as compared with a previous low of \$2. Mining operations have slowed down, production in the eastern Ohio field during week ended March 8 being 324,000 tons, the lowest of any full week's operations, excepting the holidays, in eleven months.

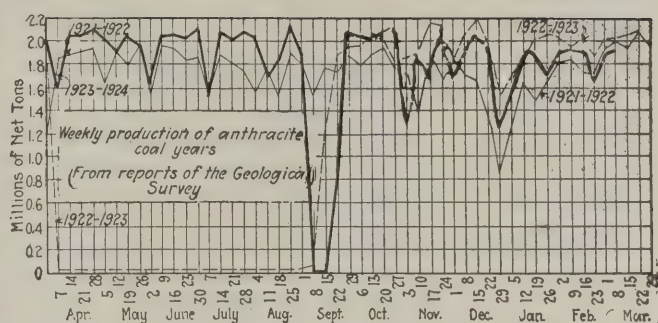
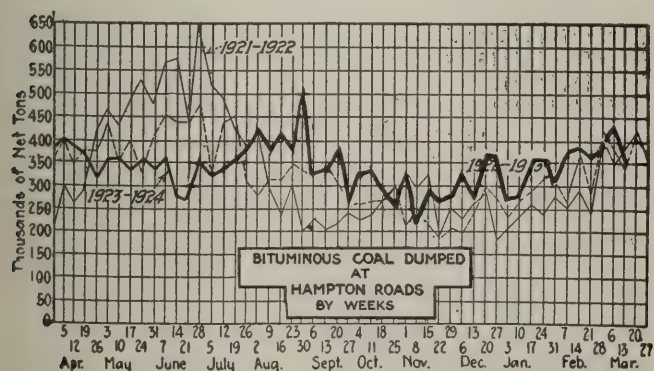
Production in the Pittsburgh district has been declining slightly. The full force of the competitive condition between the district and various non-union districts will not be felt until after April 1, when contracts expire. Nothing definite has developed as to contracts for the new coal year; there does not seem to have been enough actual negotiating to develop actual prices on contract. In the spot market prices are unchanged except that steam slack has continued to decline, being forced for sale on account of heavy shipments of domestic lump, while some consumers have stocks of slack they are liquidating.

No improvement is shown at Buffalo. Consumption is pretty good and so is the general business feeling, but output exceeds requirements.

New England Market Drags

In New England the market drags along with no bright spots anywhere. Even with the approach of April, buyers show almost no interest in prices, either spot or for season delivery. The few consumers who expect to be in the market later on are only keeping in touch with current quotations to measure the possible spring decline when conditions settle down for the long pull through the summer months.

At Hampton Roads there is no appreciable change. Navy standard grades of Pocahontas and New River are available in any quantity desired, and the spot price per gross ton f.o.b. vessel ranges from \$4.60 to \$4.75. Those agencies with strong Western connections continue to move a fair



proportion of their output in that direction at slightly better than \$4.75 at Hampton Roads. Others, however, with less Western business are inclined to take from 10 to 15c. less in order to keep coal moving to the piers. At this end there is constant pressure to sell coal against arrivals, and for that reason \$5.90 per gross ton on cars, Boston, is about the highest figure obtainable from any except small users. At Providence and at Portland, due to better local conditions, the on-car basis is somewhat higher.

All-rail there is next to nothing doing. What tonnage is being placed is on small requirements, and the active shippers are busy combing over every possible prospect.

No Ardor in Seaboard Markets

Little enthusiasm is in evidence in the soft-coal market at New York. The general market is quiet, only the better grades and some individual coals moving easily. Some contracts have been renewed at 25c. to 50c. above present spot prices, but many consumers who in former years have had contracts are going to take chances with the open market. Demand in the spot market is slow and prices show comparatively no change. Many consumers have from sixty to ninety days' reserves on hand.

The consumer is sitting pretty in the Philadelphia market, everything seeming to be in his favor. He now knows that he can get coal whenever he wants it, and he is coming close to the point where he does not want much. Prices hold firm. The producers seem to have said "this is bottom" so long now, that it actually seems to be true, and no sign of slackening demand, which occasionally crops up, has any adverse effect on spot prices.

The Baltimore trade is encouraged by a stronger line of inquiry both for spot and contract business after April 1, and price quotations, while still weak, are the best for some time past. The fact that little or no trouble is anticipated from labor sources in the mining regions is probably the only thing that has checked a sharp advance of the market.

Anthracite Moving Only for Actual Needs

Activity in the anthracite domestic coal market at New York is limited to the actual needs of consumers. It is however, sufficient to take care of shipments to this tide-water. There have been some offerings at tidewater of loaded boats of the larger sizes which have been let go at slightly less than current spot prices, but such sales have been few. Egg coal is slowly gaining in strength, demand is better and more is being sold at the average price than at a low figure. Stove and chestnut continue in good demand, while pea coal is moving slowly. Barley and birdseye are in good call. Buckwheat and rice are not active and can be had below company schedule. Normal March weather in Philadelphia has served to make some business for the retailer, but the consumer is buying as little coal as possible, being firmly convinced that he is going to get cheaper coal after April 1, and quite a few dealers hold a like opinion.

Car Loadings, Surpluses and Shortages

	Cars Loaded			
	All Cars	Coal Cars		
Week ended March 1, 1924.....	945,049	186,470		
Previous week.....	845,898	175,834		
Same week in 1923.....	918,624	193,548		
	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
Feb. 22, 1924.....	134,273	56,618	3,991	2,475
Previous week.....	125,177	48,252	5,944	.....
Same date in 1923.....	15,819	4,845	80,633	38,771

Foreign Market And Export News

British Collieries Booked to Mid-April; Output Declines Again

The Welsh coal market is unsettled as an aftermath of the dock strike. While stocks lasted the market was unaffected, but the subsequent disorganization is very evident. Dealers report difficulty in effecting arrangements for new business because all collieries are heavily booked with orders to the middle of April. Dealers are much in arrears with their deliveries and find it impossible to overtake orders with the two-shift working system.

The domestic demands continue very large and foreign buyers are reported to be placing substantial orders in the United States owing to their inability to obtain requirements in the British market even at enhanced prices. Foreign buyers in some cases are accumulating stocks against an expected strike of miners. The anthracite market is firm and steady, and all the best grades are well booked. Demand from France and Italy is good.

Output of British collieries during the week ended March 1, a cable dispatch to *Coal Age* states, was 5,702,000 tons, according to the official reports. This compares with 5,802,000 tons in the week ended Feb. 23.

In the Newcastle market prices have slightly appreciated and show a tendency to harden. Most of the collieries are well sold for several weeks. Inquiry from Germany shows a tendency to fall off.

Hampton Roads Discerns Brighter Outlook

Business is dull on spot at Hampton Roads but movement is fairly heavy on contracts, particularly to South American ports. Prices are dropping, which is attributed by shippers to the fact that no untoward incidents impend in the coal trade to disrupt the market.

Coastwise business is fairly good, as is the bunker trade, but dumpings have fallen off somewhat. Several inquiries

which may lead to big contracts later are reported by shippers, but as a whole the tone of the market is dull. The outlook is reported by shippers as brighter, however, with the expectation that April 1, the annual contract period, will see buyers coming into the market substantially.

French Coal in Brisk Demand; Domestic Consumption Heavy

Demand for French fuels continues to be the feature of the coal market in France, consumers desiring to avoid the high prices prevailing for British coal. Consumption of domestic fuel is heavy, due to the continued cold weather.

Price reduction is not being uniformly applied, certain mines in the Loire basin with difficult workings having lowered their prices by 1, 2 and 3 fr., according to grade. As there was no increase last January in the Lorraine and Sarre coal fields, prices there are unchanged, but a reduction is expected soon in the latter field. These price changes come at a time when miners are about to ask again for higher wages, due to the increased cost of living.

Shipments of Sarre coal to France could reach an average of 50,000 to 60,000 tons a day but for a scarcity of trucks. Imports of British coal have fallen off considerably. The strikes in Great Britain had no direct influence on the French market, as the demand for imported house coals has been lower.

Deliveries of indemnity fuels continue at about the rate for the last two months. During February the French metallurgical industry received a daily average of nearly 11,000 tons of coke. The government has informed the Office des Houillères Sinistrées that the price for German coke will be maintained at 143.50 fr. (delivered at the frontier) for March.

Nearly 18,500,000 fr. was collected

on the coal tax in the Ruhr during the last ten days in February, 6,000,000 fr. of this covering arrears in taxes. The output of several of the most important mines in the area, belonging to the Thyssen, Stinnes, Krupp and other groups, now is in excess of the 1922 output by from 10 to 27 per cent.

Export Clearances, Week Ended March 15, 1924

FROM BALTIMORE

For Argentina	Tons
Br. Str. Lady Charlotte.....	5,782
For France	
Fr. Str. Lieut. Jean Laurent.....	8,101

FROM HAMPTON ROADS

For Argentina	Tons
Br. Str. Clearpool, for Puerto La Plata	5,323
Fr. Str. Louis L. D., for Buenos Aires	5,817
Ital. Str. Voltorno, for Buenos Aires	7,180
Br. Str. Ethelwolf, for Buenos Aires	5,975
For Brazil	Tons
Braz. Str. Taubate, for Rio de Janeiro	6,334
Ital. Str. Monte Nero, for Porto Ferrajo	6,835
Amer. Str. Robin Hood, for Rio de Janeiro	8,690
Br. Str. Davenby Hall, for Rio de Janeiro	5,718
For Bermuda	Tons
Amer. Schr. James M. W. Hall, for Hamilton	793
For Egypt	Tons
Br. Str. City of Athens, for Port Said	2,980
For Uruguay	Tons
Br. Str. Nilemede, for Montevideo	5,532
Br. Str. Domingo de Larrinaga, for Montevideo	5,005
For West Indies	Tons
Swed. Str. Finn, for Port Castries	2,523
Br. Str. Pikepool, for Fort de France	5,386

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.	March 6	March 13
Cars on hand.....	1,403	2,212
Tons on hand.....	85,399	129,096
Tons dumped for week.....	185,418	155,098
Tonnage waiting.....	25,000	10,000
Virginian Ry. piers, Sewalls Pt.	March 6	March 13
Cars on hand.....	1,429	1,730
Tons on hand.....	96,950	117,450
Tons dumped for week.....	117,679	86,650
Tonnage waiting.....	9,562	10,000
C. & O. piers, Newport News:	March 6	March 13
Cars on hand.....	1,469	1,920
Tons on hand.....	69,555	90,385
Tons dumped for week.....	88,361	69,383
Tonnage waiting.....	4,840	5,750

Pier and Bunker Prices, Gross Tons

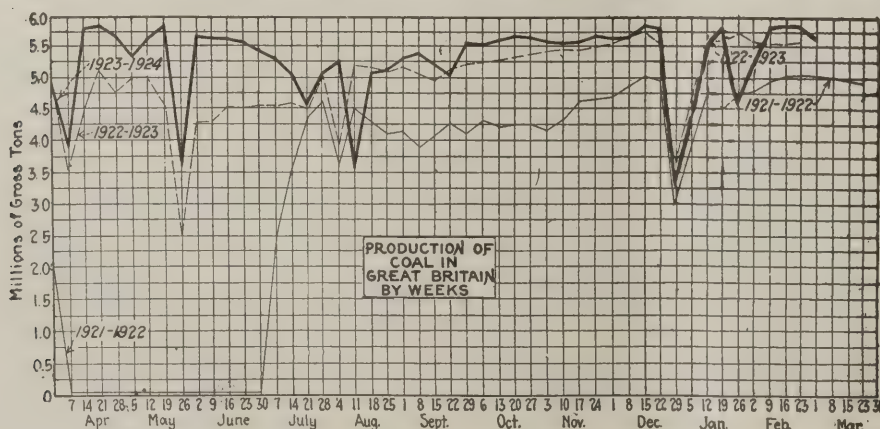
PIERS	March 8	March 15†
Pool 9, New York...	\$5.00@5.25	\$4.75@5.00
Pool 10, New York...	4.75@5.00	4.60@5.00
Pool 11, New York...	4.50@4.75	4.50@4.75
Pool 9, Philadelphia...	4.90@5.20	4.90@5.20
Pool 10, Philadelphia...	4.50@4.90	4.50@4.90
Pool 11, Philadelphia...	4.25@4.60	4.25@4.60
Pool 1, Hamp. Roads...	4.75	4.65@4.75
Pools 5-6-7 Hamp. Rds.	4.15@4.25	4.10@4.20
Pool 2, Hamp. Roads...	4.50	4.40@4.60
BUNKERS	March 8	March 15†
Pool 9, New York...	5.30@5.55	5.05@5.55
Pool 10, New York...	5.05@5.30	4.90@5.30
Pool 11, New York...	4.80@5.05	4.80@5.05
Pool 9, Philadelphia...	5.15@5.55	5.15@5.55
Pool 10, Philadelphia...	4.90@5.20	4.90@5.20
Pool 11, Philadelphia...	4.65@5.10	4.65@5.10
Pool 1, Hamp. Roads...	4.75	4.75
Pool 2, Hamp. Roads...	4.50	4.50
Pools 5-6-7 Hamp. Rds.	4.25	4.20

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to *Coal Age*

Cardiff:	March 8	March 15†
Admiralty, large.....	27s. @ 28s.	31s. @ 32s.
Steam smalls.....	18s. @ 20s.	23s.
Newcastle:	March 8	March 15†
Best steams.....	26s. 6d. @ 26s. 9d.	25s. 9d. @ 26s.
Best gas.....	25s. @ 25s. 3d.	25s. @ 25s. 3d.
Best bunkers.....	24s. 6d. @ 25s.	23s. @ 23s. 6d.

†Advances over previous week shown in **heavy** type, declines in *italics*.



Traffic News

Supreme Court Advances Appeal In Car-Distribution Case

Motion to advance the appeal of the federal government from the decision of the Southern West Virginia District Court in favor of the New River Co. and various other coal mining companies setting aside the Interstate Commerce Commission order regarding car distribution to mines served by more than one carrier was granted by the U. S. Supreme Court March 17 and the case was set for argument April 21.

In its order the Interstate Commerce Commission on Dec. 11, 1922, directed that mines served by more than one carrier should file copies of car requisitions with the agent of each carrier and that the combined requisitions must not exceed the gross daily rating of the mines. The district court, with three judges presiding, voted two to one, granting a permanent injunction to the mine companies and setting up a system of coal-car distribution which differs from that laid down by the Interstate Commerce Commission. The government appealed, and filed a motion to expedite the case, which motion has been granted.

Propose Advance in Coke Rates

The Coal, Coke & Iron Ore Committee, Central Freight Association Territory, announces a hearing in Room 606, Chamber of Commerce Building, Pittsburgh, Pa., Thursday, March 27, 1924, at 10:00 a.m., on the following proposed changes in rates on coke (except petroleum, creosote and tar or pitch coke), coke breeze, coke dust and coke screenings, carloads, from ovens on Louisville & Nashville and Interstate Roads in Virginia, Kentucky and Tennessee, and from ovens on the C. N. O. & T. P. Ry. (Southern Ry.), to Cincinnati, Ohio, Latonia, Covington and Newport, Ky., rate to be advanced from \$2.59 per net ton to \$2.90 per net ton; to Louisville, Ky.; Jeffersonville and New Albany, Ind., rate to be advanced from \$2.37 per net ton to \$2.65 per net ton. These proposed advances are intended to restore parity of rates with those from C. & O., N. & W. and Connellsville (Pa.) districts which was disturbed by the decision in ICC-Ex Parte 74.

Hearing on Rate Advance

The Coal, Coke & Iron Ore Committee, Central Freight Association Territory, announces that a hearing will be held in Room 606, Chamber of Commerce Building, Pittsburgh, Pa., Thursday, March 27, 1924, at 10 a.m., on the following proposed changes in rates on bituminous coal, carloads: From mines on B. & O. R.R. in No. 8 (Ohio) District to Peoria, Ohio, via New York Central R.R. (Ohio Central Lines); from mines on B. & O., D. T. & I., N. & W. and Hocking Valley roads, in Jackson County (Ohio) District to Peoria, via

New York Central R.R. (Ohio Central Lines), and from mines on Hocking Valley road to Raymonds, Lunda and West Mansfield, Ohio, via New York Central R.R. (Ohio Central Lines); rates to be advanced 6c. per ton, to \$1.89, to remove long- and short-haul clause departures. Rates from Clarion, Dundas, Elfork, Hawks, Minerton, McArthur, Oretton, Orland, Radcliff and Vinton, Ohio, on the Hocking Valley Ry., to Peoria, Raymonds, Lunda and West Mansfield, Ohio, to remain as at present, i.e., \$1.64 per net ton.

C. & O. Breaks Loading Record

The Chesapeake & Ohio established a new high record for coal loading in February, 18,011 carloads being moved in the week ended March 1. The previous high record was 17,742 cars, loaded during the week ending Sept. 1, 1923. Although February was a short month, loadings for the month totaled 68,551 cars.

Association Activities

The the annual meeting of the Upper Potomac Coal Association, held in Cumberland, the following officers were elected: President, T. M. Dodson of Bethlehem, Pa. (re-elected); Vice-President, R. Marsh Dean, of Elk Garden, W. Va., to succeed J. A. Brown of Frostburg, Md.; Treasurer, R. A. Smith, of Blaine, W. Va. (re-elected); Secretary, J. F. Palmer, of Cumberland, Md. (re-elected). Three new directors were chosen to serve on the board for the ensuing three years. They are Douglas Gorman, of Baltimore, Md.; S. D. Brady, of Fairmont, W. Va. and J. G. Emmons, of Philadelphia, Pa. The board of directors held its meeting prior to that of the membership as a whole and reviewed the year's activities and transacted routine business. The meeting of the association proper was held in the ball room of the Fort Cumberland Hotel, the tonnage of the Upper Potomac, western Maryland and western Pennsylvania fields being well represented. The principal speaker at the meeting was Harry L. Gandy, executive secretary of the National Coal Association. Mr. Gandy addressed himself to the legislation situation at Washington and discussed the benefits of association activities and co-operation between coal operators. Following his address members were given an opportunity to discuss questions of interest to the industry.

The Fayette-Greene Coal Producers Association held an important meeting at the Uniontown Country Club March 10, when forty-five coal and coke operators with interests in the two counties were present. Charles O'Neil, secretary-treasurer of The Central Pennsylvania Coal Producers Association, of Pittsburgh, was the speaker of the evening and he brought to the Fayette-Greene operators a message of striking importance. There also were several impromptu talks by members of the Association. G. Carl Areford, president, presided.

The Hampton Roads Coal Association, composed of representatives of practically all coal agencies at Norfolk, established to create better fellowship and improve operating conditions, has been formally organized with a board of directors which has been instructed to choose officers from its own members. The board will elect a president, vice-president, secretary and treasurer. The board members are Lewis Littlepage, Smokeless Fuel Co.; Clayton Wigg, Houston Coal Co.; T. M. Bailey, Virginia Smokeless Coal Co.; T. R. Licklider, Trans-Ocean Coal & Export Co., and Chester B. Koontz, Willard-Sutherland Coal Co.

Obituary

William Andrew Windatt, president of the Windatt Coal Co. of Winnipeg, Man., died on March 5 at the age of 63 years. He was born at Bowmanville, Ont., and came West when a young man. After being for some years engaged in the coal and banking business in Moose Jaw, Port Arthur and Portage la Prairie he settled in Winnipeg in the early 90's and established the business which bears his name. Mr. Windatt also was managing director of the Home Investment Co., and had other large interests including the Foothills Collieries, Ltd. Mr. Windatt had been an invalid for some time and his death was not unexpected. He leaves a widow, two sons and three daughters.

John T. Werry, of Johnstown, died at his home there on March 12, following a long illness from arterio sclerosis. He was born in Cornwall, England, Nov. 11, 1848. He came to America when 18 years of age and settled in Johnstown immediately and entered the coal business, spending most of his time with the Haws Manufacturing Co. He began his work with Andrew J. Haws and for a long time was foreman of the mines. He retired three years ago.

James Meehan, well known in the coal-mining industry in central Pennsylvania, died March 10 at his home in Morrellville (Johnstown) in his 69th year. At the age of 17 he took a job in the mines at Blossburg, Tioga County. It was while he was working in the vicinity of Houtzdale that he received his mine foreman certificate from the same board that examined John Lochrie and "Jack" Hughes, both now in Windber. In 1903 he took charge of Mine No. 35 for the Berwind-White Coal Mining Co., at Windber, and was later associated with the Hastings-Beaver-Spangler interests at Hastings, Spangler and Bakerton. He is survived by two sons, Harry J. Meehan, of Westmont, a coal operator in central and western Pennsylvania, and James A., also of Westmont, and three daughters, all of Johnstown. Burial was at Carrolltown.

William G. Barnhardt, a prominent coal dealer of Kitchener, Ont., died a few days ago of pleuro-pneumonia. He was 54 years of age and was formerly assistant fuel controller.

Coming Meetings

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Fuel Saving Conference, April 2 and 3, William Penn Hotel, Pittsburgh, Pa. Secretary, J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

Canadian Retail Coal Association. Annual meeting, April 3 and 4, King Edward Hotel, Toronto, Ont., Can. Secretary, B. A. Caspell, Brantford, Can.

American Institute of Electrical Engineers. Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress. May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

National Coal Association. Annual meeting May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

News Items From Field and Trade

ALABAMA

The Bessemer Coal, Iron & Land Co. has acquired an interest in the Nashville Bridge Co. H. L. Badham, president of the former company, will be added to the directorate of the bridge company, which is about a million dollar corporation, with a subsidiary plant in Bessemer.

The state has leased the Belle Ellen Mines of the Bessemer Coal, Iron & Land Co. on a royalty basis of 35c. per ton on coal removed, the coal to be sold by the state. The object of the new agreement is to get away from the convict leasing system which has been in vogue in the state for many years whereby several of the larger mining companies have been leasing the state and county convicts and employing them in the operation of their mines, and is in the nature of an experiment of several plans which have been under consideration. It is probable that similar contracts will be entered into with the other companies employing convict labor in the coal fields.

The state has leased the Flat Top mine of the Sloss-Sheffield Steel & Iron Co. and will employ its convicts in the operation, furnishing washed coal in cars at \$1.30 per net ton. The tonnage tax will be paid by the owners of the mine. Flat Top mine is one of the largest coal producers in the Birmingham district, the average output being about 2,200 tons daily. Convicts have been employed in this mine since it was opened up, about twenty-two years ago, the company leasing the prisoners at a stipulated rate per month. The new agreement is to take effect July 1, 1924, and is intended as an abolition of the leasing system, against which a bitter campaign has been waged in the state for the past year or more. The product of the mine does not enter the commercial market being coked in the byproduct plant of the company.

In line with its policy of promoting first-aid and accident-prevention work among its employees, the DeBardeleben Coal Corporation will stage a first-aid contest at Jasper, Ala., March 21, according to announcement of Milton H. Fies, operating vice president of the company. Only employees of the corporation will enter the contests, every mining camp being represented by one or more teams.

Priestly Toulmin, Herbert Tutwiler and associates, of Birmingham, are developing a new mine at Trafford, Jefferson County. Production of around 800 tons per day is contemplated. The operation will be located on the Louisville & Nashville R.R. A washery is being constructed.

The Stith Coal Co. has about completed its 400-ft. shaft at America Junction, Walker County, to reach the Mary Lee seam of coal and is now preparing to install a large washery plant.

INDIANA

Clem J. Richards, receiver for the Sugar Valley Coal Co., of Terre Haute, has been granted permission in Superior Court to sell all the property of the concern.

P. F. Bolinger, cashier of the First National Bank of Shelburn, was named receiver for the Star City Coal Mining Corporation, Star City, by Judge Walter F. Wood. The receivership was declared on a petition of the National City Bank of Indianapolis, which holds a note for \$18,000 against the company.

KENTUCKY

Several mines in the area of the Kentucky-Tennessee Coal Operators Association in the Hazard and Harlan fields of southeastern Kentucky which were closed down because of inability to agree on wage scales with the representatives of the United Mine Workers, are resuming work. It seems that the men were promised strike benefits, but these have failed to materialize.

Under date of March 8, a press dispatch from Knoxville, Tenn., stated that coal from the Stony Fork Coal Co., L. C. Gunter, president, would move from the

Kentucky mines to the Compressed Coal Co., Savannah, Ga., for use in manufacturing briquets, which will be one of the principal products of the latter company. The report stated that James Imbrie, New York, was associated with Mr. Gunter in the Compressed Coal Co., a \$1,000,000 corporation, formed in West Virginia. Mr. Gunter was formerly president of the Southern Appalachian Coal Operators' Association and is president of the Knoxville & Carolina R.R.

A bill by Senator Tabor has been passed by both houses and signed by Gov. Fields, which will make script, checks, tokens, etc., issued by coal mining companies and other employers, redeemable at face value, and also transferable. The bill was passed in 1922, but was lost before being recorded, and never was signed.

An effort to force the resignation of Lonnie Jackson, president of District 23, United Mine Workers from the office of Mayor of Central City, failed on the floor of the biennial convention at that town, March 6, the vote being 92 to 21 in favor of his continuing as mayor of the city. A small minority endeavored to show that his duties as mayor were interfering with his work as president of the district union.

Senator Hiram Brock of Harlan, has put a bill through the Kentucky Senate to regulate type of containers used, and amount of explosives which can be taken into Kentucky coal mines at any one time. The bill passed by a 20 to 14 vote.

The Pittsburgh Coal Co., Baskett, of which Alexander Blair is president has changed its name to the Race Creek Coal Co., Inc. The management remains the same.

The Hazard Fuel Co. of Lexington, capital \$50,000, has been chartered by T. F. McConnell, W. J. Raibould and Asa Ewen.

T. C. Miller on March 15 became superintendent with the Elkhorn Coal Corporation at Jackhorn, Letcher County.

MISSOURI

About 15 cars of coal per day are replaced by electric power to be furnished on a contract just signed by the Pittsburgh Plate Glass Co. for its Crystal City plant from the new gigantic Cahokia power plant of the Union Electric Light & Power Co. across the river from St. Louis. The contract calls for total payments of \$600,000 a year for 10 years and is the first big contract signed for the new Cahokia station. The glass company will continue to use coal for its gas producers and yard locomotives.

NEW YORK

A new issue of \$2,500,000 Central Coal & Coke Co. first mortgage 6½ per cent sinking fund gold bonds, closed mortgage, series B and C, at 98, to yield about 6.65 per cent, is being offered. The bonds are dated March 1, 1924, and are due March 1, 1944. The Central Coal & Coke Co. owns and operates extensive timber and coal properties in Oregon, Louisiana, Texas, Missouri, Kansas, Oklahoma and Wyoming. The bonds are the joint and several obligations of the Central Coal & Coke Co. and the Delta Land & Timber Co., a wholly owned subsidiary. Net operating earnings of the Central Coal & Coke Co. and its subsidiaries, not including Oregon-American Lumber Co., for the seven-year period ended Dec. 31, 1923, averaged \$1,033,515.40 or more than 2½ times the maximum annual interest requirements on all outstanding first-mortgage bonds of the company.

The Sunday Creek Coal Co., Columbus, Ohio, announces the opening of a sales office at 872-74-76 Ellicott Square, Buffalo, in charge of J. Fred Morlock.

The Board of Directors of the Lehigh Valley Coal Sales Co. has declared a dividend of \$2 per share payable to stockholders on April 1.

The Island Creek Coal Co., of Boston, has declared an extra dividend of \$1 on the common stock, the regular quarterly dividends of \$2 on the common and \$1.50 on the preferred, payable April 1 to stock of record March 26.

OHIO

The Essex Coal Co., of Columbus, is installing oil-burning boilers at three of its operations in the Hocking Valley field to operate electrical plants. The mines being thus equipped are the Hocking Valley Mining Co., at Hocking; the Kimberley Mining Co., at Nelsonville, and the Ohio Mining Co., at Jackson. At each place two 300-hp. oil-burning boilers are being installed which will operate generators capable of generating about 700 kw. The company is taking advantage of the slack demand in order to make the improvements, which are expected to be completed in a month.

Richard Osborne, general manager for the Borderland Coal Sales Co. for the past year, with headquarters in Cincinnati, has resigned and has opened an office for the Mid-West Coal Co., of Cario, Ill., which will be located in the Union Trust Building, Cincinnati.

The Columbus office of the Pittsburgh Coal Co. started lake shipments late last week from its Ohio and Kentucky mines for transshipment on bottoms tied up in the Toledo harbor. This is expected to relieve the situation to a certain extent as a considerable loading of bottoms will be made to wait for the official opening of the lake season.

W. T. Richardson, vice president of the Universal Coal Co. of Price Hill, W. Va., who directed the firm's Western selling office in Cincinnati, has resigned and has been appointed manager of the Cincinnati office of Dexter & Carpenter, Inc.

The J. R. Fitzer Coal Co., Columbus, which has offices in the Citizens' Trust Bldg., is being operated by John Fitzer, son of the late J. R. Fitzer, under the same name. This company has two very important selling connections.

The Kanawha & Ohio Coal Co., Columbus, of which Sheldon Smith is at the head, has moved its offices from the Arcade Building to the Douglass Building.

The General Electric Co. moved the headquarters of its East Central district from Cincinnati to Cleveland on March 1, according to a recent announcement. In the latter city, combined with the local Cleveland office of the company, it will be located in the new Union Trust Co. building.

OKLAHOMA

The Acme Coal & Coke Co. will build five miles of railway tracks at its strip pit 2½ miles east of Stigler. It now operates three miles of track. This company shipped 123 cars of coal in January, the largest monthly shipment it has made since it began operations in 1920. The product was shipped into eleven states.

PENNSYLVANIA

The Hudson Coal Co., which owns extensive tracts of anthracite land near Mechanicsville, Schuylkill County, has erected drills on Salem Hill, Port Carbon, Schuylkill County, with a view of locating definitely some of the big seams known to exist in that vicinity. It is expected that a colliery employing about 800 men will be erected by that company on the site of the proposed workings and homes and other buildings constructed for the workmen and their families. Many coal companies, operating in Scranton and Wilkes-Barre, are rapidly invading the Schuylkill fields. Incidentally with the announcement of the Hudson Coal Co. the Peach Mountain slope in Schuylkill County, after an idleness of seventy-five years, is again in operation. The independent operators in charge of the colliery found that they can strike a large body of coal containing hundreds of thousands of tons through this slope and had it opened at a great expense. The Peach Mountain slope was one of the many operations abandoned in the Schuylkill region when it was found cheaper to mine the beds in the vicinity of Scranton and Wilkes-Barre.

The merger of the Cosgrove-Meehan Coal Co., located in Johnstown, has received the approval of the state. The capital stock of the merged interests is given as \$315,000. J. E. Graham, of Johnstown, is treasurer. Companies entering the merger are the Homer City Coal Co., Purity Coal Co. and the Grazier Coal Mining Co.

Coal production in the Tenth bituminous district, which includes the mines in Blair and a portion of Cambria county, was 3,230,593 tons in 1923, according to the report of Mine Inspector Joseph Williams, of Altoona.

Approximately 15,000,000 tons of coal, or an increase of 50 per cent over the previous year, was produced in the **Cambria County region during 1923**, according to the annual reports of the state mine inspectors of the four districts of which Cambria county is a part. The number of tons produced per fatal accident in the Sixth district was double that of the previous year, according to State Inspector Thomas D. Williams. The Bethlehem Mines Corporation, a subsidiary of the Bethlehem Steel Corporation, produced 2,101,272 tons, or more than 40 per cent of the coal mined in the Sixth district, in which it is located. An increase of approximately 62½ per cent in coal production over the 1922 figures was recorded in the Thirteenth district, Inspector John I. Thomas reported. Few accidents marred this production record. A total of 4,753,805 tons of coal was produced last year in the Thirtieth district, of which Charles H. Crocker is inspector. This district comprises mines in Cambria, Indiana and Westmoreland counties. Of the amount, 1,514,487 tons was mined in Cambria County.

River coal, or anthracite washed down stream from the mines, valued at \$605,822 was recovered in 1923 from the Susquehanna, Schuylkill and other rivers, according to reports made to Auditor General Samuel S. Lewis for taxing purposes. The coal had an average value of \$1.27 a ton. Sixty corporations, firms and individuals have made reports and they will pay a state tax aggregating \$9,087.33.

The State Supreme Court has affirmed the judgment of the Greene County Common Pleas Court in the case of the Shannopin Coal Co., which appealed from the triennial assessment for 1922, 1923 and 1924. The lower court reduced the valuation. The County Commissioners then appealed the case to the Supreme Court and it was agreed that all appeals taken from assessments of coal lands should abide by the final decree of the higher court in the Shannopin case, and that assessments made be reduced by a like percentage in case the reduction made by the Greene County court should be sustained.

The anthracite producing companies in their reports of 1923, made to Auditor General Samuel S. Lewis, for state coal-tax purposes, indicate a total tax due considerably in excess of the estimated return and \$3,500,000 more than was reported for the year 1922. "An increase in state revenues is shown by the indicated yield from the anthracite coal tax for 1923," Auditor General Lewis said. **The tax reported for 1923 by the anthracite coal operators aggregates \$7,273,788.** A feature of the tax shown by the reports, the period for the filing of which expired recently, is that ten coal companies report eighty per cent of the tax. Two companies reported a tax of nearly \$1,000,000, each, for the year.

The following bituminous coal companies, which will mine and manufacture coke and by-products and all of which have their home offices at Ligonier, were incorporated recently at the State Department at Harrisburg: **Ligonier Diamond Coal Co.**, No. 2, capital stock, \$52,000; incorporators, John Seger, W. J. Seger and Joshua Vogeles. **Seger Brothers Co.**, Ligonier, \$370,000; incorporators, John Seger, Joshua Vogeles and H. E. Behrhorst. **St. Clair Fuel Co.**, \$136,000; incorporators, John Seger, Mayme Vogeles and Dora D. Seger. **Seger Brothers Coal Co.**, \$710,000; incorporators, John Seger, Joshua Vogeles and Jane Crann. **Vogeles Coal Co.**, \$35,000; incorporators, John Seger, Mayme Vogeles and H. E. Behrhorst. John Seger, Ligonier, is treasurer of all of the companies.

TENNESSEE

By court decree of Feb. 23, at Nashville, the property operating the past seven months as the Old Hickory Powder Plant Receivers has been restored to the **Nashville Industrial Corporation**.

UTAH

It is planned to provide the first unit of the blast furnace of the **Columbia Steel Corporation** near Provo, in Utah County, with ten cars of iron ore, twenty-five cars of coal, and five cars of limenock a day. The plant will be in operation in a few weeks.

L. F. Rains, president of the Carbon Fuel Co., of Salt Lake City, has been appointed to the production committee of the U. S. Chamber of Commerce.

The capital stock of the **Mutual Coal Co.** has been increased from \$500,000 to \$800,000. **The company had not lost a day due to poor market conditions since July 1.**

VIRGINIA

The Amherst Coal Co. has opened an agency at Norfolk with H. M. Fadeley, formerly with the Low Volatile Consolidated Coal Co., in charge. H. W. Moore, formerly with the Port Dearborn Coal Co. at Norfolk, also is in the new agency.

E. H. Jarvis, formerly with the Low Volatile Consolidated Coal Co., has become associated with the Smokeless Fuel Co. at Norfolk.

W. R. Moore, of the Houston Coal Co., Norfolk, has gone to Richmond to take a position with the Raleigh Smokeless Fuel Co. **J. B. McClure**, of the Beckley, (W. Va.) office of the latter concern, has gone to the Norfolk office of his company.

WEST VIRGINIA

The No. 2 mine of the **New River & Pocahontas Coal Co.**, on Laurel Creek, in the New River field, which had been in idleness for some time, resumed operations during the first week of March. The company is having 100 new mine cars constructed. This company has not reduced wages, paying the same scale which has been in force for the past two years.

The Supreme Court of West Virginia has held in the case of **R. M. G. Brown** and others against the American Gas Coal Co., appealed from the Circuit Court of Monongalia County, that **federal income taxes constitute a prior lien.** Litigation in this case grew out of the fact that after the Knob Coal Co. had been sold by J. M. G. Brown, Robert D. Hennen and others to the American Gas Coal Co. for \$300,000, on which a cash payment of \$125,000 was made, when there was a default in payment action was brought, charging insolvency and when the case was referred to a master, unpaid income taxes were given a prior claim, such unpaid income taxes amounting to \$35,166.66 plus interest. Brown and his associates filed an exception to the finding of the master and the court sustained such exceptions and gave the trust lien priority, that portion of the decree of the lower court being reversed by the Court of Appeals. The Circuit Court held that federal income taxes did constitute a lien against the property but placed it after other liens on the ground that the federal government had failed to assert and establish its lien for unpaid income taxes.

C. E. Reese, gas and electrical engineer, has been appointed general manager of the Bluefield Gas & Power Co., Bluefield. This is a Sanderson & Porter property. Mr. Reese has been connected with the Westinghouse Electric & Mfg. Co., as section head stoker sales and publicity department, Philadelphia, Pa. He has been actively engaged in the Stoker Manufacturers Association as secretary of the publicity committee and chairman of the advertising sub-committee. He was formerly combustion engineer with Henry L. Doherty & Co., New York City, and assistant engineer with the Illinois Public Utilities Commission, working in Springfield and Chicago.

The U. S. Circuit court of Appeals at Cincinnati has affirmed the verdict of a lower court at Cleveland in awarding judgment of \$440,000 in favor of the Main Island Creek Coal Co. against the Cleveland & Western Coal Co., of Cleveland. There was an arrangement, it is alleged, between the two companies under the terms of which the Cleveland & Western company was required to deliver as much coal at tidewater for the Main Island company as that company delivered at the lakes for the Cleveland concern. The Main Island company in its suit alleged that at the end of the lake season it had shipped about 60,000 tons more than had been delivered for its account.

J. A. Blake has resigned as mining superintendent at the Glen White plant of the E. E. White Coal Co., and has been succeeded by **E. E. Jones**, who has been the superintendent at the Statesbury plant for some time. Mr. Blake was presented with a gold watch by the company at a farewell function. He also was presented with a gold chain and B. P. O. E. emblem on behalf of the Glen White Mining Institute and the official force of the E. E. White Coal Co.

Owing to a falling off of orders, the operators in the Mountain Park coal field, Saskatchewan, are **laying off about 500 men.**

The New England Fuel & Transportation Co. of Grant Town, W. Va., has contracted with the Roberts & Schaefer Co., for the installation of a screen and loading booms in its No. 3 tippie, at Lowsville.

Carl Scholz, vice-president and general manager of the Raleigh-Wyoming Coal Co., with mines at Edwight, in Raleigh County, and at Glen Rogers, in Wyoming County, has announced the appointment of **Walter Stevens as general mine superintendent at the Glen Rogers mine** of the company. The new general mine superintendent at Glen Rogers was associated with Mr. Scholz when the shaft at Valier, Ill., was sunk, that ranking as a record breaking performance, since work was commenced on September 1, 1917 and two shafts 612 feet deep had been sunk by April 1 and coal was being hoisted by the latter date. Mr. Stevens succeeds Edward Nicholson.

All the holdings of the **Macbeth Coal Co.** on Rum Creek in the Logan district of West Virginia, owned in large part by John Laing and associates of Charleston, has been purchased by the **Logan Eagle Collieries Co.**, headed by Walter R. Thurmond, former president of the Logan Operators Association and general manager of the Thurmond Coal Co. and of the Argyle Coal Co. The consideration involved is said to be in excess of \$1,000,000.

The judgment of the Circuit Court of Kanawha County in the case of the **Fayette-Kanawha Coal Co.** against the Lake & Export Coal Corporation of Huntington has been reversed by the West Virginia Supreme Court in the suit involving alleged breach of contract. The upper court set aside a verdict of \$50,281 for loss of anticipated profits, but the appeal court in its decision asserted that the possible production of one of the plaintiff's mines, not in operation, should not be considered.

WASHINGTON, D. C.

The Government Fuel Yards opened bids for anthracite and bituminous coal required between April 1 and June 30, 1924. There were 24 bids for supplying 24,600 gross tons of New River or Pocahontas mine run, the price varying from \$2.22 per gross ton, by the Lake & Export Coal Corporation of New York, to \$2.80, by William C. Atwater & Co. Thirty-four companies submitted figures on 10,000 tons of Maryland, Pennsylvania or northern West Virginia mine run, for shipment to the Capitol power plant, on the Pennsylvania R.R., the price range being from \$1.90, by the Valley Camp Coal Co., to \$3.30, by the Iron Trade Products Co.; for supplying 4,500 tons of the same coal for shipment to St. Elizabeth's Hospital, on the B. & O. R.R. 33 companies submitted tenders, the quotations ranging from \$1.80, by the Steamship Fuel Corporation, to \$3.14, by the Iron Trade Products Co. Six companies submitted bids on anthracite.

CANADA

Three recommendations were presented to Acting Finance Minister J. A. Robb and Charles Stewart, Minister of the Interior, by a delegation from the Central Council of Municipal Associations of Ottawa, that all retail merchants should put the analysis of the coal they sell on their invoices, that import duties should be removed from all machinery used in the manufacture of coke and its byproducts and from imported soft coal for conversion into coke; that the sales tax be removed from all byproducts, whether agricultural or chemical, of the manufacture of coke. Both ministers promised that the recommendations would be referred to government fuel experts.

An increase of over a million and a half tons of coal for the year ending September 30, 1923, is recorded in the annual report on the Nova Scotia mines. **The total output was 6,179,890 tons** as compared with 4,537,494 tons for the preceding year. There was an increase in local consumption of over 600,000 tons, while shipments to the St. Lawrence increased by nearly half a million. In his report Premier Armstrong stated that he hoped a scheme might be evolved whereby Nova Scotia coal might yet be coked somewhere on the St. Lawrence, its gas utilized and the coke go west to replace anthracite. He expressed the hope that the waters of the St. Lawrence might be sufficiently deepened so that Nova Scotian coal could reach Ontario and replace American bituminous coal and by semicoking replace the anthracite now imported from the United States.

Recently coal operators in the Edmonton field of central Alberta have been shipping coal by the **Canadian National Ry. to Port Mann**, and thence to Seattle. There seems to be reasonable hope that a good business will be developed by the mine operators with Puget Sound ports.

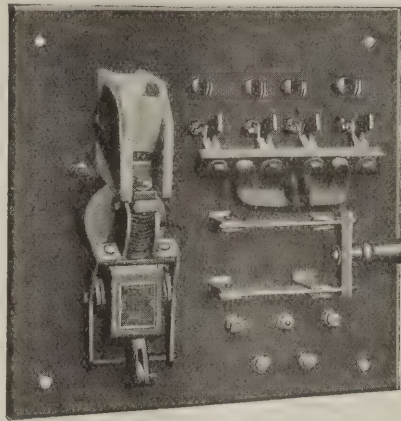
New Equipment

Oil Circuit Breakers with New Automatic Features

A line of indoor service electrically operated oil circuit breakers, in which are incorporated several new and distinctive features has been developed by the Westinghouse Electric & Manufacturing Co. These breakers are three-pole, single-throw, either non-automatic or automatic in operation, for capacities up to 2,000 amperes and alternating current voltages up to 25,000 with interrupting capacities rated at approximately 9,500 volts and 13,000 amperes respectively. They are particularly adapted to the control of alternating-current circuits of large capacity where the voltage does not exceed 25,000 volts. Each of the two forms has a different maximum interrupting capacity but the details of construction are similar.

The two outstanding features in the construction of this type of breaker are its compactness and its ease of installation. No intermediate structure walls are required for supporting the individual poles; all of them are supported from the common steel top. The breaker is supported by means of anchor-plates set in and projecting from the cell walls. The steel top of the breaker, which rests on these plates, is bolted securely in place. Where space is of prime importance, a saving of almost 6 in. per three-pole breaker can be made in length of cell structure by the use of steel compartments instead of concrete compartments. The space between the breaker top and the floor, in front of the tanks, is covered with removable doors, each consisting of a metal frame with asbestos panels and hinged at the top.

The oil tanks of the CO breakers are



Control Relay Makes Tripping Completely Automatic

The operation of the release coil of the control relay is designed to trip the breaker irrespective of the fact that the operator may be holding the control switch in the closed position.

seamless and die-pressed from heavy sheet steel. They are so fastened to the steel top that an oil-tight joint is secured. Each tank is equipped with a muffler, so that when the breaker opens a heavy short circuit, the air in the top chamber is forced out through the muffler in advance of the arc gases rising through the oil. This eliminates the possibility of a violent explosion in the breaker structure from the mixture of oxygen and arc gases. The rupturing capacity and the severity of the duty cycle which a given breaker structure will handle are thereby greatly increased. To prevent arcing between contacts and tanks, a set of removable flame-resisting insulating linings is used in each tank. The inner layers

of these linings are of asbestos; the outer layers, of micarta. Oil gages indicate the level in each tank.

The breaker is operated by a unit type solenoid mechanism mounted above the poles on the top of the steel bed plate forming the cell top. After the breaker is closed by the solenoid, it is held in the closed position by a hardened steel latch which in turn automatically engages with a trigger. The oil circuit breaker is equipped with a special control relay panel which is provided with a two-piece contact arm and release coil. As soon as the circuit breaker is closed by the operator in the usual manner, the pallet switch on the breaker energizes the release coil of the control relay. This release coil opens the contact of the control relay, irrespective of the fact that the operator may hold the control switch in the closed position. By the use of this special control relay, full automatic protection can be secured where the breaker is used in connection with overload relays and current transformers.

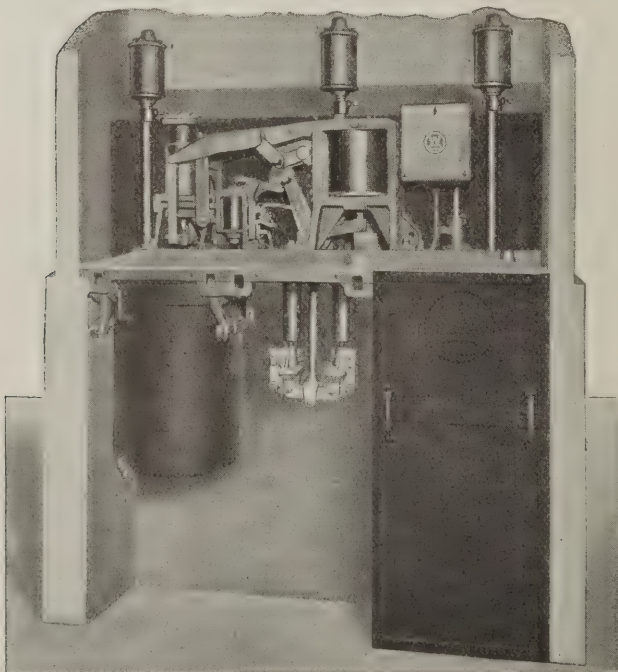
Electric Capstan Car Puller

The Silent Hoist Co., of Brooklyn, N. Y., has developed a car puller which they claim is powerful, compact, waterproof, dirt-proof and fool-proof. When used for placing cars, one end of a manila rope is hooked to the car and a few turns are made around the capstan head. When the free end of the rope is gently pulled the cars may be easily placed wherever desired.

The equipment consists of a Silent Hoist vertical capstan winch driven by an electric motor, or a gas engine. This equipment is all mounted on a self-contained fabricated steel I-beam base. The capstan is driven through a self-locking, non-reversible, worm gear drive consisting of a phosphor-bronze worm-wheel meshing with a nickel-steel hardened, ground, and polished worm. All thrust is taken by a ball bearing and the entire gear drive is inclosed in a gear case.

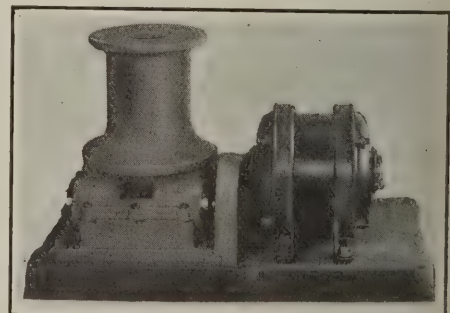
The entire machine is unusually compact, taking up a space of 22 in. by 44 in. The shipping weight of the unit complete with an alternating-current motor is about 750 lb., and with a direct-current motor the weight is approximately 950 lb.

The Model T-5 car puller has a rope pull of 5,000 lb. at 25 ft. per minute and will easily pull two average loaded railroad cars.



Oil Circuit Breaker

A 1,200-ampere, 25,000-volt, three-pole automatic circuit breaker with doors removed from two units and tank removed from one unit, showing heavy contact construction.



Hoist for Car Placing

This little hoist can be fitted either with an electric motor or gasoline engine and is especially suitable for spotting cars under the coal chutes.

COAL AGE

McGraw-Hill Company, Inc.
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Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

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A Near Way to Oil and Coke

TWO problems of the domestic users of anthracite have been driving them to oil, to coke and even to bituminous coal—shortages of anthracite and its occasional poor quality. When a consumer buys coal, much of which came unwashed from some culm bank, he becomes utterly disgusted with anthracite.

Reputable operators declare he should sally forth and find out where he can get, say, Lehigh Valley, Glen Alden, Philadelphia & Reading or some other reputable coal unmixed with fuel of a lower quality. He should canvass all his friends to find out what company is delivering such coal. He should go far afield if necessary and buy his coal from some distant point even if he should have to pay a big price for delivery. Or he should band himself with other neighbors, buy a car-load from a reputable producing company, hunt up a teamster and open a set of books, making charges against, and collecting from, the recipients of the coal.

Perhaps he should, but then, perhaps his time is worth something. Then also he is not sure that he would be able to collect his money promptly and is not confident that he would get thanks instead of blame for his self-imposed activity. The coal may arrive too late or may not satisfy his friends or may be too expensive, being bought at the highest price at which "independent" coal is sold. Then again, the teamster may impose on him or fail to unload the coal promptly causing him to pay demurrage. The unloading will be expensive for he has no facilities for doing it. There are no scales, perhaps, convenient on which the coal can be weighed. So he decides not to make the attempt.

If he has to look around for a dealer who sells only good coal and is fortunate enough to have it on hand, that probably will take some time which he may not have to spare and when he does he may have to pay a high price for the hauling. As for buying on the statements of friends, that is not quite safe, for in time of shortage many kinds of coal good and bad are sold by the same dealer.

Consequently, he goes to oil or it may be to coke or even in some cases, where that is possible, to bituminous coal. If he puts in the first he has to expend so much for equipment that he is loathe to go back to anthracite. If he buys coke, he finds he has a little difficulty in adapting himself to it, but after a while he is apt to like it and he becomes a permanent coke buyer.

With bituminous coal he will have a little more trouble, perhaps an explosion or so, not severe, of course, but troublesome nevertheless, some annoyance from dust and soot and a few extra fires to light on some cold morning or on a return from a party or a theater. But perhaps he can excuse that because his cost is less and some of the difficulties can be avoided by careful firing, breaking up clinker, wetting down the coal pile and choosing the right kind of bituminous fuel. So he also may be lost to the anthracite market,

for a while at least, for how long depending largely on his location with regard to the anthracite region and on the forbearance of his neighbors.

No matter whether he did right or wrong, that is not the point at all. He did it, and the anthracite market is the loser and mark you! the owner of the unwashed culm bank does not suffer the loss. That individual is not continuously in business. It is the company that looks to stay in the market that loses that trade, not because it has been dishonest but because it has said it was none of its business if other people did fleece the purchaser, because it has said that the buyer should beware and if caught should demand restitution, because it has believed its own bright coal would "shine like a good deed in a naughty world," whereas it did nothing of the sort. Good coal, after a few deliveries of low-quality product, shines only like a "will o' the wisp."

Those Bad Boys of Nova Scotia

PRESIDENT LEWIS' good right palm must itch to spank the reds of the Nova Scotia union district. For years, in that distant corner of unionism, they have been cutting up naughtily. When Lewis spoke they thumbed their noses and threw mud balls at the union king like bad boys on the other side of a creek from their scolding parent. And now they have upset all precedent by refusing to accept a wage advance the organization got for them. Dear, dear, dear! What to do! What to do!

The difficulty dates back almost to the very year in which the independent Nova Scotians in their separate union were induced to join the United Mine Workers. Their independence within the union has grown steadily stiffer. About 1921 it became painful. Bolshevism colored the district so vividly that the miners once voted to join the Red Trade Union Internationale of Moscow, and later withdrew their petition. Toward Lewis, since then, the policy of the district evidently has been: "No matter what he wants; we don't want it."

In November, 1921, when their agreement expired, Lewis urged them to demand a new one; so they did not. Two months later, operators cut wages thirty-seven per cent. Lewis said strike; so they worked. He advised them later not to "strike on the job"; so they did that, too. When the great strike of 1922 started, Lewis wanted them to come out and make it unanimous. They stayed in and dug union coal. In August, when they finally struck, Lewis thought they should demand a return to 1921 wages. They accepted reinstatement of only seventeen per cent of the thirty-seven per cent cut. This left them twenty per cent short of 1921, and they went back to work under contract at \$3.25 a day—the lowest day rate in any union field.

Then, last fall, while Lewis was negotiating with the anthracite operators and publicly declaring the union's belief in the sanctity of contracts, the union miners of

Nova Scotia violated their contract by striking. *That* mudball spattered Lewis good. The MacLachlans and Livingstones of Nova Scotia were viciously happy. "What do you mean by doing such a thing?" Lewis wired. "None of your business" they replied. Mr. Lewis' collar nearly burst. He dissolved their district organization and named provisional officers. These are the ones who induced the operators, Feb. 11 of this year, to raise day men twenty-five and thirty cents, loaders seven cents a ton and pick miners eight cents. And now the district rejects the increase 5,617 to 3,145!

This sort of thing, together with recent periods of violence, makes Nova Scotia a problem for Lewis, the coal operators and the whole industrial fabric of eastern Canada. About the only hope lies in a change of attitude by the men. To bring this about the operators can only pay fair wages, adopt a policy that is stern but absolutely just, peaceful and humane, and stick to it. Lewis, to regain district control and respect for the contracts he makes, might try colonizing Nova Scotia with some of this excess of loyal union men from the United States—if any willing loyalists can be found.

Meantime if the 5,617 anti-Lewis miners were to go on working at the new wage but spitefully scorning the contract, the region would be non-union, and the bad boys of Nova Scotia would have accurately landed another mud ball. Oh for a chance to wield that good right palm!

At Castlegate

UNFORTUNATELY the mines in the Rockies have their own particular troubles or rather they have the troubles of other mines in accentuated form. We may therefore look to them to set the pace for the rest of us. Many excellent practices originated around Castlegate. Many schemes for making mines safe came from those workings, and good plans they were too, though this disaster shows they were not good enough.

The Utah Fuel Co. will have to start over again and earn a reputation by being among the first to protect its mines by adobe or rock dusting. The material is readily available, only too available, most people will say who have traveled through the arid stretches nearby Castlegate with little but adobe in sight over large areas.

Dr. Wheeler said the other night that no one should be afraid of firedamp. It simply won't explode unless the percentage of methane reaches the explosive limit. And so it is with coal dust, it won't explode if every last pile of it is so wet that it will ball in the hand and if the right explosive is always rightly used and if trolley wires don't fall and arc, and if a half a dozen kinds of mistakes aren't made.

Coal dust is perfectly safe, if all precautions are always taken everywhere, but they are not, never were and never will be, so why expect it in any one instance. Resting lives and property on eternal and universal watchfulness when men are known to fail frequently is a senseless gamble with death if better ways are known. Discipline is all very well as far as it goes, but any safety which has to rely heavily on discipline will sometimes fail and if a mine can be made so safe that discipline is rendered less necessary it will avoid startling headlines and be less likely to subject its owners to a staggering loss.

Rock dust is not only a cure for explosions but an active antidote. It will not only prevent them but limit

them if they start. A little breach of discipline that will let them commence will be corrected therefore by the condition of the roadways that such explosions will meet as they travel on their way. Consequently it is a double protection, one half of which, that on the main roadway being subject to ready and easy inspection by everybody. The color of the dust is a reliable guide, and the frequency of the application is a ready matter of record.

It is not an inexpensive cure. However, in Utah it is not so expensive as in some other states which do not have adobe to dust with. And after all a million dollars or more of a loss such as the Castlegate mine sustained is so large that any mere maintenance cost would be years in equalling it. With that in view, rock dusting becomes a saving rather than an expenditure and wise indeed is he who does not omit it.

Small Mines Have Advantages

TO HEAR the statisticians talk, one would think the small mine had never a chance, but with its short haul, its low ventilating pressures and the possibilities of greater co-ordination between its individuals, conditions are not really so perplexing after all, if care has been taken to keep the mine in good operating condition. The small mine does not as a rule have much capital expenditure on which to pay interest. It is usually so located that its drainage problems are not difficult. Given good management the small mine should be able to hold its own, till it gets too much extended, till it becomes that saddest of all mine properties, a big mine with a small capital outlay.

It used to be and probably still is true that many mines continue operating till they reach a certain extension when they become snuffed out from lack of money to provide for the needs of so far-flung an operation. Happy is the man whose mine is nowhere over a mile from the tippie. Some people may be willing to buy a mine on the basis of trackage length but after they have operated it awhile they realize that if they want cheap coal long haulages are not desirable.

Airtight Compartments in the Coal Industry

AS ONE travels around the coal regions he realizes how provincial parts of it are. Perhaps least provincial sections are Pittsburgh and Chicago. Possibly St. Louis might be added. There are sections bound in by mountains with poor means of communication which positively do not have any connection with the outside except through technical literature. The towns in which these secluded people live may be large enough to fill the outsider with interest and respect but the roads leading from them run in only two general directions or they are so far away from other mining sections that technical provincialism is quite marked.

The only cure is in technical reading. First-hand information is not available. The press of business prevents traveling, and neighboring operators do not invite visitors, so nothing remains but the written word. Where social life is well developed, where Rotarians, Lions, Kiwanis, Masons, Elks, Moose and other organizations monopolize the spare moments there is no time for study and the isolation is complete. Still, progress is the word of the hour and more time certainly should be given to obtaining from books and periodicals what fails to travel by word of mouth.

Steeply Pitching Coal Beds, Undercut by Machine, Are Tapped by Slope in Shales Below Them

Seam Gradient 58 per Cent—Coal Does Not Crop Anywhere on Face of Hill Fronting Tipple—Slope Will Not Cut Seam Till It Has Been Driven 2,600 Ft. but a Slant Is Provided to Tap Coal 1,900 Ft. from Portal

BY CHARLES M. SCHLOSS
Denver, Colo.

BACK in the frontier days of the West, "Remember the Alamo!" was the stirring battle cry of the patriot Texans, when, fighting against heavy odds, they annihilated the Mexican forces led by Santa Anna and made Texas an independent nation. Today a new Alamo is being made memorable. In spite of obstacles, and in the face of adverse conditions prevailing in the coal industry, a mining enterprise headed by W. B. Lewis of New York is bringing one of the newest mines of Colorado, the Alamo, into production. The name chosen is reminiscent of one of the most picturesque episodes in the romantic past of the great West.

Careful search was first made for a virgin territory containing a coal equal in quality to that produced by the Oakdale mine—also situated in Colorado and operated by the interests that control the Alamo. Finally a tract of 640 acres lying 16 miles north, and slightly to the west, of Walsenburg was optioned and drilled, with the result that two workable beds of coal 39 ft. apart were proved suitable for mining. The upper bed is 6½ ft. thick, and the lower contains 10 ft. 5 in. of hard bituminous coal believed to be the Cameron seam. The drill holes proved about 18,000,000 tons in the two measures.

In order to develop the mine quickly and place coal on the market in the least possible time, an executive committee consisting of Harry F. Nash, vice-president and general sales agent, E. H. McCleary, general manager of operations, and J. H. P. Fisk, engineer, all of whom reside in Colorado, was appointed. These men had authority to adopt plans, purchase material, and in fact, push through to successful conclusion all construction and development. All this work was done by con-

tract under the supervision of Mr. McCleary and the engineers, Douglas, Corey & Fisk, of Trinidad, Colo.

With the necessary preliminaries attended to, active work was started on Jan. 1, 1923. Since that time a camp has been constructed, mine buildings erected, and five miles of railroad built as a connection between the mine and the joint track of the Colorado & Southern and the Denver & Rio Grande Western which serves the mines between Walsenburg and Tioga, the former terminus of the line.

The water problem at this mine was solved by sinking a well, 11 ft. in diameter, through 45 ft. of quicksand. In this operation a continuous concrete ring with a metal cutting shoe was employed. A flow of 200 gal. per min. was obtained. The well is located a few feet from the power house, and the water is pumped through a 4-in. wrought-iron pipe line, a mile long to an elevated reinforced-concrete tank of 50,000-gal capacity. Ample pressure is thus afforded for fire protection at both tipple and townsite.

The Alamo camp is situated on a hill with the Spanish Peaks towering in the distance on one side and the supposedly volcanically formed Black Hills on the other, in the immediate vicinity. It thus possesses real picturesqueness. The mine is separated from the town by a dense piñon grove, rendering it impossible to see the mine from any part of the town. This physical detachment lends an atmosphere of independence to the camp; the workman at home at the end of the day is not constantly viewing the scene of his labors.

Twenty homes, now completed, are built in two lines paralleling a central plaza or boulevard, constituting one arm of a cross. They represent one-quarter of

FIG. 1
Alamo Mine

This shows the general location of mine and camp. It will be observed that the power house and spray pond are on a point where two arroyos converge. Coal is brought to this plant from the tipple by means of a conveyor line. Although the mine workings underlie the town the mine buildings cannot be seen from it, being obscured by a pinon grove.



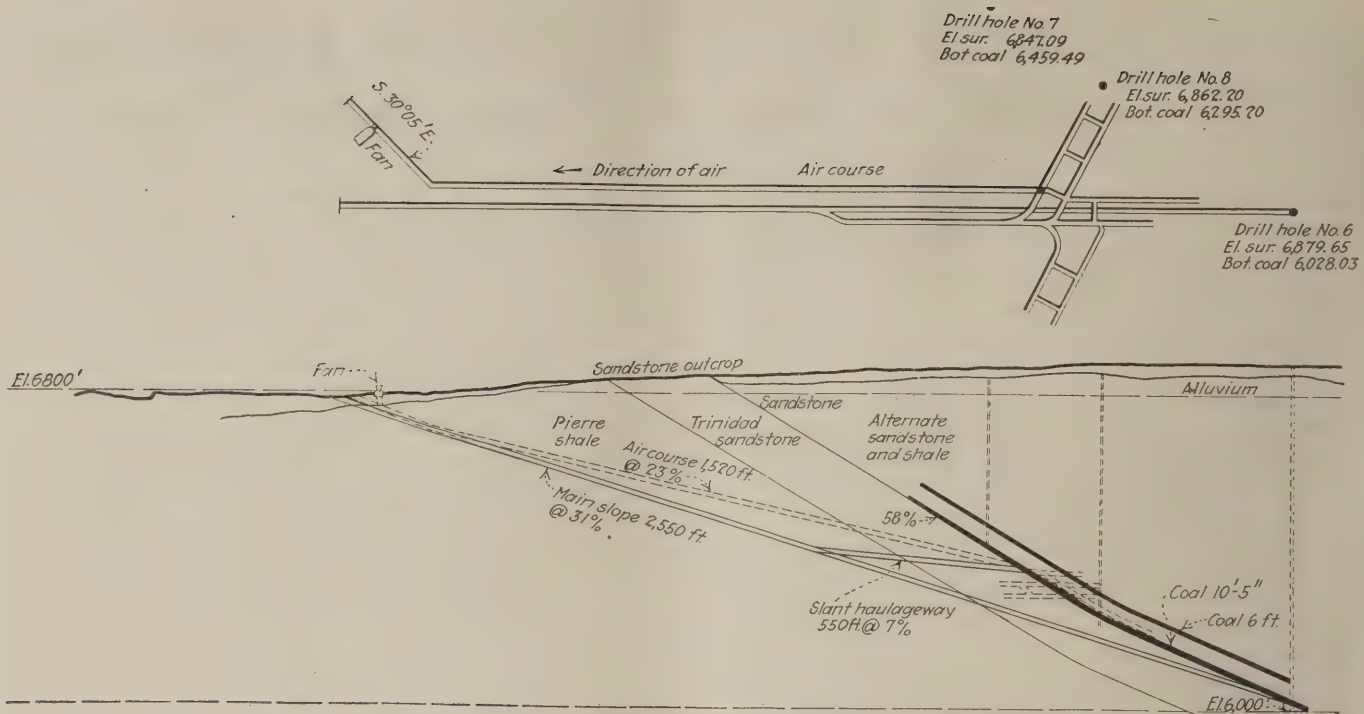


Fig. 2—Plan and Elevation of the Rock Slope, Slant and Coal Workings

The coal pitches under the hill at a 58-per cent gradient, the main slope being driven in the rock underneath it at a grade of 31 per cent. The airway on the other hand is driven at a 23-per cent gradient. A 7-per cent slant haulageway is driven off the main slope 1,300 ft. from the portal, reaching the coal at the same elevation as the airway

the contemplated townsite. All special town structures, residences and other buildings will occupy positions in one or other of the four quadrants. In outside appearance the houses follow the architecture of the world-famous Alamo, as in fact do all the other buildings. Several bungalows of different designs have been erected, all containing four rooms and two closets and all made of cement brick, manufactured by the company at Alamo. This has proven a means of materially reducing the cost of both construction and maintenance.

Because of the position of the coal the underground development is of a most unusual character. The two beds underlie a hill and dip steeply from west to east. The pitch, beginning at the western edge of the deposit, is 58 per cent. This decreases materially, however, as the measures are followed to the eastward under the hill. On the western slope of the hill the coal does not outcrop, but the sandstone which is directly below the coal outcrops several hundred feet above the valley floor where the tippie is located.

From the foot of the hill, the main slope and air course have been driven straight eastward. The inclination of the slope was fixed at 31 per cent so as to tap the under side of the lower seam 2,600 ft. from the portal. The slope is 8x10 ft. in over-all cross section, giving 7x9 ft. in the clear.

The plan called for entrance into the coal at two points. Thus, when the main slope had been driven 1,300 ft. through the Pierre shales, a slant was turned off on a 7-per cent down gradient. This penetrated the stratum of Trinidad sandstone lying above the shales and immediately underlying the coal and tapped the lower coal bed at a point 1,900 ft. from the portal. Thus coal can be produced while the rest of the main slope is being driven. The development of the upper or western, part of the mine is being projected from this slant. These workings are expected to supply the mine's tonnage for the next four or five years.

An aircourse was sunk at the same time as the main slope and on a 23-per cent gradient. This intercepts the coal at the same elevation as the slant. Both passages have been timbered throughout their entire length in the shales with three-piece red-spruce timber sets placed on 5-ft. centers and lagged on top and on both sides.

The main slope is as straight as an arrow, adhering uncompromisingly to the set pitch and direction. Manager McCleary says of it: "There were several days when at a certain hour the inclination of the sun's rays coincided with the inclination of the slope, and the actual sunlight lighted up the face, 1,500 ft. in. The alignment and uniformity of grade will be so exact that this condition will prevail at a point 2,600 ft. from the portal where the coal will be struck."

The pitch of the bed, 58 per cent at the west side of the property, might prove alarming to one unaccustomed to the methods to be employed at Alamo. Many old-timers, when considering the steepness of the pitch, would doubtless say: "That's easy; drive level entries and turn chutes up the pitch." They would fail to take into consideration that the market to be served demands lump coal. Lump commands a high price, but with chute mining, because cutting machines could not be used up the pitch, the coal would necessarily be shot off the solid, and this method of mining yields a relatively small percentage of lump. Consequently, if the coal were mined by chute methods, the income from the property would be small.

It was realized that a better system was available, a system that would yield much greater financial returns. This was the panel system with level cross entries driven at right angles to the slope, butt or panel entries down the pitch and rooms turned on the strike. Cutting machines thus can be applied successfully, and the percentage of lump substantially increased.

It is interesting to know that shortwall machines are successfully operating on this pitch of 58 per cent.

The work done thus far has been the driving of the cross entries on the level and the dip entries on the pitch. The machine sumps in at the lower rib and cuts to the top without appreciable effort. Because of the width of the cars and the 42-in. gage used, the track, though laid near the lower rib, is considerably higher than the lower corner where the machine loads and unloads from its truck. It is no easy task to load it from this depression.

Two machines, a Goodman universal control and a Sullivan Ironclad were purchased. These undercutters operated on 3-phase, 60-cycle, 440-volt current. Both have their reels mounted on extensions from the truck. This is necessary, because the machines are handled by hoisting ropes and the trailing trucks, if used for carrying the reels, would frequently derail when negotiating curves.

Experience in other mines has shown that this is what happens, though it is admitted that trailing trucks are advantageous in flat beds. Operators of the Sullivan equipment use jack pipes to maneuver the machine at the face, whereas Goodman machine runners drill holes in the ribs, set anchors in them to which they hook their ropes, thus avoiding the labor of handling the heavy jackpipes necessary for this high coal.

Hoists placed at the head of each panel slope will gather the loads from the room necks and deliver them to the partings on the level cross entries. Thence, locomotives will pull them to within reach of the main hoisting rope. The panel hoists will be so placed that no rope from them will cross a haulage road. The main hoist, located in the power plant, is rated at 25,000 lb. of rope pull and a speed of 900 ft. per minute. The diameter of the drum is 84 in. and the drum has a 60-in. face—large enough to wind 3,500 ft. of 1½-in. rope in not to exceed four layers. It is equipped with a 96x12-in. wood-lined face, parallel-motion, and oil-operated post brake. This machine is driven by a 600-hp. motor.

The slope track is laid with 60-lb. steel, the level entries with 30-lb. and the rooms and panel entries with 20-lb. rails. The cars weigh 2,800 lb. and hold an average of 5,000 lb. of coal. Being equipped with roller bearings, they are easily moved.

Each pair of level entries will be about 2,600 ft. long and will be served by a separate split of air which will also ventilate the three to four sets of panel entries turned off them. Six pairs of levels will be turned off each side of the main slope. This means that a like number of main splits of air must be provided. A cement-block undercast has been built under the first

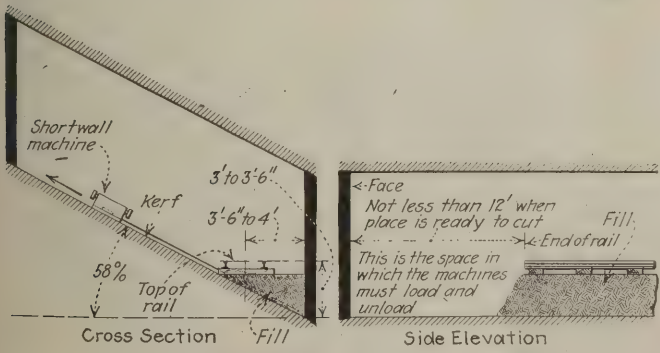


Fig. 3—Section and Elevation of a Room

This shows the difficulties under which the undercutting machines must be operated. Despite these handicaps, which will be at once appreciated by mining men, the undercutters have given excellent satisfaction.

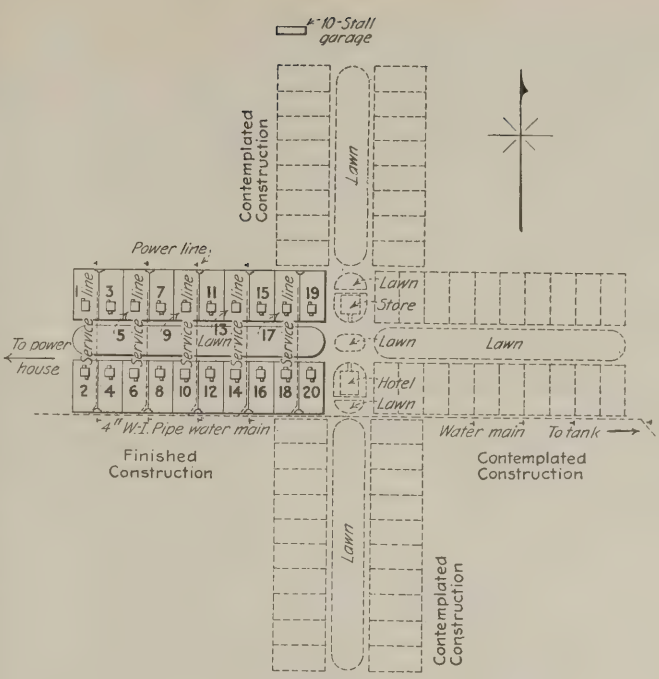


Fig. 4—Alamo Village Laid Out with Grass Plots on Street Centers

Only one arm of the cross has as yet been completed but the entire projected layout is shown in this illustration. It will be noted that a simple, neat and aesthetic design has been attained.

left or north level. This is provided with a concrete roof reinforced with 20-lb. rails and old haulage cable. Because of the heavy pitch of the coal an overcast would have made an impossible traveling way for men and mules. Air is exhausted by a 5x7-ft. multi-blade fan with a capacity of 150,000 cu.ft. per minute against a 2-in. water gage. This ventilator is reversible.

The tipple, built largely according to Mr. Nash's suggestions, was designed so as to provide well-prepared coal. The main hoisting rope pulling over the tipple deck, lands the trip on a car retarder, from which the cars are fed one by one over the scale to the rotary dump, thence into the kickback, and onto the empty track. Coal is fed from the dump hopper to the screen. The small sizes are re-treated in a revolving screen fed by a continuous bucket elevator, and from it deposited in two bins.

Nut and lump pass to loading booms which are hinged and pivoted at the screen ends so that they may move in both horizontal and vertical planes. The discharge ends are carried by 3-ton overhead electric hoists, suspended by trolleys from I-beams spanning the respective tracks. When swung at an angle across the track the goose-necks in the booms permit them to reach over the sides of gondolas and discharge near their bottoms.

If swung parallel to the tracks, the booms discharge to curved right-angle chutes leading to extension box-car loaders, a belt type for nut and a drag type for lump. These loaders reach over 16 ft. into the ends of the box-cars and load with a minimum of breakage. Cars can be filled to capacity at a conveyor speed of 290 ft. per min.

A cement-brick building of Alamo architecture, 60x70 ft. in plan, houses the modern power plant, designed by Wood & Weber, consulting engineers of Denver. The two dominant influences in the design of this structure were the desire for economy in equipment and for a minimum of operating labor cost.

By a rope-and-button conveyor slack coal is transported

from the bin at the tippie across the arroyo to this plant, a distance of about 400 ft. Additional storage of coal is provided by a pit into which this conveyor discharges. When a chain-operated rack-and-pinion gate near the discharge end of this conveyor is opened, the coal drops into a screw conveyor extending across the power plant to small hoppers over the stoker magazines. A centrifugal discharge elevator is provided, to raise the coal in the pit to the same screw conveyor. This feature insures operation of the power plant in case of a breakdown to the rope-and-button conveyor or of a shortage of slack in the bin at the tippie.

The boiler equipment consists of two 250-hp. marine-type water-tube units originally built for the Emergency Fleet Corporation. Both are stoker-fired. Water is automatically maintained at the proper level in the boilers by a feed-water regulator, and the forced draft is automatically controlled. A drag-chain conveyor disposes of the ashes at the rear of the plant.

An electric hoist was considered more economical than a steam-actuated machine under the conditions prevailing at Alamo. Heavy fluctuations in demand on the 600-hp. hoist motor necessitated the installation of a 1,250-kw., 2,300-volt, 3-phase, 60-cycle turbo-generator, rated at 80-per cent power factor. Steam is exhausted

into a jet condenser to which cooling water is supplied from a concreted spray pond. All the water entering this pond is first passed through a softener. Once the pond has been filled with softened water it is necessary to treat only such makeup water as is needed each day.

The complete power plant including not only the boilers but the hoist also is housed in the one large room. To keep the investment down, only the bare necessities of operation have been installed. The economy practised can be appreciated from the fact that the installation cost per kilowatt of capacity including the hoist, was less than \$100. The arrangement is such that additional generating equipment can be added from time to time as needed. For the present, an engine-driven alternator used in the temporary plant employed for construction work, is being moved to the power plant as an emergency unit.

Taken all in all this property is expected to become one of the most interesting in Colorado. Though only the lower bed is to be worked for the present, the upper one contains 6 ft. of good coal and will be entered whenever the time seems opportune. It is possible therefore, that the coal industry of the West, may have occasion to "Remember the Alamo" for a long time to come.

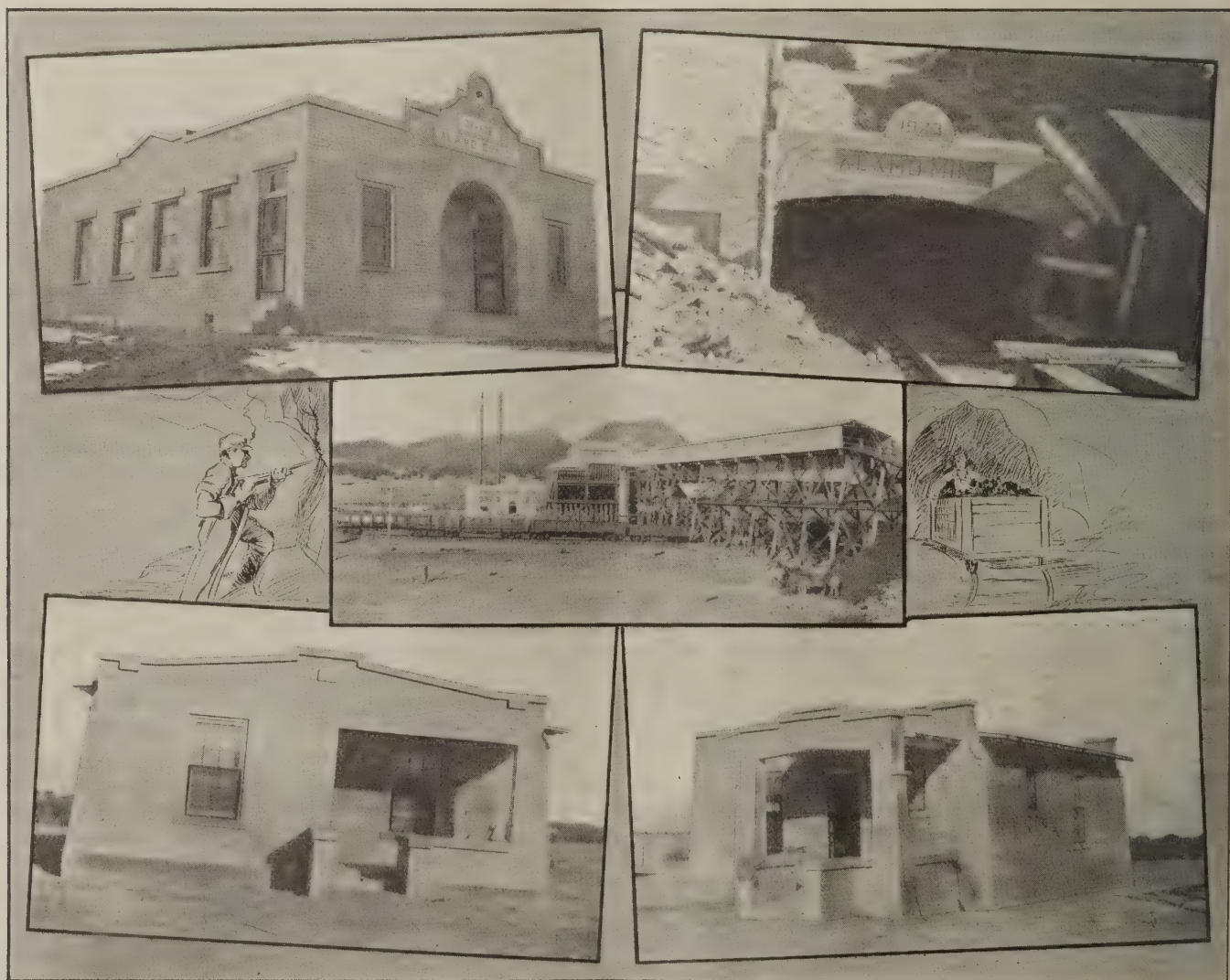


Fig. 5—Everything at Alamo Except the Tippie Is Built of Permanent Materials

At the top, the office and slope mouth; in the center, the tippie, and at the bottom, two bungalows. Concrete, reinforced concrete and cement brick are the materials used. This kind of brick can be manufactured at the mine more cheaply than ordinary brick

can be purchased. Appreciable savings were accordingly effected in house and general construction. Every building in Alamo is of characteristic Mission architecture, simple but effective, the camp as a whole presenting a harmonious picture.



Ormonde Colliery, Butterley Co. near Derby

How Washer at British Colliery Readily Treats Mixed Coals of Widely Varying Character

Coal Up to 3-In. Cube Is Separated Into Four Sizes and Each Size Separately Washed — Adjustment to Suit Any Kind of Coal Readily Can Be Made

BY C. H. S. TUPHOLME
London, England

ARHEO-WASHER designed to prepare 100 tons per hour of coal up to 3-in. cube—the first washer of its kind to be erected in the British Isles—is located at the Butterley Co.'s Ormonde Colliery, near Derby. The unwashed coal from the screening plant is brought by a canvas conveyor, *A* (see Fig. 1), running at 350 ft. per minute and capable of conveying 100 tons per hour. The coal is delivered into the coal storage hopper *B*. Provision also is made to enable coal from other shafts to be washed by installing dumps, *C*, for end-gate cars. These are so arranged that it is immaterial which end of the car is foremost. These dumps each have a separate motor, spur drives to a rope drum which is connected to a block and tackle arrangement which lifts the hinged platform and so tips the car. This method provides a rapid means of emptying cars without the need of clips or damage to the sides of the car.

From the bin for the unwashed product the coal is raised to the shaking screen, *D*, by means of the elevator *E*, which has a capacity of 100 tons per hour. The frame is dustproof and has an adjustable sliding door at the bottom to regulate the feed. The opening and closing of this door sets up enough disturbance in the

bin to prevent the coal from arching and so destroying the regularity with which the coal is delivered to the elevator. The unwashed coal then passes down a forked chute, *F*, having a regulating door to insure equal distribution of the coal to each of the side-by-side balanced shaking screens, *D*, which size the coal into 0 to $\frac{3}{8}$ in., $\frac{3}{8}$ in. to 1 in., 1 in. to $1\frac{1}{8}$ in., $1\frac{1}{8}$ in. to 3 in. With this type of screen the coal has a transverse zig-zag movement down the perforated plate, giving effective screening. Although these screens are working at a considerable elevation above the ground they are so well balanced that it is impossible to detect any vibration of the building.

The various sizes of coal are then delivered from the screens by chutes to the top of their respective bins, each having a capacity of 50 tons. These bins are provided with spiral chutes *G* to prevent any likelihood of breakage.

Following the 0 to $\frac{3}{8}$ -in. coal through the process of washing, the door at the bottom of the bin is opened, allowing the coal to join the flowing water in the top trough. It will be readily understood that in the trough a classification takes place between the shale and the coal, its greater specific gravity and its frictional

resistance to travel, causing the shale to form a bed in the bottom of the trough. It would now be possible to allow the shale to fall through a slot in the trough, but in so doing the suction would cause some coal also to fall with it. To prevent this, an ascending current of water sufficiently strong to eliminate this possibility is introduced in the slot. Considering the installation for 0 to $\frac{1}{8}$ -in. coal as a whole, it will be noted that there are three washing troughs, having in all twenty-four traps.

The velocity of the ascending current at the first two traps on the top trough is such that most of the shale is eliminated, the last trap on the top trough being set to pass a mixture of coal and shale. It will be readily understood that a layer of shale consisting of smaller and smaller particles, extends almost the full length of the top trough, so that all that is required is that the intermediate traps between the first trap and the last on the top trough shall be regulated to suit the condition at their respective sections of the trough. In the second trough the traps are similarly adjusted, but as the quantity of coal has considerably diminished, the shale can be more readily extracted, while in the third trough we have a mixture still containing coal. This mixture is conducted to the rewash elevator *H*,

and raised to the head of the first trough to be re-washed.

The pure shale is collected in a further trough and carried by it to the final shale elevator, *K*, to be dumped into the shale hopper, *L*. By this arrangement some coal is allowed to pass with the shale so as to make sure that all the shale is extracted. This coal is recovered by rewashing. The clean coal passing over the ends of the top and second troughs is conducted to the foot of a slow-running elevator, *M*, having perforated buckets and a capacity of 50 tons per hour, whence it is delivered on to the distributing scraper conveyor, *N*.

To reduce the moisture in the fine clean coal, a new feature has been incorporated in this scraper conveyor. As the coal is scraped along the top plate the resistance to motion causes the coal to be compressed. This squeezes out the water, which passes through a series of perforations. Any coal that may also pass through is recovered, and by means of a chute is delivered to the trough. Then, by means of doors on the lower tray, the coal is distributed to some one of the five storage drainage bins, where it is allowed to drain for a few hours. As is generally understood, it is the particles of clay which tend to hinder drainage from the bin, but by this system this undesirable material is removed in the washing.

To convey some idea of the flexibility of the device, and how readily the installation may be adjusted, this plant has on several occasions washed batches of 60 tons of coal from other mines where the coal has quite different characteristics from that usually washed, and in a few minutes all the necessary adjustments have been made and results have been obtained as satisfactory as when washing the coal of the Ormonde Colliery.

In the treatment of the larger sizes of coal the door at the bottom of the bunker is opened, allowing the coal to join the flowing water in the trough. The classification is obtained in exactly the same way as for the fines, but instead of having three troughs only one is used. The reason for this is that naturally the larger classes of material need a shorter length to take up their relative positions in the bottom of the washing trough, and only two traps are required.

The first trap, *F*, extracts pure shale; the second, *R*, extracts any remaining shale and some coal. This mixed product is then raised by means of the rewash elevator, *S*, to the head of the trough to be re-washed. The shale from the first trap is raised by means of an elevator, *T*, where it is finally discharged into the shale

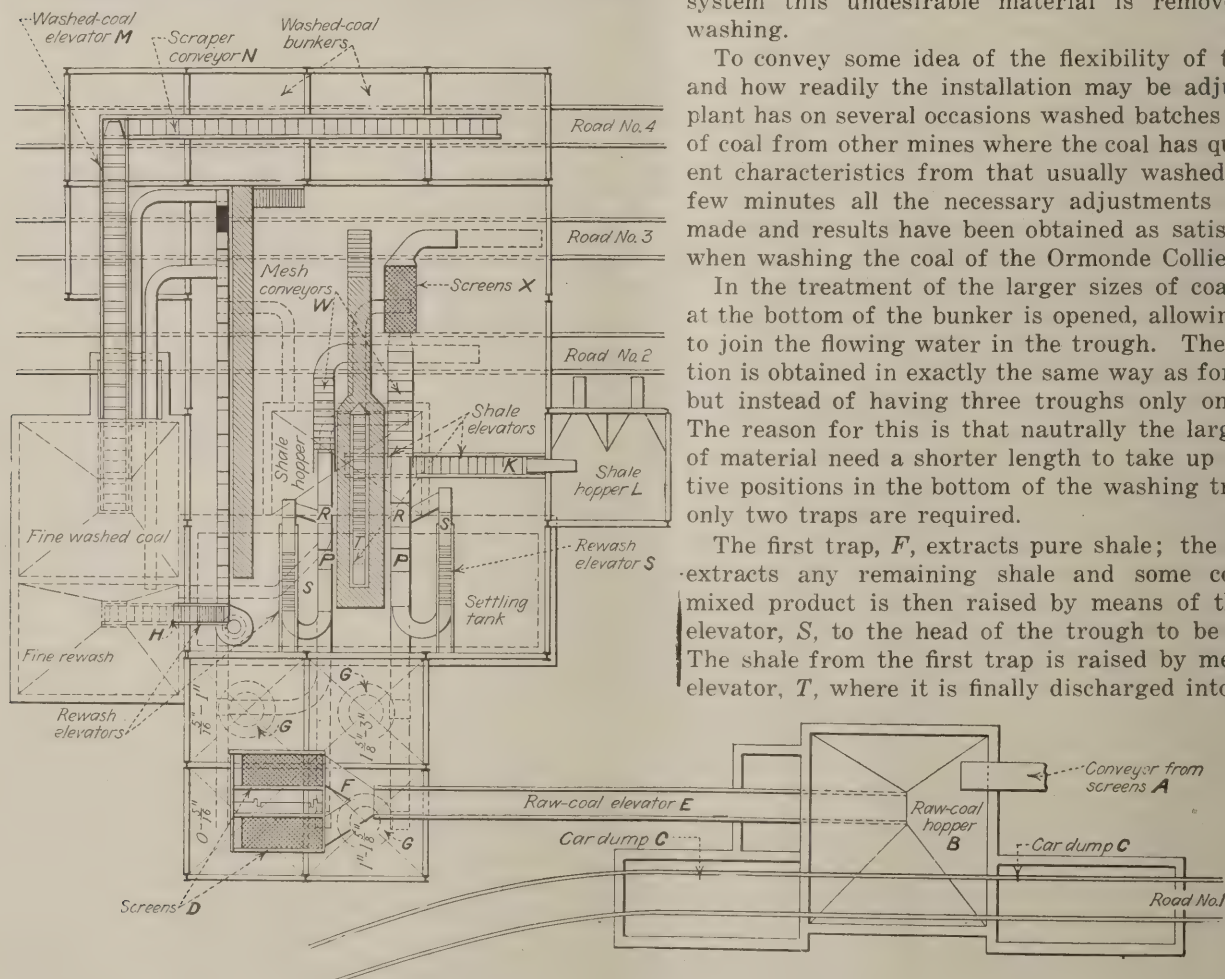


Fig. 1—Plan of Ormonde Washer Showing Treatment by Flow Method, Screens and Bins

Coal enters over a belt at *A* or by way of car dumps *C*, into raw coal hopper *B*. It is carried by an elevator *E* to a chute which feeds two screens *D*. These separate the coal into four sizes. Spiral chutes deliver the coal to four bins, one for each size. The finest size goes to the flow washer on the left. The fine coal is taken off the end, and the shale and rewash coal go to their respective bins. The elevator *H* carries the rewash back to the top of the head trough for rewashing. An elevator *K* raises the shale to the bin *L*. The clean fine coal is raised and drained by elevator *M* and conveyed by scraper conveyor *N* to two

bins over Road No. 4. In the two central flow-washers pure shale is removed at *PP* and rewash material at *RR*. The first is removed by elevator *T* and goes to the shale bin *L*, the second is returned to the top of the upper flow washers by elevators *SS* and re-washed. The fine coal goes to Road No. 2 or Road No. 3, according to the size, being elevated for the purpose in drainage mesh elevators *W*. The larger size is taken to screens *X* for sizing, the degradation coal going thence to the fine rewash tank for treatment on the flow washer for fine coal, the coal being lifted by elevator *H*.

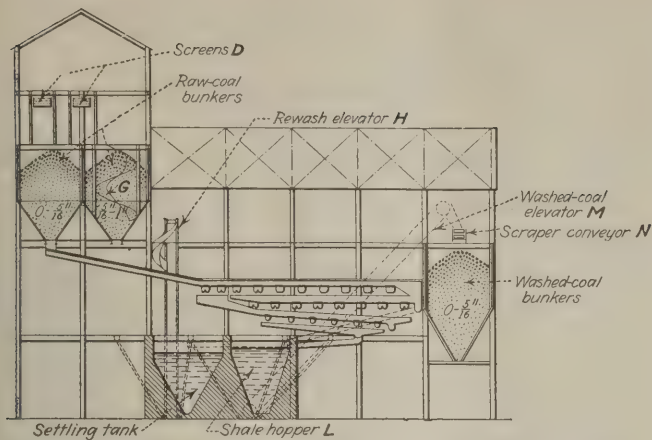


Fig. 2—Elevational Section Through Fine-Coal Washers
This elevation shows the three washing troughs with their twenty-four traps, with the screens D, the raw coal bunkers for 0 to $\frac{1}{8}$ in. and $\frac{1}{8}$ to 1 in. coal respectively, the rewash elevator H, the settling tank, shale hopper L, washed-coal elevator M and washed-coal bin.

bunker. The clean coal passing over the end of the trough is conveyed by means of a drainage mesh conveyor, W, to the small screen, X, where any fine coal is extracted and directed to the foot of the fine rewash coal elevator, H.

The washed coal passing over the screen is loaded directly into railroad cars by means of a telescopic loading chute, Y, as shown in Fig. 1. The Ormonde washery has two washers for the preparation of large sizes which are, with the exception of the screen, quite similar.

From each of the tanks containing shale, fine washed coal and fine-coal rewash, the water overflows to a main settling tank, from which the main circulating pump, having a capacity of 90,000 gallons per hour, takes the clarified water and lifts it to the overhead tank, which provides the constant head of water for both the horizontal flow and the ascending currents.

In this system of washing little or no fine material is

caused by the actual process of washing, but the very fine particles already in the coal, which settle at the bottom of these tanks and of the settling tank, are, by means of flushing valves, collected in a sump. This material, which for the want of a better name is called sludge, is finally pumped and mixed in the tank with the fine washed coal.

By this method of dealing with the sludge the settling tanks do not need to be shoveled out and waste of material is eliminated. The percentage of sludge is small compared with the whole quantity of coal handled. The washed coal is very clean, the total ash content being well within the permissible limit.

The building is of steel, with $4\frac{1}{2}$ -in. brick paneling. The fine washed-coal bins and the unwashed screened-coal bins are of steel, brick filled in cement mortar, and lined with a thin layer of cement. The shale tank and the settling tank are constructed of brick-work in cement mortar and lined with cement. The fine washed coal and the fine coal rewash tanks were made of different materials in order to ascertain which of the two types was preferable as regards efficiency and relative cost. The washing troughs and curved chutes from the rewash elevators are constructed in reinforced concrete. This material is recommended for troughing when the water is of a corrosive nature.

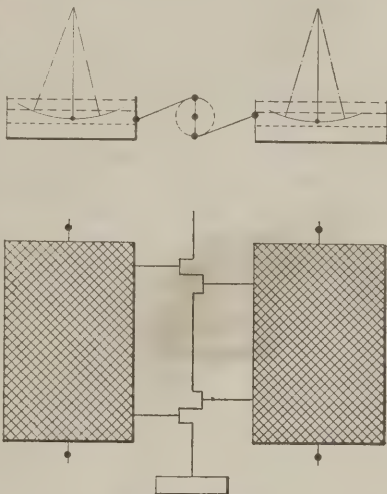
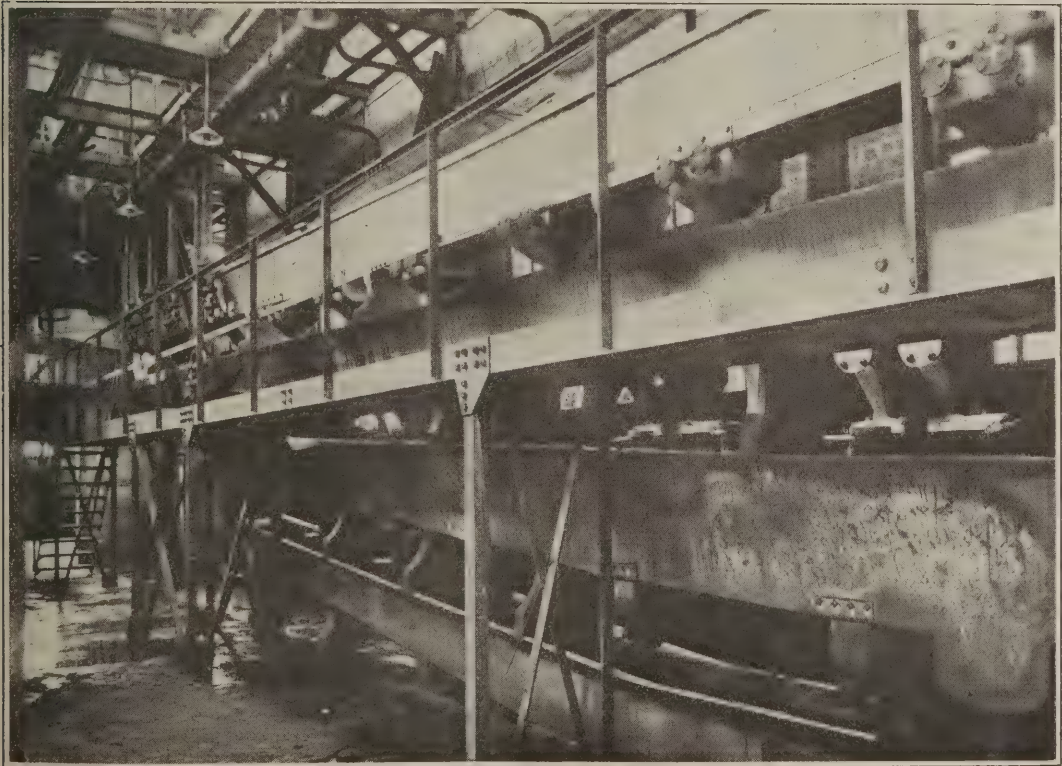


Fig. 4—Screens

Above an elevation, below a plan. The screens swing side-ways and not end-wise which is the usual practice. Vibration is fully counterbalanced.



**FIG. 3
Troughs for
Fine Coal**

The fines are washed along the troughs at varying speeds depending on the specific gravity and shape of the material. Heavy and flat particles being slow fall readily into traps set in their path. A current of ascending water sustains the clean product. Middlings and coal are taken off at some of the traps and passed to the head of the washer to afford a larger quantity of material of a specific gravity greater than coal and less than slate, thus separating the two effectively and aiding in their segregation.

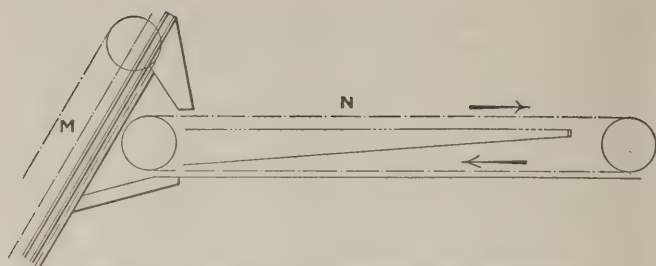


Fig. 5—Draining and Distributing Conveyor

To reduce the moisture in the fine coal a scraper conveyor is used which squeezes the coal through a series of perforations. Any coal which may pass through these holes falls on a chute and returns to the trough, an unperforated chute being provided for that purpose.

The roofs are supported by steel trusses and are covered with slate wired to running single purlins. The floors and gangways are of concrete. Alongside the installation, gantries are provided for inspecting the washing troughs, and for regulating the valves. The elevators, screens and conveyor are sturdily designed, with consideration given to facilities for lubrication, inspection and renewals. Each machine is provided with fast and loose pulleys, and the belts can be shifted from the inspection platforms. Generous walking room and staircases are provided everywhere.

The whole of the plant is electrically driven and is provided with five electric motors having a total capacity of 150 hp., only 100 hp. being needed for normal working of the plant. This is equivalent to 1 hp. per ton of coal washed per hour. The water required to compensate for losses in the coal is 40 gallons per minute. The labor required to attend to the actual washery consists of one man and one boy, two men being needed for the loading of the washed products.

Two different seams of coal are normally washed in this plant, the mixture of which is extremely variable. Sometimes (owing to temporary stoppage of one or the other of the shafts) the washery has to treat either one separately. The characteristics of washability of the two coals, however, are entirely different, the Kilburn coal, for example, containing twice as much dirt as the Low Main, and the pure coal of the former seam having a greater specific gravity than that of the latter.

In spite of the difficulties enumerated, the percentage of free coal contained in the shale varies between 0.9 and 1.7 per cent only and the total ash in the washed product has generally not exceeded 2 per cent above the fixed ash of the coal, although the sludge has been continuously mixed with the fine washed product.

One of the most striking properties of the plant is its capacity for reducing the percentage of pyritic sulphur. The total sulphur in the raw material is approximately 1.6 per cent, whereas in the washed product it is reduced to 1.11 per cent.

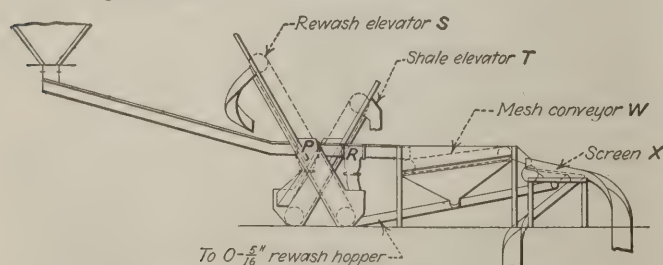


Fig. 6—How the Coarse Coal Is Washed

Only two traps are provided and neither have any ascending water. They take off rewash and slate respectively. The rewash goes back to the head of the trough and is put through the process a second time. The screen sends any undersize that may be formed back to the fine-coal washer. Some also goes through the mesh conveyor and joins the coal from the screen.

The Miner's Torch

Overrating the Value of Education

During the last few months of 1923 most all of the weekly and monthly literary magazines and especially the ones appealing to women, had articles marshalling support to Senator McCormack's proposed amendment to the Constitution designed to give Congress power to regulate Child Labor in the United States.

In most States children are already prohibited from working in mines until they pass the age of sixteen so the amendment in question would have little effect on the employment of children in mines, consequently mining men have paid little attention to the pending bill, but the magazines mentioned reach a large number of homes in mining communities and the possible effect of the magazine articles is worth considering.

Every article on the subject of Child Labor that I have seen starts off something after this manner: "It is no longer possible to suggest argument against the prohibiting of child labor; every objection that can be advanced has long since been proven absurd. Only two plausible reasons for allowing children to toil have ever been suggested. First: Labor is good for children. Second: Some communities need the earnings of the children. The rebuttal to the first is found in the records of our juvenile courts and to the second in banking statistics."

I am in no position to question the records of the juvenile courts and when it comes to banking statistics I am still more helpless, so of my own knowledge I cannot question the arguments put up by the opponents of child labor but of my own knowledge I can say that many of the parents who have been led to believe that education is a broad highway to success for all children may find that they have been misled.

The most pathetic figure that you can find around a mining camp is a hard-working foreman who has come up from the ranks and made a success, in spite of early handicaps due to poverty and lack of education, trying to place a son who has just finished college but who has never been allowed to labor with his hands because he was destined by his father to become an educated man that he might be spared the struggle of his father.

If we can accept the testimony of the men who have made the most conspicuous success of recent years even in the so-called learned professions, at least 75 per cent of the work which they perform consists of wearisome routine and in their capacity for hard work in spite of all of the drudgery we find the secret for all of their accomplishments. What chance then have the sons of self-made men to gain recognition in any profession when they have been led by their fathers to believe that their education will allow them to escape all of the drudgery.

Granting that the ability to apply one's self to hard tasks is at least as important as education, is it exactly fair to allow our homes to be flooded with articles which lead ignorant parents to believe that their sole responsibility to children consists in keeping them in school?

Just a word of caution. If you believe that I am opposed to educating the young, please read again what I have written and be assured that I have not said so.

Lethbridge Coal Field Developing Rapidly

Seam Has Eight per Cent of Moisture and Though It Contains Only Four and One Half Feet of Clean Coal, Its Good Roof, Level Floor and Freedom from Water Make Mining Easy

BY JOHN H. TURNER
Lethbridge, Alta., Canada

LETHBRIDGE is the oldest coal-mining region in the province of Alberta, coal having been mined in that district for more than forty years. The Geological Survey of Canada (1914) is authority for the statement that coal was probably mined at Coal Banks (Lethbridge), Belly River, in 1874, the output being hauled by team to the barracks at Macleod. At that time the coal was excavated from the banks of the river; but, later, a company was formed and a plant erected, which caused the industry to assume greater importance. In 1886, prior to the advent of the railroad, coal was shipped down the river in scows.

According to Dr. Dawson, the coal measures in the Lethbridge district contain several associated seams, only one of which is of sufficient thickness to be worked. That seam was first mined in the banks of the river, the operation being known as the "Sheran mine." Subsequently, the Northwestern Coal Co. operated the same seam on the opposite bank of the river. For the sake of distinction, this will be called the main seam.

During the summer of 1882 the Sheran mine started a small level or drift. Both that mine and the Northwestern Coal Co.'s operation were located in Section 36, Twp. 8, Rg. 22, west of the fourth principal meridian, which is that indicated at the bottom of the accompanying map of the district. Since that time, from twenty-six to thirty mines have been opened in the area covered by the map.

SIX MINES PRODUCE MOST OF LETHBRIDGE OUTPUT

At the present time, twenty mines are being operated in this district, the more important being the following: Galt mine No. 3, capacity 800 tons a day; Galt mine No. 6, capacity 1,600 tons per day, both these mines being operated by the Canadian-Pacific Ry.; Federal mine with a capacity of about 150 tons per day, operated by the C. S. Donaldson Coal Co.; Coalhurst mine, capacity 1,200 tons per day, operated by the North American Collieries, Ltd.; Chinook mine, capacity about 400 tons per day, operated by the Chinook Coal Co. and Lethbridge Coal Co.'s mine with a capacity of from 150 to 200 tons per day. The other fourteen mines are operated at different points on the outcrop along the river bank and streams, but they supply local trade only.

The topography of the district is that of a gently rolling prairie, having an elevation ranging from 3,000 to 3,250 ft. above sea level. The soil is a rich loamy clay, and water is very scarce. As appears in the map, this prairie is cut through by the Old Man River, which is 300 ft. below the prairie level. The river has many branches, some of which extend miles back into the prairie. The river itself at times attains a width of over a mile.

The coal is found at the base of the "Pierre shales," in what is known as the "Belly River" formation. The following table is a typical section of the strata overlying the coal, which may be summed up briefly as

Boulder clay, 128 ft.; a glacial deposit of stratified material, 123 ft.; Pierre shales, 305 ft., beneath which are thin coal seams and shales overlying the main seam of coal. This main seam has an average thickness of 6 ft., but contains only 4½ ft. of good, clean coal.

A small quantity of water was struck in the moist river sand, at a depth of 190 ft., and again in the shales between 442 ft. and 480 ft. in depth. Little water is encountered in mining operations throughout the district.

In Table 2 is given the analyses of coal made recently by the Scientific & Industrial Research Council of the Province of Alberta, as given in its Report No. 5, 1922. The samples of coal analyzed were taken from five of the largest mines in the district. It is noteworthy that the results of these analyses show the coal to be superior to that of other lignite coals now being mined in Alberta.

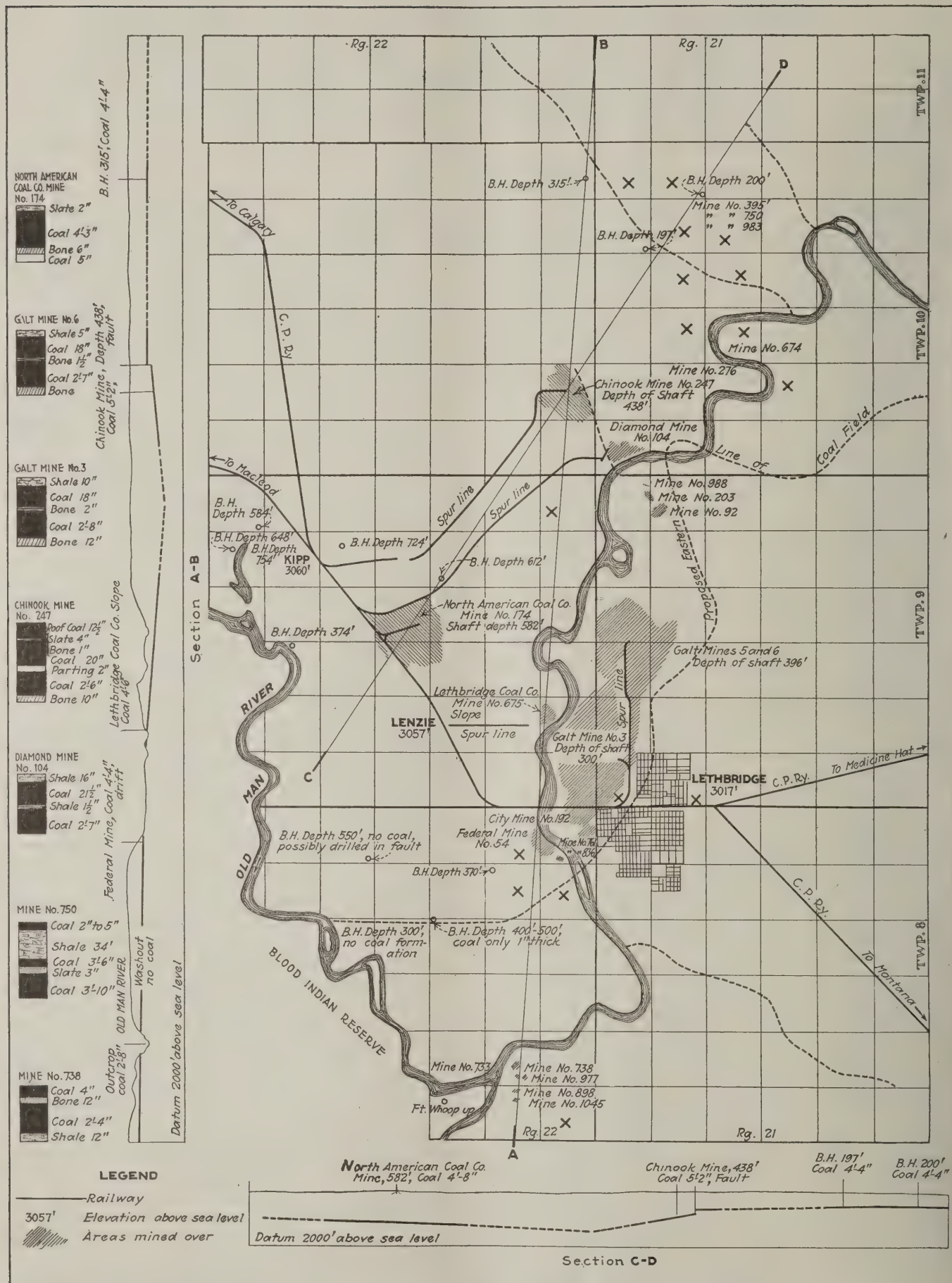
Though slightly undulating, this main seam has a general average dip of from 1 to 2 per cent in a direction varying from N 8 deg. W, to N 27 deg. W, according to the locality. In the southern and western part of the field the undulations conform to the average dip. The thickness of the seam decreases toward the southern and eastern boundaries of the field.

From present indications, it appears that there is a trough or valley that commences at or near the Southeast corner of Sec. 30, Twp. 9, Rg. 21, and extends approximately in the direction N 27 deg. W. It is possible that further exploitations to the North and west of the field may develop a basin in that portion. As indicated on the map by a dotted line, a well defined fault of 80 or 100 ft. lies between the Chinook and Diamond mines. This fault first was located in the former workings. The development there shows the seam to be dipping from 1.5 to 7.5 per cent, in a direction S 60 deg. W, along the northeastern edge of the trough or basin previously mentioned.

It is thought that a greater thickness of coal may develop in the lower levels approaching the center of the trough. An interesting feature of this seam is the generally uniform bearing of the cleats, in all the mines operating in the area shown on the map, as well as in mines to the north, east and south of this area. This bearing varies from S 61 deg. W to S 64 deg. W.

Table I—Section of Strata at Lethbridge, Alta., Canada

	Ft.	In.
Surface drift and boulder clay.....	128	0
White sandy clay with layers of gravel.....	30	0
Very fine loose sand.....	14	0
Gravel and boulders.....	18	0
Moist river sand.....	25	0
Gumbo.....	10	0
Gravel.....	26	0
Shales.....	305	0
Coal.....	0	8
Shales.....	2	2
Coal.....	0	10
Shales.....	20	0
Main coal seam.....	6	0



Principal Part of Lethbridge Coal Field, Alberta, Canada

Though the coal is lignitic it is of relatively high quality. As the field lies to the east of the Rocky Mountains and is level and almost untroubled, which cannot be said of the mines in the country to the West, the Lethbridge field has a distinct place in the geologic economy of the Province of Alberta.

There are many outcroppings of this seam, which I have indicated on the map by crosses.

The map covers only a portion of the whole area constituting the Lethbridge coal field, which embraces in all an area of 156,500 acres. Of this area, 108,000 acres contain merchantable lignite coal of superior quality. At present, little more than 3,000 acres, or 2.8 per cent, of this area has been developed in the forty years of coal-mining operations. In 1886 when, as already stated, coal first was shipped by scows from the Lethbridge field, the total output from the Province of Alberta was only 43,200 tons of coal, which increased to 1,246,360 tons, in 1916; and 5,976,432 tons, in 1922; and one-tenth of this total output then came from the Lethbridge field.

The report of the Mines Branch of the Province of Alberta, 1919, states that "over 100,000,000 tons of coal have been opened by mining operations, of which only 47,628,498 tons have been actually extracted; the remainder 26,628,770 tons have been lost beyond chance of recovery." The loss of coal mentioned in this report is a serious matter and worthy of the gravest consideration on the part of all concerned. Not only is it a waste of the nation's resources; but it is, also, a source of serious pecuniary loss to the mining industry of the province and is responsible, to a large degree, for the present high cost of coal.

Speaking from the standpoint of the coal operator, loss in extraction means a decrease in the value of assets. To open and mine a given area requires a certain expenditure for development and equipment. This determines the cost of these items per ton of coal mined. If half the coal is lost beyond recovery, it is evident that the return on the capital invested will be reduced 50 per cent. Incidentally, the overhead charges will be proportionately increased and the expense of haulage, drainage and ventilation per ton of coal mined will exceed the normal cost. So down the whole line of expenditure there is an increase in cost, while the income that should be available is reduced, which proves the necessity of enforcing economies in the system of mining with a view of producing cheaper coal.

ADVANTAGES POSSESSED BY LETHBRIDGE FIELD

The Lethbridge field is possessed of several advantages which reduce the cost of mining. Little or no water is encountered in sinking and in the development of the underground workings. Little or no gas is present and practically all the small mines use open lights. One of the large mines in operation for many years, still adheres to the open-flame lamps, others of the larger mines are equipped with electric cap lamps or flame safety lamps. The conditions of roof and floor are fair, which means economy in timber and the cost of upkeep of roads and air-courses.

In general, the mines of the district are worked by some form of the room-and-pillar system. Though on several occasions, modified longwall has been tried without success, it does not follow that longwall is unsuited to the mining of this coal. Eventually, some form of longwall may be found that will be better adapted to the conditions in the district than any yet tried.

Main roads are driven on the face of the coal, two, three and four abreast, at distances of 1,100 or 2,200 ft. apart. From these face entries, butt headings are driven in pairs, 400 or 500 ft. apart. The butt headings are driven to the right and left of the main entries and rooms, from 12 to 30 ft. wide, are turned off each

Table II—Analyses of Coal at Lethbridge, Alta, Canada

Name of Mine	Galt No. 3 Per cent	Galt No. 6 Per cent	Lethbridge Coal Co. Per cent	No. 4 American Coal Co. Per cent	Chinook Coal Co. Per cent
Loss in air drying.....	2.0	1.6	1.4	1.7	1.7
Analysis of Air-Dried Coal					
Moisture.....	8.2	8.4	8.5	8.5	8.9
Ash.....	9.1	10.3	10.0	9.9	11.4
Volatile Matter.....	33.4	32.9	33.3	32.4	33.0
Fixed carbon.....	48.8	47.9	47.7	48.7	46.2
Sulphur.....	0.5	0.5	0.5	0.5	0.5
	100.0	100.0	100.0	100.0	100.0
B.t.u., gross.....	11,140	10,900	10,950	10,900	10,590
Fuel ratio.....	1.45	1.45	1.40	1.50	1.45

pair of butts and driven to meet similar rooms driven from the adjacent butts. The width of rooms and room pillars will vary considerably, the distance, c. to c. ranging from 35 to 46 ft. As quickly as rooms are completed, the room pillars are drawn back, the entry pillars and stumps being removed as each pair of butts is finished.

Compressed-air punching machines are used for undercutting the coal. In some cases, the coal is sheared in the center, with the result that a larger percentage of lump coal and less fine coal and slack is produced. Permitted explosives are employed for shooting the coal. In the smaller mines, horses are used to haul the coal from the face to the shaft bottom. In the more extended workings, horses are used only to gather the coal, which is hauled out of the mine by an endless rope.

HOW SILICA AIDS TUBERCULOSIS.—Dr. W. E. Guy and Dr. W. J. Purdy have been engaged at the National Institute for Medical Research, Hampstead, Eng., in the study of the poisonous properties of colloidal silica, hitherto believed to be harmless. With Dr. E. H. Kettle Dr. Guy has completed and published studies of the effects of silica dust upon the tissues with special regard to the problems of industrial tuberculosis. These inquirers have made a thorough investigation of the experimental basis of the treatment of tuberculosis with soluble silica, which some have recommended. They have found says the *Colliery Guardian* that colloidal silica fed to or injected intravenously into susceptible animals has no influence on the progress of tuberculosis; the only effect it has is to localize the infection where the lesion caused by silica—soluble or insoluble—is such as to provide a *nidus* in which the tubercle bacilli, protected from the bactericidal defenses, possessed by the normal tissues, can initiate progressive damage. Thus a small dose of bacilli given with silica becomes in effect a large one, and the infection becomes firmly established.

TRAPPING FLAT PIECES OF SLATE—Screens and rollers have been installed in Great Britain with corrugated surfaces. These set flat pieces of material on edge, thus allowing them to pass through holes edgewise, the rounder pieces passing over the top of the corrugations or on the top edge of the rolls. This effects a separation of shaly material from the rounder coal. The separation was not complete so far as the shale and small coal was concerned, but it insured the larger coal being practically free from loose shale and the extracted mixture containing a large percentage of rock could be dealt with by other means.—Cecil Bentham at the meeting of the Manchester Association of Engineers.

Deputy Chief Walker Describes British Mine Laws, Emphasizing Points of Difference

Firebosses Inspect Places for Gas Three Times Daily—Timbering Methods Prescribed by Division Inspectors—Inspect Mines by Sample—More Dangerous Mines More Frequently Visited—Thorough Wetting Costlier than Rock Dusting

QUANTITY of air rather than quantity, regulation of timbering by the inspectorate, and instruction of mining novices by experienced men are three important features in the British mining law which Henry Walker, deputy chief mine inspector, Great Britain, described on the evening of March 4 in an address on "Engineering and Safety Problems of the Coal Mining Industry of Great Britain," at a joint meeting of the civil section of the Engineers' Society of Western Pennsylvania, the Pittsburgh section of the American Institute of Mining and Metallurgical Engineers and the Coal Mining Institute of America.

Mr. Walker described those details of regulation in the Coal Mines Act of 1911 which differ most from those in force in the United States. A fireman (fireboss) must examine all places in his district before his men go to work. Twice during the shift, in the morning and afternoon, he must make a like examination. Mr. Walker believes more firemen should be employed and the mines divided into smaller districts. By such means, he believes many accidents will be prevented, especially those resulting from roof falls.

Col. Edward O'Toole, general superintendent of the U. S. Coal & Coke Co., has a similar point of view. His success in reducing accidents by dividing a mine into small districts under the supervision of assistant mine foremen was detailed by Howard N. Eavenson at a meeting later in the week.

MUST WORK TWO YEARS UNDER EXPERIENCED MAN

In England unskilled workmen must work for at least two years under the direction of skilled miners, at the end of which time they are rated as "experienced" men. No skilled miner is allowed to supervise the work of more than one novice.

"Half of our accidents are caused by falls of roof," Mr. Walker remarked. "Consequently, all working places are required to be adequately supported by rows of posts or chocks. The intervals at which these are spaced usually are specified by the division inspector. As a rule, the intervals are less than those allowed in the United States. The row of supporting timber must be placed no less than 4 ft. from the face."

An "agent," one who represents a coal company and is superior to a mine manager, must have the same qualifications as the latter, if he has any authority as to the manner in which the mine is conducted. That is, he must hold a first-class certificate. While this might work a hardship on a number of our higher coal-company officials, such an act in this country would prevent not a few mine disasters.

Mr. Walker said that in Great Britain the mine ventilation must be adequate to give the right "quality" of air regardless of volume. S. A. Taylor reviewed the origin of those provisions of the mining law of Pennsylvania relating to the quantity of air required for ventilation. At that time, it was held that the

average man breathed 9 cu.ft. of air per minute. A margin of safety was established by requiring enough air to be pumped into non-gaseous mines to furnish 100 cu.ft. of air per minute to each man, and in gaseous mines, twice that amount. In late years this margin has been increased.

Mr. Taylor said he believed that quality should come before quantity, contending that air at a high velocity stirs up coal dust, increasing the risk of an explosion from this source. George S. Rice, of the U. S. Bureau of Mines, said that lessees of government-owned coal lands in the west must comply with a federal law specifying "quality" in ventilation.

The discussion then turned to the regulation of hoisting equipment. Prof. Fred Crabtree asked if hoisting equipment was examined every week. Mr. Walker said that it is examined daily. That the English law is one-sided in this regard was revealed in the answer given Graham Bright's interrogation as to what precautions are taken to control a hoist, should its operator suddenly become incapacitated. Regulation covers only precautionary overwinding equipment. Safety catches are not used to stop a cage in the event the rope breaks. Prevention of accidents from this source is dependent upon rope inspection.

WILL COLLABORATE IN SAFETY INQUIRIES

A spirited mine-safety conference was held all day, March 6, in the assembly room of the Pittsburgh station of the U. S. Bureau of Mines. A. C. Fieldner presided. Dr. H. Foster Bain, Director of the Bureau of Mines, outlined the purpose of the British representatives in coming to this country: To promote the proposed international co-operative research into safety in mining which they themselves had proposed. Dr. Bain hopes that each country will manage to send representative research men to the other's experimental stations to form a close contact in the work planned by the two organizations.

"The Mines Inspection Department of Great Britain" was the subject of a talk by Henry Walker dealing with the organization and duties of the department of which he is the head. Inspections of mines are made without notice. Contrary to the American practice, an English inspector is not required to examine all parts of a mine. Usually he visits one section and takes its condition as a criterion of that of the entire mine. If suggested corrections are not made between visits of an inspector, the Mines Inspection Department may delegate two inspectors to make a joint inspection of every working place in the mine.

Failing to observe the recommendations made after the joint inspection, a mine manager is liable to prosecution. This action, however, is seldom taken. In case of difficulty in his problem, the mine manager takes the inspector into his confidence and seldom tries to hide trouble. In turn, the mine inspector co-operates

with him to remedy faults and does not resort to the alternative of prosecution.

In order of rank, the staff of the Mines Inspection Department consists of a chief or deputy (Mr. Walker) and division senior, junior and sub-inspectors. A division inspector has duties and responsibilities on the plane with those of our state mine inspectors, and he may be provided with one or two clerks and an office. Vacancies made by the promotion, retirement or death of division inspectors are filled by competitive civil-service examinations.

Promotion is made on merit and not on seniority. A retiring inspector receives a pension equal to one-sixtieth part of his yearly salary for every year he has served, or he may accept a lump sum equal to a year's salary plus one-eightieth of that earned for every year in service. He may retire with pension at 60 and he must retire on reaching his sixty-fifth year. Salaries are low, and allowances for expenses in traveling are less than actual expenditures.

Miners have the prerogative of appointing two fellow workmen to inspect the mine in which they are employed. Miner inspectors may be delegated to make only one examination of the mine or they may be appointed for a term. In either case, the workman must pay the wages of his representative inspectors. At the end of each day these men must file a report with the management. The managers must submit any unfavorable report to the division inspector. The system gives the miners confidence in the safety of the mine in which they work. J. W. Paul inquired as to the extent of labor turnover in British mines. Mr. Walker said that it was very small. The miners are little disposed to wander from mine to mine.

MINES EXAMINED BY SAMPLE AND WHEN NEEDED

Mines are not inspected on any regular schedule. Those in which dangerous conditions are found are examined more frequently than others. In answer to a question by George S. Rice, Mr. Walker said that the inspector's report was not posted at the mine. "No one," said Mr. Walker, "outside of the inspection department had a right to see this report." When asked his opinion as to the policy of posting reports as is customary in the United States, he replied, "The posting of a report publicly proclaims the inspector's rating of the conditions of the mine at the time of his examination, and may not be a correct statement of the conditions existing ten minutes or ten days later." He does not favor the practice of posting reports. An inspector should not be held responsible for accidents occurring in a mine soon after it is examined, and certainly not at a later period. It was argued, however, that the posting of an inspector's report inspired the miners with confidence.

"Research on Mine Explosion Prevention with Special Reference to Stone Dusting" was the subject of a talk by Dr. R. V. Wheeler, Director of the Department of Mines of Great Britain. In that country, researches are being made to discover something more effective than stone dusting in preventing dust explosions. Coal dust presents a peculiar problem because a small fraction of the quantity usually distributed on the roof, ribs and floor of the mine is sufficient to propagate flame. The rôle of inflammable material in diluting coal dust is parallel to that which ventilation plays in diluting firedamp. Though Great Britain is still studying the action of coal dust under various conditions and



Administration Building, Carnegie Institute of Technology, Pittsburgh

The Carnegie Institute welcomed the delegates from England to its auditorium. The Institute recognizes that it can afford no greater service to the industry than to promote aggressively the campaign for safety in mining. The mine operators and managers are looking askance at the frequency of big explosions and wondering if their fate, misfortune or destiny it is to be the next victim.

is hunting industriously for a substitute, it has decided to rely upon the ability of rock dust to prevent explosions until a better means has been found. Dr. Wheeler is particularly anxious to drive home this purpose, as is evidenced by the fact that he repeated it several times in his series of talks in Pittsburgh.

Included in the study of the ignition of coal dust, three problems have received much attention: (1) The character of coal dust; (2) the character of the mine atmosphere, and (3) the character of the source of ignition. The last problem involves studies of sources of ignition both of short and long duration.

In studying problems relating to the propagation of coal dust explosions, four major factors are given careful consideration. These are: (1) the maximum degree of violence such an explosion can acquire; (2) the effect of restrictions in a roadway (causing turbulence and increasing violence); (3) the effect of air currents on the characteristics of an explosion; (4) the effect of the position of the source of ignition. These are being studied in the attempt to find something to supersede rock dusting, and are not being made because any doubt exists as to the value of following that practice at the present time.

LIGHT-COLORED DUST CONSERVES ILLUMINATION

George S. Rice and Edward Steidle spoke on "Rock Dusting or Stone Dusting as Applicable to American Mining Conditions." Mr. Rice reviewed British methods prior to 1920 when the official law relating to rock dusting was inaugurated and then turned his attention to the practices in the United States. Light-colored rock dust should be used, not only because it aids in underground illumination but also because it enables one to judge with surprising accuracy its percentage in a mixture with coal dust.

The shortcomings of water as an agent to make coal dust harmless compel us to look for a substitute. None better than rock dusting is known. At present only two or three companies in the United States are using this system, but sooner or later the practice must become national. Mr. Rice did not infer protection by rock-dust barriers but by the English method of general distribution of rock dust throughout the mine. The coal-dust hazard, he added, is more serious in this country than in England.

There, practically 90 per cent of mining is longwall

and few of the coal seams are developed by entries, thus avoiding the explosion hazards of narrow places. In this country the thickness of exposed coal is in most cases equal to the height of the entries. The spalling of exposed coal, the absence of rock spillings, the building up of coal in the sides of mine cars and the rapidity of haulage combine to intensify the hazard of coal dust as compared with that in England. Mr. Rice frankly admitted that he has no confidence in any method of watering or humidification, because explosions had occurred in mines which took pains to be thorough in the use of water or steam. He is inclined to believe that rock dusting is cheaper than any system of wetting or humidification that rightly may be termed thorough.

ROCK DUSTING SHOULD BRING LOWER INSURANCE

Captain Steidle took the operator's viewpoint in the matter. If rock dusting is cheaper than present practices with a like purpose, then it should be adopted without hesitation. New operations should be protected by it from the start. Compensation insurance ratings ought to be reduced for those mines which use rock dust. "Solid" mine cars and rotary dumps eliminate much of the dust on roadways.

The morning program wound up with a general discussion, started by Dean Holbrook who was interested in the milling and screening of rock dust. Mr. Rice explained that the Griffin roller mills are used more generally in Great Britain than grinding machines of any other type. The hammer-head type is better in the opinion of Dr. Wheeler. He urged that care be taken to detect the wearing of the screens, which, when it occurred, prevented accurate sizing. Centrally located mills on a joint ownership basis will probably be established in the United States. The most important questions for consideration, according to J. T. Ryan, are what materials should be used and how fine they should be ground. The arrangements for grinding are of secondary consideration.

CARBONACEOUS SHALE SHOULD NOT BE USED

Mr. Rice added that shales containing much carbonaceous material should not be used for two reasons: (1) Because the quantity required will be greatly in excess of the quantity needed where carbon-free shale is used, and (2) because the carbonaceous shale does not reflect light as effectively as pure shale or limestone.

Richard Maize asked if water will be used in connection with rock dusting. Mr. Rice replied that it should continue in use, for thereby the air currents will be prevented from carrying coal dust. In Alabama a number of cutting machines are equipped with spraying devices. S. E. Reynolds believes most explosions would not occur if coal dust did not spread. In response to a question by Mr. Maize, Mr. Rice said that though the hand method is probably best, the high labor cost of that method of distribution would inevitably lead to the use of machinery in its stead.

When R. Z. Price asked where rock dust should be spread, Dr. Wheeler suggested that it be placed wherever coal dust occurs. It should be mixed with coal dust in rooms and extended to the face.

The Inland Collieries Co. is beginning to use rock dust in its Indianola mine. T. G. Frear, general manager of the company, related in a few words the steps he is taking. Shale dust injected into entries displaces coal dust on the roof and ribs. A period of four hours

is required for the dust to settle. Some of the dust traveled half a mile. Earlier in the discussion Dr. Wheeler said he attached little importance to the portability of rock dust in air currents.

In next week's issue of *Coal Age* the discussions of the Mine Safety Conference will be concluded by an account of the afternoon session.

Moments of Unusual Danger from Falls

MINING men in America have thought that they noted that at a certain period of the night the danger of falls increased. Unfortunately no one in the United States appears to have made any effort to sustain that belief from reasoning or definite observation. Men are not working in equal numbers night and day, and so statistics of accidents from falls are not evidence of the hazard. In fact, the accident record would tend to prove the night the less hazardous if we did not know that at that time few persons are exposed to the risk.

D. W. Rees in an article in the *Colliery Guardian*, Vol. CXXV., p. 331, recently regretted that more attention had not been given to this subject, seeing that falls in the aggregate killed and maimed more men than explosions. He explains that the earth tilts on an average twice a day and in winter sometimes more often. That tilting is only about one-thirtieth of a second of arc but this, though intrinsically small, corresponds to a vertical movement of the strata of about 60 ft. The figure given is often exceeded, however. One or two hours after midday or midnight is the most likely time to observe this effect.

Mr. Rees declares that miners know as a matter of tradition that a visible and audible effect is produced at these times and that falls which are on the point of occurring are most likely to take place during those periods. He says that fine matter drops from the roof at these intervals, showing that a slight movement of the strata as a whole is taking place, a grinding noise is heard as the roof settles on the packs, and the mine seems to be moving in every part. The greatest effect over a period is produced in March and September, but weighting should proceed at a more rapid rate in winter than in summer.

The author shows a chart showing the relation between the number of unassisted falls and the time of occurrence averaging over the period of one year in a seam with a weak roof. From this can be gathered that an average of fourteen and a half occurred at about 2:30 a.m. and six about 2 p.m. These periods were the two maxima. The night maximum, though higher than the day maximum, is of a duration not in accord with its intensity.

At midnight, about 0.5 falls occurred; at 2 a.m., about nine; at 2:30 a.m., as stated, about fourteen and one half; at 3 a.m., about twelve; at 4 a.m., about six; at 6 a.m., only three; at 8 a.m., less than two; at 10 a.m., a little less than one. Then starts the day maximum. At noon there are two and at 2 p.m. there are, as stated, six; at 3 p.m., about five and a half; at 4 p.m., only three, and thereafter till midnight, never more than one and a half nor less than one half. The author does not state the length of time taken as the basis for these figures, whether a day, a week or a month, nor the size of the mine. He only states that they are averages for one year.

Determining by Volumetric Tests the Quantity of Unmarketable Material in a Coal Seam

Displacement Tank Used to Obtain Volume of the Various Sizes of Coal Shipped—Volume of Coal in Solid Calculated from Mine Maps and Compared with Volume Shipped to Market

BY HAYDN OWENS

A PRACTICAL example of how the mining engineer devises schemes for assisting him in his work occurred when the problem of determining the proportion of waste coal in a certain mine area presented itself to our department. The mine maps were first carefully measured by means of a planimeter, and by applying the thickness and pitch factors, the total number of cubic feet of coal removed from the section was determined. The total tonnages of the various sizes of coal mined and shipped from the area were next obtained, and by means about to be described, their volumes were ascertained. Obviously, the volume of the waste or unmarketed coal must be equal to the difference between the volume of coal originally in the section and the volume of the coal mined and shipped.

DISPLACEMENT TEST MADE OF PRODUCT IN BULK

The real problem in the investigation was the determination of the volume of the coal which had been marketed. Knowing the tonnages of the various sizes of coal shipped and by combining with it the academic principle of water displacement the solution became quite simple.

When a solid body is immersed in water, the volume of water displaced is equal to the volume of the body itself, and by the application of this basic principle we found a means for determining the volume of the coal which had been shipped to market.

The water displacement test was made in a tank which consisted of two uncovered compartments connected by a pipe. If the time consumed in making the test covers an extended period and the material tested is heavy the tank should be lined with sheet iron or constructed of concrete, thereby preventing the interior from becoming worn, and thus enlarged. Should this wear occur, the accuracy of the test would be destroyed. If the material to be tested is not heavy and not liable to injure the sides or bottom of the tank, it may be constructed of wood. In this event well seasoned red cedar, cypress or white pine should be selected. The surface of the wood should be well shellacked and painted, and all joints should be carefully calked to prevent losses by absorption and leakage.

The accompanying illustrations show a well-constructed wooden tank suitable for testing light materials. It is made with a displacement compartment *A*, the bottom of which is lined with sheet iron. A measuring compartment *B* connected by a pipe *C* and holes at *D* and *E* for draining off the water. Each compartment is 3 ft. square, the water flowing from the displacement compartment to the measuring compartment at a point 4 ft. above the bottom of the tank. Therefore, each compartment will hold 36 cu.ft. of water.

To explain the method of conducting a test we will

assume that we desire to determine the volume of a known weight of chestnut coal. After inserting the plugs at *C* and *D* (Fig. 1) the displacement compartment *A* is filled slightly above *C*. When the plug at *C* is drawn, the water drops to the lowest level of the pipe, to wit, 4 ft. above the bottom of the compartment. After the excess water has passed to the measuring compartment and out at *E*, the plug at *E* is inserted and the tank is ready for the test.

Fig. 2 shows a 1,000-lb. sample of chestnut coal which has been dumped into the displacement compartment, its equivalent volume of water having passed into the measuring tank. It is now necessary to determine the volume of the water thus displaced. The depth of the water is measured and found to be 1.18 ft., and the bottom of the tank being 3 ft. square the volume of the water must be 10.62 cu.ft.; therefore 1,000 lb., the weight of the coal, divided by 10.62 gives the weight per cubic foot of the chestnut coal as 94.16 lb. in the solid.

STEEL TAPE BETTER THAN ROD FOR MEASURING

Care should be taken in establishing the depth of the water in the measuring tank, because capillary attraction will cause the water to rise up the sides of any measuring rod that is inserted in it. A good device for this purpose is a steel tape with a plumb bob suspended from a board *F* to the surface of the water, the depth of water being determined by the difference between the distances of the board *F* from the bottom of the tank and from the point of the plummet respectively. To aid the eye in discerning when the plumb-bob point reaches the surface of the water a small quantity of fine dust may be sprinkled over the surface.

To the total tonnages of the various sizes of coal shipped was applied the weight per cubic foot of the respective sizes. This gave the solid content of the coal

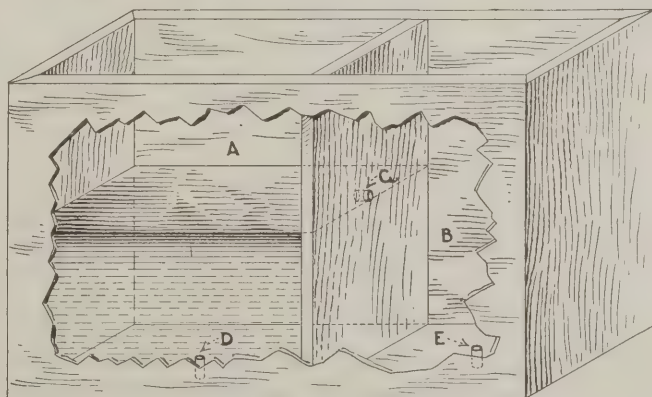


Fig. 1—Isometric View of Displacement Tank

Compartment *A* is first filled so as to overflow through pipe *C* into compartment *B*. This establishes the proper level in *A* making the tank ready for the test.

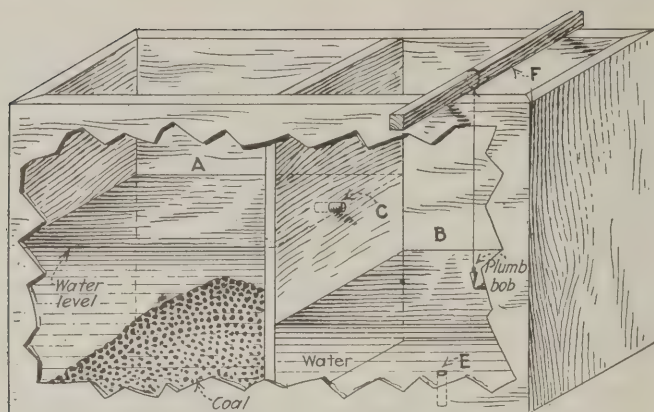


Fig. 2—Making a Volumetric Test of Coal

The coal in compartment A has displaced a quantity of water equal to its volume. The level of the water in compartment B is measured by means of a plumb bob and measuring tape. The height of the water in the tank is equal to the depth of the tank minus the distance measured by the tape as shown.

removed. The difference between the volume of the original coal area in the mine and the volume of the coal shipped gave the volume of the waste.

In Its Coal Era, South Wales Was Folded, Like Pennsylvania, in Two Directions

BY R. DAWSON HALL

Engineering Editor, *Coal Age*

BROADLY speaking, the history of folding movements during the laying down of the Carboniferous measures in Pennsylvania and South Wales has some points of similarity. In South Wales, anticlines and synclines in two different directions may be found. Some run northwest and southeast and some east and west. The latter in South Wales attain "considerable magnitude and at the present time" say Davies and Cox in a paper presented to the South Wales Institute of Engineers "determine the dominant features of the coal field." The two classes of folds appear to have been formed promiscuously, now one now the other. The forces causing one class of fold apparently ceased to act and the forces causing the other came into play only to be replaced later by thrusts accentuating the first folds or perhaps starting others in the same direction.

In Pennsylvania also there are flexures in two directions and it seems probably they alternated, or as Mr. Davies would say, they "oscillated." No expressive word seems available for the relative occurrence of these intermittent, interacting and irregular impulses. One series of Pennsylvania folds has a northeast and southwest trend instead of northwest and southeast as in South Wales. That series is the dominant geological feature. There is also a series running east and west. It is distinctly subordinate to the other and is certainly not the dominating series as is the east and west folding of South Wales.

In speaking about that principality Davies and Cox remark that the later movements might be expected to cause an apparent deflection in the axis of an earlier movement. It might also cause a local thickening to be superposed on a local thinning where to a synclinal axis would cross an earlier anticlinal axis or conversely a local thinning to be superposed on a local thickening due to a later anticline crossing an earlier syncline. However, they say that they are not prepared to state whether this thinning and thickening action is marked enough to be of commercial importance.

Another instance of the value of the displacement test occurred when it became necessary to estimate the capacity for water storage of a partially inundated quarry, conditions being such that it was not easy to survey the area owing to the difficulty of obtaining access to the excavation. In this case, to the record of loose shipments the data obtained from the displacement tests was applied converting the loose material removed into cubic content in the original solid and so the storage area was ascertained.

It would be possible to determine the specific gravity of solids by dividing the weights per cubic foot by the weight of a cubic foot of water. This, however, is not recommended, as only a sensitive balance should be used for this purpose, and the voids in a coal pipe are different for various sizes of coal.

In making a test of coal shipped to market in the manner just cited, the percentages of impurities carried by the coal should receive consideration. The coal should be graded either to conform to the trade allowances or to the averages of the percentages obtained in the tests made by the coal inspector.

By numerous measurements the authors have made maps showing where the intervals between coal beds are of equal thickness. These lines they term isopachytes. They found sometimes in the higher seams a little difficulty in correlating the beds. Therefore pending a more reliable correlation of the seams between the Two-Foot-Nine and Rhondda No. 2 seams it has been found advisable to utilize only certain of the more prominent seams such as the Two-Foot-Nine, Rhondda No. 3 and Rhondda No. 2. Thus in all seven isopachyte maps have been prepared, five of which show the variation in the thickness of the intervals of the strata between the following horizons: Rhondda No. 2, Rhondda No. 3, the Two-Foot-Nine, the Four-Foot, the Six-Foot and the Nine-Foot seams.

It would not serve the interests of the readers of *Coal Age* to go into the details of these variations in thickness of interval. It would seem better rather to point out that this study should be pursued with regard to the coal measures in the United States as much of value geologically would be discovered. There are evidences in plenty of east-and-west synclines in the Kittanning measures and of anticlines which run in the same direction. The buried rivers of the Kittanning period are also more or less of east-and-west trend. The coal in the Middle Kittanning is often found only in such synclines and it rapidly thins as the bottom of syncline is left.

In the Freeports, strange to say, the evidences as of these synclines and the thickening that goes with them is not evident, making it questionable whether the thrust north or south whichever it was continued into the period when the Freeport was laid down. Perhaps as in South Wales it did not persist. This inquiry into the South Wales field would furnish a suggestion for geologists, striving to trace the history of the deposition of our beds, to forecast the direction of the main buried valleys in the Freeport and Kittanning horizons and also to prognosticate the areas in both groups of beds likely to be found most productive of coal. The study may be easier later when the ground has been better proved but it certainly then will be less productive of valuable results, for when the coal is out the indications will have only academic value.

News Of the Industry

Central Pennsylvania Coal Miners Seek Best Scale Obtainable for Three Years

The convention of District No. 2 (central Pennsylvania), United Mine Workers, came to a close March 22, when it was agreed that the scale committee be authorized to obtain the "best agreement obtainable as to wages and working rules on the basis of no wage reductions and for a period of three years." It also was agreed that the salaries of district union officers be increased and that the *Penn Central News*, the official organ of the district union, be abolished. The convention lasted two weeks, and most of the sessions were stormy. Representatives of the miners and operators will meet to negotiate a wage agreement in Philadelphia this week.

The proposal to increase the salaries of district union officials was overwhelmingly defeated on the first vote. On reconsideration strong pressure was brought to bear on the delegates, it being set forth that living conditions and expenses have undergone such changes since the present wages were adjusted that it was no longer possible to make ends meet. When the vote was taken the second time it carried, 441 to 320. The salaries hereafter will be as follows: President, \$300 per month, an increase of \$75; vice president, \$275 per month, an increase of \$75; secretary-treasurer, \$300 per month, also an increase of \$75 per month. Board members will receive \$250 per month, an increase of \$56.

Strike Was Costly to Union

The scale fixed for checkweighmen was fixed as follows: From 25 to 200 miners, \$7.95; 201 miners and over, \$8.50. A resolution also was passed which provides that any member of the union found guilty of assisting any mine foreman to discriminate against an active member of the organization shall be fined \$100 for the first offense and for the second offense shall be expelled for two years and fined \$200.

The report of Secretary Richard Gilbert, which was accepted and ordered filed, shows that the strike in Somerset County, which terminated last August, cost the district, from April, 1922, to December, 1923, \$1,186,915.17.

A long list of resolutions was adopted, of which the following is a brief résumé: Favoring the creation of a permanent national fact-finding agency for the industry; endorsing the work done by President Brophy in forming a plan for public ownership and democratic management of mines; to have asthma classed as an occupational

disease; demanding that shotfirers in gaseous mines possess a state certificate and be able to read and speak English; to have the union employ physicians; that the district officers take out compensation for all local officers and delegates when they attend conventions, and requesting approval by the district officials of all national organizers and field workers sent into the district.

The report of the scale committee was adopted, after being fully explained by President Brophy, during which he declared that all grievances will be taken up at the conference with the operators in Philadelphia and that the union will go the limit to improve working conditions. The report as adopted reads:

"We, your scale committee, recommend to the convention, in lieu of all resolutions relating to wages and working conditions that have been presented, that the scale committee of District No. 2 be authorized and instructed to secure the best agreement obtainable as to wages and working rules on the basis of no wage reductions and for a period of three years.

"The scale committee is authorized to take such action for the protection of our best interests as circumstances may require, and to advise the membership of unexpected developments that may arise and which cannot be foreseen."

The scale committee is composed of John Brophy, Richard Gilbert, James Mark, William Welsh, Patrick McDermott, Harry Crago, H. Elmer Johnson, F. V. McCloskey, Arthur Taylor, Leonard Cluiois, Herman E. Varletto, George Mottey, Peter Ferrara, James H. McCarthy, William Ackley, John P. Nelson, Tony G. Badiale, D. P. Kirk, S. J. Hudunski and William Hoskins.

DuBois was selected as the meeting place for the next convention.

Heavy Union Majority for Jacksonville Agreement

The three-year wage agreement negotiated at Jacksonville last month for the Central Competitive Field will be accepted by an overwhelming majority, according to an announcement at headquarters of the United Mine Workers, Indianapolis. Several days more will be required before all the ballots have been returned and tabulated.

John L. Lewis, president of the miners' union, announced the international executive board would meet April 3 to consider routine matters.

Wyoming Signs Up

The United Mine Workers of America, District 22 (Wyoming), signed an agreement providing for a three-year extension of the existing wage contract without change as to rates or conditions, at Cheyenne, Wyo., March 19. The miners' union had about sixty delegates in session at Cheyenne from March 3 to 19 formulating demands for changes in rates and conditions regardless of the fact that their national organization at the Jacksonville convention and thereafter had approved a renewal of the existing contract without change for three years. The cost of the Cheyenne convention represented a heavy tax on the local unions.

11 Companies Join Coal Field Superpower Plan

Eleven electric-power companies controlling forty stations in five states, capable of developing 2,000,000 hp. and representing a capital of \$315,000,000, have joined in a co-operative distributing system to be known as the Coal Field Super Power Group, according to an announcement March 20 by H. Hobart Porter, president of the American Water Works & Electric Co. The group serves a population of nearly 8,000,000 people in the industrial center of the country embraced in Ohio, Pennsylvania, Maryland, Virginia and West Virginia.

Companies in the co-operative system include the Duquesne Light Co., Penn Public Service Corporation, Potomac Edison Co., American Gas & Electric Co., Cleveland Electric Illuminating Co., Ohio Public Service Co., Penn-Ohio Electric Co., Northern Ohio Traction & Light Co., Penn Central Light & Power Co., Keystone Power Corporation and West Penn Power Co.

Mr. Porter said the cost of electricity would be reduced by many millions annually and better service assured. Labor troubles also would be minimized, he said, for the coal miner would be provided steady work.

This particular superpower group is but one of many growing up in the country. The idea is taking hold in New England, New York, New Jersey, the South, the Middle West and on the Pacific Coast. The importance of the industries served in Ohio, Pennsylvania and Maryland has hastened the completion of plans there, but Mr. Porter stated it as his opinion that eventually all electric power in North America would be linked into one gigantic unit.

Settle Working Conditions but Not Wages at Baltimore

Operators of northern West Virginia and the United Mine Workers had agreed on working conditions but not on a wage scale when the conference at Baltimore adjourned Saturday, March 22, to reassemble Wednesday, March 26.

George C. Brackett, executive vice-president of the operators' association, however, expressed confidence that complete agreement would be reached between the miners and operators after going back home to talk it over.

"All changes agreed upon as to working conditions," Mr. Brackett said, "will tend to more efficient production of coal, better management of the mines and better understanding of the rules by both parties."

Coal Exporters Protest Low Rates on U. S. Ships

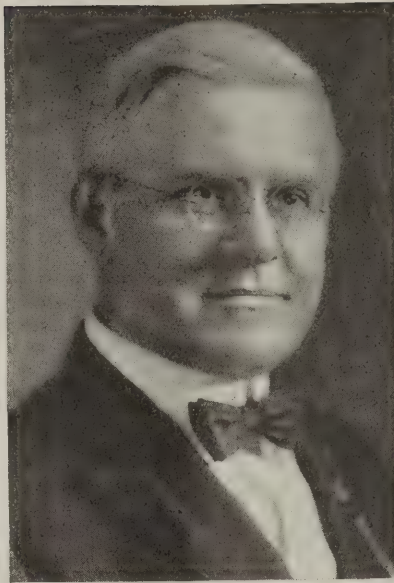
Exporters of coal have joined with shippers of certain other commodities in protesting against the action of the U. S. Shipping Board and the Interstate Commerce Commission, which will allow Sec. 28 of the Merchant Marine Act to become effective May 20. Under that act, the lower rates which are allowed on goods intended for export or on shipments being imported are to be applied only when the consignments are carried on ships flying the American flag.

Since the enactment of the Merchant Marine Act in 1920, the Shipping Board has not regarded the supply of American flag ships sufficiently adequate to justify the application of the provision. The Shipping Board is of the opinion, however, that "adequate shipping facilities now are available to handle the transportation of all commodities, other than grain, between ports of the United States and ports of Great Britain and northern Ireland and the Irish Free State, the ports of Continental Europe north of and including Bordeaux and the east coast of Asia, the islands of the Pacific Ocean, Australia and the East India islands and the ports of Central and South America."

Keeney Acquitted After Trial Lasting Five Weeks

C. F. Keeney, president of District No. 17, United Mine Workers, was acquitted March 15 after being on trial since Feb. 11 charged with having been an accessory before the fact to the murder of John Gore, a deputy sheriff of Logan County. The jury deliberated just an hour and a half before returning its verdict of not guilty.

In the closing hours of the trial it was apparent that the defense relied for acquittal on the evidence it had introduced to show that Keeney acted in good faith when he urged the miners in a speech at Madison to turn back, and that the state relied on the evidence it had introduced to show general



E. J. McVann

Attorney for the Fairmont operators in the Pittsburgh rate case, which will be reopened before the Interstate Commerce Commission April 22.

responsibility for the march as a means of obtaining a conviction.

It has not been definitely determined just which one of the defendants will be tried next. Charges still pending against Keeney include treason, of being accessory to the murder of John Cafalgo and two charges of insurrection. Several charges also are pending against Blizzard. Although Fred Mooney is under indictment with other union officials for alleged complicity in the armed march, he has never been brought to trial on any of the charges pending against him.

Deepwater Co. Buys More Alabama Coal Lands

Several hundred thousand acres of coal and iron lands have been acquired by the newly organized Deepwater Coal & Iron Co. in Cherokee, Marshall, DeKalb, Jackson, Fayette and Tuscaloosa counties in addition to the 500,000 acres already acquired in and near the Birmingham district by the company, according to an announcement by L. B. Musgrove, an official of the company.

This makes the company the second largest in the South in point of holdings and brings the total amount involved in the big enterprise to more than \$30,000,000, he asserted.

Engineers for the Robert W. Hunt Co., of Chicago, will prepare plans and specifications for the developments, mining, construction, building, engineering, etc. This Deepwater enterprise is a Delaware corporation, with an authorized capital of 10,000 shares of 7 per cent cumulative preferred stock of \$100 par value, and 200,000 shares of no par value common stock. L. B. Musgrove, of Jasper, is chairman of directors; Charles A. Meade, of New York, president; John M. Goetchius, Walter Douglas and Morris R. Poucher, of New York, vice-presidents; Charles T. Lark, of New York, secretary-treasurer and counsel.

To Study Operating Problems At Cincinnati Coal Show

A series of discussions of practical operating problems has been arranged in connection with the exposition of coal-mining equipment and machinery to be held by the Manufacturers' Division of the American Mining Congress at Cincinnati May 12 to 17. The coal symposium will last four days, beginning May 13; the program, which was arranged by Ralph C. Becker, Alphonse F. Brosky and H. F. Peck, follows:

"Problems of Mine Electrical Men," Graham Bright, chairman—(1) "Storage Batteries on Cutting Machines and Main-Line Locomotives," R. L. Kingsland; (2) "Advantages of Multiple-Speed Fan Motors," A. B. Kiser; (3) "Savings in Power and Maintenance by Better Voltage Regulation," Carl Lee; (4) "Economy of Equipment Standardization," J. H. Edwards; (5) "Inspection of Electrical Equipment," C. L. Harrod; (6) "Testing of Electrical Equipment," J. F. MacWilliams.

"Necessity for Rock Dusting," D. W. Buchanan, chairman—(1) "Occurrence, Characteristics and Behavior of Coal Dust," J. W. Paul; (2) "Actual Experiences with Rock Dusting," D. W. Buchanan; (3) "Tried Methods of Applying Rock Dust," John E. Jones; (4) "Methods of Procedure," John T. Ryan; (5) "Rock Dust vs. Water," Edward Steidle; (6) "Co-operation of U. S. Bureau of Mines," George S. Rice.

"Safety and More Lump Coal by Proper Use of Explosives," H. C. Adams, chairman—"Tests to Produce More Lump Coal," C. W. Nelson and J. E. Crawshaw.

"Correlation of Mechanical Loading with Haulage and Mining Systems," Howard N. Eavenson, chairman—(1) Review of Progress, D. J. Carroll; (2) "Determining Factors in Application of Various Types," Raymond A. Walter; (3) "Preparation of Mechanically Loaded Coal," Thomas F. Downing, Jr.; (4) "Mechanical Loaders for Rapid Entry Driving," Carl Scholz; (5) "In Connection with Room-and-Pillar Mining," David Ingle; (6) "In Connection with Longwall Mining," R. Dawson Hall; (7) "Relative to Mine-Car Haulage," James Elwood Jones; (8) "Relative to Conveyor Haulage," Everett Drennen.

"Recent Developments in Equipment for Preparation of Coal," Col. Warren R. Roberts, chairman.

New York Dealers Discuss Burning Topics

Presided over by Roderick Stephens, vice-president of the Stephens Fuel Co., the New York City group of the New York State Coal Merchants' Association held a meeting at the Hotel Pennsylvania March 25. Some of the subjects discussed were the economical use of anthracite, new standards in the preparation of anthracite, and coal vs. oil, the latter by George Cushing.

At the banquet, in the evening, Michael Burns was toastmaster, and the speakers were Senator Harrison, of Mississippi, whose subject was "Freedom in Business," and Mgr. John L. Delford, on "Timely Topics."

Conversion of Coal Consumers to Storage Idea Proves Only Temporary

Backsliding Now in Evidence Indicates Off-Season Buying of Last Year Was Dictated by Circumstances Rather Than Vision—Early Slump in Purchasing Presages Trouble for Railroads

By PAUL WOOTON

Washington Correspondent of *Coal Age*

Immediately on learning that the Jacksonville agreement had been signed, coal consumers apparently began to use their stocks. The production statistics and other information reaching the federal agencies concerned with coal indicate that the policy generally being followed is to curtail coal purchases or new commitments to make as large use as possible of these reserves.

Officials who are watching the trend in the coal trade are fearful that consumers are backsliding, if any of them were really converted to the storage idea last year. The real belief is that it was circumstances rather than vision and altruism that resulted in the large storage of last year, making possible the remarkable performance of the railroads during that year.

It is apparent that should the present trend go on unaltered, the railroads will be called upon next autumn to handle a high peak of coal movement at a time when they will be less able than ever before to handle such a contingency.

In 1923 coal consumers regularized their purchases of coal so as to make more uniform than ever before the employment at mines and the traffic burden on the railroads.

The characteristic curve showing coal production starts from a high point in January and drops gradually until May, when it turns downward sharply and runs at a low level until October, when it rushes again into the winter peak. In 1923, however, the curve was unprecedentedly flat. The curve of no other commodity was so free of peaks and valleys. The railroads were delighted. It made possible their premier traffic performance. The only coal that they had to handle during the crop-moving period was the normal production of 10,000,000 tons a week.

Even Movement Forced in 1923

In 1923 there was an unusual combination of circumstances, however, which did much to force the even movement of coal throughout the year. At the beginning of the year stocks were abnormally low because of the preceding year's strike. They were below the safety point. Consumers were well aware of it. They started to build up their stocks with a vim, because of the various uncertainties of the situation ahead. They even bought steadily on a declining market. This is an extraordinary occurrence in any commodity and doubly so when the commodity is coal.

Then just at the psychological moment the Interstate Commerce Commission handed down a decision which abolished assigned cars. It was virtual notice to the railroads that they must protect themselves in the matter of coal supply. They lost no time in

establishing reserves. They accumulated an amount of storage which had been exceeded only in one previous year.

The advent of 1924, however, found the situation reversed. Instead of low stocks, consumers were starting the year with very heavy stocks. Their stocks were above any margin of safety which has been regarded as necessary. The possibility of a strike, however, kept most consumers from drawing on their reserves. As a consequence production continued at a high rate until the Jacksonville agreement was signed. Immediately thereafter shipments began to decline.

The natural time to begin drawing somewhat on the stockpile is at the end of cold weather. This year, despite the continuance of cold weather, the curve has plunged downward far earlier than in the normal pre-war year. It has carried with it the spot price, which is now lower than at any time during 1923. The assumption is that it is going to be very difficult, indeed, to prevent a return to the old policy of living from hand to mouth.

Railroads Can Help Themselves

An unusual opportunity is offered by this situation for the railroads to help themselves and to do a public service. The carriers know better than does anyone else that they cannot handle the bituminous-coal traffic during a year of average prosperity if it cannot be spread fairly evenly over the twelve months of the year. The railroads use 28 per cent of the total bituminous-coal output. If they will concentrate their orders during the spring and early summer and build up as much storage as can be carried reasonably, they can do much to prevent a car shortage next autumn. In that connection the suggestion is advanced that an accounting system should be devised by the railroads whereby the use of cars for company fuel during periods of car shortage should be charged at the rate which the car would have been earning had it not been withdrawn from the commercial haul for which it could have been utilized.

This simple expedient, it is believed, would do much to prevent coal purchasing agents from speculating and withholding purchases for possible lower prices. At the same time it would give the railroads a figure in dollars and cents to bring home to them the losses of revenue which result from having to use large numbers of coal cars for company fuel during a period of car shortage when revenue freight is being denied movement.

It is possible that some plan will be worked out whereby inducements can be held out to consumers to store during the spring and summer months.

Hoover Denies Supporting Open-Price Associations

Commerce Secretary Hoover hit back hard when Samuel Untermyer attacked his proposal to Senator Capper that centralized buying should be legalized so as to meet the menace of foreign combinations in essential raw materials. Secretary Hoover meets the charges in a letter dated March 21 to Senator Capper, in part as follows:

"He knows or should know that his statement is absolutely false when he says I ever supported the so-called open-price associations. I informed him specifically and personally two years ago that he should not repeat this misstatement for it was false, and that I was vigorously opposed to this practice or any other form of price control. I have, in fact, repeatedly advised the business world that it should not be engaged in this practice regardless of whether it proved legal or illegal, because it was against public interest. Furthermore, as a result of the work of this department and the Federal Trade Commission most of these so-called open-price associations have been abandoned.

"He knows or should know that the Webb-Pomerene Act was passed under the last administration for the purpose of enabling American exporters, under regulation by the Federal Trade Commission, to establish joint selling agencies for foreign trade and that the act in express terms prohibits its use for the control of domestic prices or for any restraint of trade within the United States."

Move to Broaden Activities Of Bureau of Mines

Representative Robsion, of Kentucky, chairman of the Committee on Mines and Mining of the House of Representatives, has taken an unusual step in calling upon his committee to consider the broad proposition of how the Bureau of Mines can be made more serviceable to the mining industry. While there will be scrutiny of the existing activities of the bureau to determine whether or not equivalent effort expended in other directions would be of greater practical value, the main purpose of the study will be to find out how the work of the bureau may be expanded to greatest advantage.

It will be recalled that President Coolidge has declared himself to be in favor of a greater Bureau of Mines rather than attempting to create a Department of Mines at this time. In view of that declaration of administration policy, Representative Robsion believes that his committee is in a position to be helpful in determining the lines along which the bureau's activities should be increased. He expresses the personal hope that there may be a decided augmentation of the bureau's work in connection with the safety problem in coal and metal mines.

As this is written, the exact date for the conduct of these hearings has not been determined, but Chairman Robsion hopes to convene them early in April.

A New Kansas Row

The newest row affecting coal down in Kansas is the effort of Governor Jonathan I. Davis to replace James Sherwood, chief mine inspector, with Leon Besson, who was state inspector up to 1913, elected by the miners in the days of the old Society of Miners. The Governor announced the appointment several days ago. But he reckoned not with the Kansas Industrial Court, which declared, March 21, that its approval is necessary before the appointment can take effect, and that it may not approve. Besson is regarded as a radical and a friend of Alex Howat, deposed president of the Kansas district of the United Mine Workers. It is reported that Ernest Shaw, a deputy inspector, may get the appointment as a compromise between the Governor and the Court. Besson's appointment would be a Howat victory.

Georges Creek Miners Accept 8 per Cent Wage Cut

Two hundred coal miners who went on strike March 18 at the Jackson mine of the Georges Creek Coal Mining Co. at Lonaconing, Md., because of a reduction in wages, returned to work on March 20, after a conference with General Superintendent Gerdetz and a general meeting held on March 19. There was extended discussion of the proposed reduction, at the conclusion of which the miners in a secret ballot decided to accept the cut, and returned to work.

Notice of the proposed reduction was posted at the mine on Saturday, March 15. This company, in which Pittsburgh people are largely interested, continued to operate its mine in agreement with the union during the period following the 1922 strike when other mines were operating on a non-union basis, and paid miners the scale fixed by the union, being the only company of any size in the western Maryland field which did so. It was necessary not long ago to effect a reduction, so that the one just announced is the second. It is stated that the second cut contemplates a shift from day wages to the checking system of 85c. a ton. Production has been at the rate of from 10 to 15 cars of coal a day.

The only exception made to the general plan proposed by the company is as to the pay of miners employed in the longwall headings, who will receive a minimum of \$5 per day, eight hours to constitute a day, this eliminating the checking system of 85c. per ton. Otherwise there has been a general reduction.

It is stated by Superintendent Gerdetz that the proposed reduction averages about 8 per cent, applied to all classes of labor. He points out that prices have dropped nearly 30 per cent in the last three months and that the company cannot continue operations unless there is a reduction. He also states that the company has planned to increase its working force to 300 men.

May Evict Striker from Company House Without Notice, Says W. Va. Court

A "rule of property" decision that will establish a legal precedent for the mining industry everywhere in America was laid down in the decision of the West Virginia Supreme Court of Appeals at Charleston, W. Va., last week, in an appeal from an eviction suit.

Under this decision a mine owner may recover possession of his houses the moment his employees quit work, and without the slightest notice to them. He may use necessary physical force, such as knocking down doors or tearing out windows of the house, or may even tear down the house, if he chooses, while evicting a striking tenant who refuses to give up possession of a company house. This decision was handed down in the case of Watt Angel vs. Black Band Consolidated Coal Co., of Kanawha County, which was a test case in the state courts, on the part of the defendant company to obtain the "rule" which has been requested by federal courts when injunction cases are heard.

The syllabus in the case was written by Judge James A. Meredith, president of the court. The decision stated:

The houses are not kept for rent generally, but are occupied only by the company's employees, and then only by its consent. Under these conditions a miner is employed, is furnished a house, he moves in, continues his employment for a number of years, and the deductions for rent are regularly made from his wages every two weeks; he then voluntarily quits work and pays no rent thereafter. There being no agreement that he should occupy the house for any definite period, when he ceased work for the company his right to occupy the house also ceased.

Must Pay for Coal Mined in Federal Land in Alabama

Millions of tons of coal have been mined by individuals from government reserves in northern Alabama, according to federal investigators. G. B. Morgan and J. A. Ramsey, of the Government Land Office, after checking all available records in Montgomery and Birmingham, are now in Jasper, Ala., winding up the inquiry.

The inquiry covered 75,000 acres, and the investigators reported infringements on some of the most valuable coal lands in the state. It was announced that all the alleged trespassers will be given opportunity to settle amicably by paying the government for the coal taken. Otherwise suits will be instituted, it was stated.

The object of the investigation, according to Morgan and Ramsey, is not only to stop trespassing and collect damages due the government but also to take steps to insure protection of government reserves in the future. The government in years past has transferred many acres to the state government, but has always reserved mineral rights. The inquiry chiefly concerns this land.

More Illinois Mines Sold

Two more sales of Illinois coal property were completed last week. The Harrisburg Colliery Co.'s Harco mine was bought by C. E. Karstrom, representing other interests, and the two Newsam Brothers mines in the Peoria field were purchased by the Crescent Coal Co., of Peoria. The Harco mine, a 4,000-tonner and one of the leaders in Saline County, has been eyed with interest for many months by various Saline County interests, including Big Creek Coals, Inc. The titular purchaser, Mr. Karstrom, vice-president of the Shoal Creek Coal Co., was vice-president of Big Creek Coals until 1920. The purchase and operation of this mine by Mr. Karstrom does not change the name of the Harrisburg Colliery Co. and is not regarded as interfering seriously with a probable consolidation of the principal Saline County companies several months hence.

U. S. Steel Coal Output Jumps 42 per Cent

Coal mined by the United States Steel Corporation during the year ended Dec. 31, 1923, totaled 35,289,901 tons, an increase of 11,996,430 tons over the production in the previous year. Of the coal mined, 28,234,030 tons was used in the manufacture of coke and 7,055,871 tons was used for steam, gas and all other purposes. During the same twelve months 18,837,631 tons of coke was manufactured, of which 11,694,730 tons was produced by byproduct ovens and 7,142,901 tons was manufactured in beehive ovens.

During the year \$12,749,606.03 was expended in maintenance and replacements on the coal and coke properties, as compared with \$8,084,895.73 in 1922, an increase of \$4,664,710.30.

Capital expenditure on the coal and coke properties during the year were \$8,079,269, of which \$461,958.84 was expended for the acquisition of 2,073 acres coal lands in Fayette, Mercer and Greene Counties, Pennsylvania, and in Vermilion County, Illinois, and for 339 acres surface land in Fayette County, Pennsylvania. In the Connellsville district for facilities to increase the output of coal and for underground transportation \$3,688,250.26 was spent.

The corporation employs 33,354 persons on its coal and coke properties, as compared with 26,856 persons in 1922.

In the western Pennsylvania fields \$4,989,776 was expended in the opening and development of new coal operations.

The corporation spent \$1,763,417 during 1923 for accident prevention and safety work, as compared with \$1,175,171 in 1922.

The northern coal and coke property of the corporation comprises 252,908 acres of coking coal and 183,756 acres of steam and gas coals. The southern coal and coke properties consist of 171,617 acres of coking coal and 170,398 acres of steam and gas coals.

New England Dealers Assail
Badly Prepared Anthracite

The New England Coal Dealers Association held its annual convention in Boston on March 20 and 21 with a record attendance. Horticultural Hall was converted into something like a modern coal yard for the two days, and many of the latest appliances for handling coal were installed for exhibition purposes. Mechanical devices for scooping, loading and unloading were shown by the manufacturers, connected with electric power in the hall or operated by their own motors. The two leading coke producers of New England occupied large areas and there also was an exhibit of bituminous coal that had been chemically treated for domestic use. There were numerous belt loaders on exhibition, and dump wagons, coal trucks of many kinds, and a new type of bucket loader made up the rest of the equipment that was of special interest to the visiting coal men.

W. A. Clark, of Northampton, Mass., was elected president for the 12th year, and G. A. Sheldon, of Greenfield, Mass., and C. R. Elder, of New Britain, Conn., were respectively re-elected treasurer and secretary. Those elected vice-presidents were J. Calvin Miller (Maine), H. A. Osgood (New Hampshire), N. E. Pierce (Vermont), E. A. Wilson (Massachusetts), G. L. Miner (Rhode Island), and J. B. Gregory, Jr., (Connecticut). R. S. Hays, of Newport, R. I., and Herbert C. Edwards of Lewiston, Me., were elected to vacancies on the executive committee.

The feature meeting was on Friday afternoon, when a vigorous resolution was adopted conveying the dealers' "most urgent request to the anthracite producers that a more uniform and satisfactory standard be established and maintained." The preamble to the resolution declared that "the complaints of the public during the post-war years have convinced us that there must be abnormal impurities in anthracite," and "though we know that properly prepared anthracite is the most economical of fuels, the public will purchase any substitute for poor anthracite at present prices."

The convention then tabled another resolution in favor of limiting anthracite to two sizes, acclaiming the statement of a member of the resolutions committee that "the condition of the coal business is badly enough upset now, due to the bad quality of coal, without upsetting it more by changing the sizes."

There were two interesting addresses the same afternoon; one by Walter D. Rogers, executive secretary of the National Retail Coal Merchants Association, on "The Retail Coal Dealer at Washington," and the other by J. M. Dunphy on "The Small Anthracite Coal Problem and Its Solution," with special reference to the pyramid grate.

E. S. Brooks Dies at 66

E. S. Brooks, vice-president and general manager of the Union Pacific Coal Co., died at his home in Rock Springs, Wyo., March 17 of heart trouble at the age of 66. He became

Utah Miners Not Afraid

There is no superstition among Utah miners to make them hesitant about working in the burned-out No. 2 mine of the Utah Fuel Co., at Castlegate, in which 173 men were killed March 8. Possibly it is because many Utah miners want a chance to earn a living. Possibly it is because they want to work for a good company. But for whatever reason, more than 200 men outside the company's employ have already applied for jobs to replace the 173 dead men, and more applications are coming in.

superintendent of the company's mines at Hanna, Wyo., in 1894. In 1906 he was made superintendent of the anthracite mines of the Southern Pacific Ry. Co. in old Mexico and in 1911 took charge of the Washington Union Coal Co.'s Tono Mine, in Washington. Since 1920 he had been at Rock Springs in charge of the Union Pacific mines.

World Coal Output in 1923
Near High Mark of 1913

World's total production of all coal in 1923 was approximately 1,335,000,000 metric tons, according to the Geological Survey, but information is still incomplete. In comparison with the preceding year this was an increase of 112,000,000 tons, and it was but 7,000,000 less than the output in 1913, when the high record was established. The principal factor in the improvement over 1922 was an increase of 34 per cent in the production of all coal in the United States. All countries listed, however, with the exceptions of Germany and Japan, showed increases and the output by France was but 3,000,000 tons below the pre-war level. The

E. J. McQuail Ends Life

E. J. McQuail, chief executive of the Turkey Gap Coal & Coke Co., the Coe Pocahontas Coal Co., Ennis Coal Co. and American Coal Co., residing at Bluefield, W. Va., committed suicide March 24 by blowing out his brains with a pistol. No reason can be assigned for the deed. Those who were with him shortly before the act state that he was in his usual frame of mind and noted nothing out of the way.

Mr. McQuail was the son of William McQuail, who came to West Virginia from Shamokin, Pa., thirty-five years ago and opened up the mines of the Turkey Gap Coal & Coke Co. at Ennis. Upon the retirement of his father from active business about five years ago Mr. McQuail became the executive head of all the McQuail interests. He was about forty-five years of age, enjoyed good health, happy family relations and his coal companies are considered among the soundest of any in the state. James A. McQuail, of Mercer County, West Virginia, and Ennis McQuail, of Philadelphia, are brothers of the deceased.

world's output in 1923 was 16,000,000 tons larger than in 1920, an increase that was largely due to recovery in the production of the United Kingdom, France, Poland and Russia, which more than offset the decrease in the United States.

It is of interest to note the tremendous decline in the production of coal in Germany. According to a report by the German Imperial Coal Council, published in the *Colliery Guardian* of Feb. 1, 1924, the output of coal was 55,000,000 tons, a decrease of 58 per cent from production in 1922. The production of lignite also declined and totaled approximately 125,000,000 tons, a decrease of nearly 10 per cent. The report attributes the decline to the economic disorders that attended the occupation of the Ruhr.

Coal Produced in Principal Countries of the World in Calendar Years 1921, 1922 and 1923

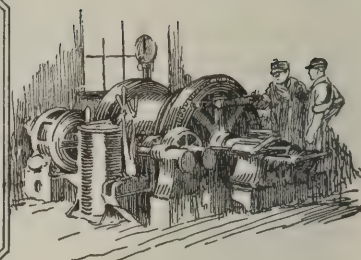
(In metric tons of 2,204.622 lb.)

Country	1921	1922	1923
North America			
Canada { Coal.....	10,684,259	10,587,611	15,542,294
{ Lignite.....	2,975,598	3,162,907	
United States { Anthracite.....	82,076,000	49,607,344	86,585,000
{ Lignite and Bituminous.....	377,316,000	383,073,174	494,772,000
Other countries.....	(a)	(a)	(a)
South America.....	2,040,598	1,917,493	(a)
Europe			
Belgium.....	21,750,410	21,208,500	22,916,070
Czechoslovakia { Coal.....	11,648,399	9,906,261	11,624,748
{ Lignite.....	21,050,712	18,942,920	16,202,496
France { Coal.....	28,211,839	31,163,032	37,714,393
{ Lignite.....	748,634	777,813	862,422
Germany { Coal (b).....	136,227,231	129,964,597	55,000,000
{ Lignite.....	123,010,036	137,207,125	125,000,000
Saar.....	9,574,484	11,240,000	8,950,000
Poland.....	7,842,533	23,800,000	(d) 37,000,000
Russia.....	7,611,900	8,914,600	11,707,200
United Kingdom { Great Britain.....	165,781,404	253,613,054	282,970,535
{ Ireland.....	89,958	(a)	(a)
Other countries.....	(a)	(a)	(a)
Asia			
British India.....	19,612,759	19,316,112	(d) 19,000,000
China.....	19,876,375	21,300,000	(a)
Japan (inc. Taiwan and Karafuto) (c).....	27,418,000	29,150,000	28,000,000
Other countries.....	(a)	(a)	(a)
Africa			
Union of South Africa.....	10,339,044	8,830,774	10,800,000
Other countries.....	(a)	(a)	(a)
Oceania			
Australia.....	13,084,210	12,496,417	(a)
Other countries.....	(a)	(a)	(a)
Total.....	1,132,400,000	1,223,000,000	1,335,000,000

(a) Estimate included in total. (b) Of which the Ruhr produced as follows: 1921, 94,114,785 tons; 1922, 97,346,176 tons; 1923, 40,000,000 tons. (c) Exclusive of lignite from Japan (annual production of about 200,000 tons) for which estimate is included in total. (d) Estimated from figures for first 11 months.



Practical Pointers For Electrical And Mechanical Men



Where Electric Power Can Be Saved

Insulation Leakage, Poor Bonding, Use of Heaters and Lights Unnecessarily, Insufficient Cross-Section in Conductors, Underloading of Induction Motors All Cause Excessive Power Bills

IN the past when nearly all coal companies generated, at their own plants, the power used to operate their mines, employees were uneconomical in the use of electrical energy. They wasted it both in the mines and in their homes as if it were of no value. But now that the use of purchased power is increasing, we begin to realize our wastefulness and we are commencing to comprehend that something must be done to eliminate this costly and unnecessary expense.

On visiting mines, any number of wasteful practices may be noted, but one cause of loss that should be given due consideration on all such occasions is lack of electrical insulation. Some mines have smooth dry stone roofs, while in others the roof is damp and irregular, and in this a better quality of insulation is required if the current is to be used with economy equal to that attained with a dry roof.

INCOMPLETELY GLAZED INSULATORS

For an example, let us take the feeder circuit or "machine line" as it is commonly termed. This is usually arranged so that it may be cut in or out of service independent of the trolley circuit. It is probable that the most popular type of insulator now being used on this circuit is that known as the security insulator, which gives satisfactory service where little or no dampness is encountered. However, as its entire surface is not glazed, a path for the leakage of current is afforded if the insulator is exposed to excessive moisture for a considerable length of time. This leakage may be small, but when we consider the number of insulators employed under these and similar conditions, we shall soon realize that the total leakage or waste of current may form an important part of the monthly power bill.

Until some manufacturer of such products places on the market a wet-ware porcelain insulator for this particular purpose, I am unable to recommend any standard for use in such mines. However, I am firmly of the belief that the additional cost of a wet-ware porcelain product over the present grade of insulator would be small as compared to the savings that a reduction in the leakage of current would effect.

Other power losses from the electrical system are due to poor bonding, to

heaters operated needlessly, to lights kept burning when their illumination is not required, and to copper conductors of insufficient carrying capacity. Poor bonding is no longer excusable, especially since the new copper-weld bond has made its appearance on the market. These bonds are inexpensive, and little skill and labor is required for their installation. When properly installed they afford 100-per cent contact surface, this being an entirely new feature with welded bonds, especially when installed by an inexperienced operator.

A large saving of power may be effected by connecting all the lights and heaters to the trolley circuit, leaving none of them energized from the machine circuit where they would probably be left in operation every hour of the day and night, regardless of the requirements. When the last motor trip for the day is completed, the trolley circuit should be disconnected from its source of power supply, thus relieving the light and heater load. At the same time, the pumps, fans, necessary signals, etc., may be supplied with current from the machine circuit.

These minor electrical loads are seldom given any consideration by the employees of a mine, and frequently the executives in direct charge of affairs scoff at them. Nevertheless, such continued savings, though small, are sure to net a handsome reward.

LOST OVER 100,000 KW.-HR. A YEAR

As an example of the importance of such leakage, I am taking a rather modernly equipped mine with which I am familiar, which has an average output of approximately 1,200 tons per working day.

Through various tests at this mine it was shown that it was convenient to relieve the load of the trolley circuit about 8 hours of each working day, and the whole 24 hours on Sunday, or a total of 72 hours per week, which amounts to 3,744 hours per calendar year, without considering idle days. The waste load, due to leakage, lights and heaters was found to be 112 amperes, which at a pressure of 275 volts is approximately 31 kw., or 41 hp.; this in the 3,744 idle hours of the year would result in a loss of 116,064 kw.-hr.

Let us trust that the readers of this article will bear in mind the value of these large figures, and that in the

future on no occasion will they hesitate to take a few extra steps to prevent the use of any circuit unnecessarily.

Another consideration particularly pertaining to purchased energy is that of the power-factor. When induction motors are used it should be remembered that an under-loaded induction motor requires nearly as much current as when operated at full load; hence such motors should be applied to loads so as to operate at full capacity most of the time.

The loss of a credit for good power-factor or the payment of penalty for a poor power-factor may not seem to be large on a monthly power bill, but in the total power cost for the year, it may amount to a considerable figure. Many people forget that poor power-factor loads reduce the efficiency of the whole power system, resulting in a much greater consumption of power than necessary.

ROYCE L. GRIMES.

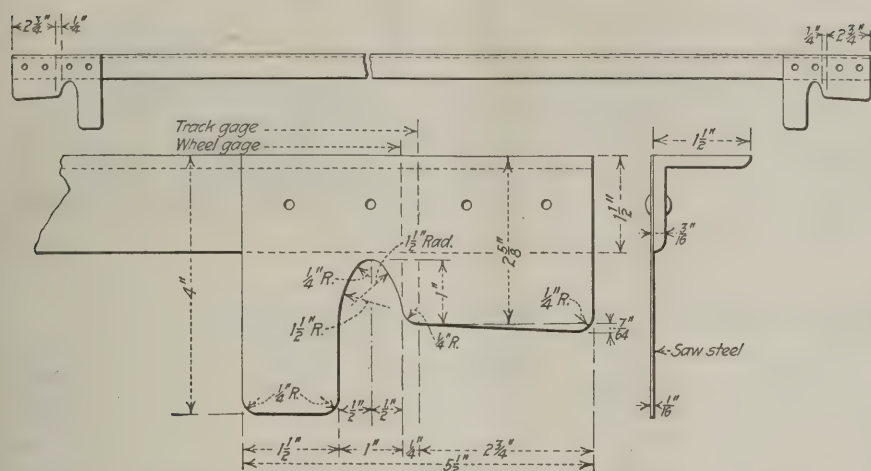
Electrical and Chemical Engineer.
Piney Fork, Ohio.

Checking Locomotive Wheels Before Using

Never be indifferent in regard to the condition of your locomotive wheels. They are just as important as any other part of the machine. Unless the wheels of a locomotive are of proper size parts of the locomotive frame, gear cases or the motors may drag on the ground with serious consequences. If the wheels have false flanges the track is soon torn to pieces, frogs and cross-overs are damaged and wrecks occur. Wheels which are not set at proper gage may spread the rails or become uncontrollable at switches.

These are only a few of the many reasons why locomotive wheels should be always kept in good operating condition. Even under normal operation the wheels of some locomotives may wear rapidly and must therefore be renewed. When it becomes necessary to change a set of locomotive wheels a thorough inspection of the new wheels should be made. Such an inspection should reveal any defects in the material, incorrect assemblage or design. If the tread of the wheels has not been properly shaped it may cause accidents as serious as those resulting from the use of wheels with false flanges. The wheel gage should be checked at the four quarters of the wheels so as to be sure that the axle is true and that the wheels and tires have been properly placed.

Necessarily the expense of renewing a set of locomotive wheels is always



Are Your Wheels True? With Gages Like This, You Can Find Out

Two saw-steel templates on the end of the gage are shaped to fit the standard wheel tread. By placing them on the treads the position of the wheels on the axle can be readily checked. Thorough inspection and the use of a gage like this will materially reduce accidents and delays.

great, for the locomotive must be taken out of service and large quantities of material must be handled and used at the expenditure of much labor. Consequently, the work should be well done and the material should be accurately designed. Ordinarily the work at the mines merely consists of changing the wheels and axles; that is, the machine work of assembling the wheels on the axles and the work of turning down worn wheel treads is done at a machine shop located some distance from the mine.

In any event, whether the machine work is done in the mine repair shop, located on the immediate property, or whether it is done at some outside shop, there is a great probability that the wheels may be out of true when they reach the locomotive pit.

To enable our electricians to check a new set of wheels before they are placed under a locomotive our depart-

ment designed a gage to be used for this purpose. This gage is made of two pieces of 1/8-in. saw steel cut to fit the shape of our standard wheel tread, and mounted on a piece of angle iron in such a position as to fit accurately a standard set of wheels when properly placed on the axle.

When a new set of wheels and axles are received at the mine a thorough check is made of the material and the gage is placed on the wheels at four quarter positions on the circumference. The templates at the ends of the gage show whether the treads are properly shaped. By this test it is possible to determine whether or not the material has been received in good condition. Later a similar test is made inside the mines to be sure that the wheels have not been damaged or the axle bent in transit to the locomotive pit.

O. E. KENWORTHY.

Wilkes-Barre, Pa.

Giving Trolley Bushings Lubrication and Life

In several articles that have appeared in *Coal Age* regarding trolley wheels and bushings, they have been truthfully described as the weakest parts in the equipment of an electric locomotive. It is easy to see why this is so. The 4-in. trolley wheel attains a high velocity when the locomotive is running at normal speed and the contact of the wheel on the wire is so small that it is a wonder that we get the good service that we do.

No electrician would think of connecting a 100-hp. stationary motor to a power line simply by throwing a wire or a cable over it. Yet such a wire would afford a connection almost as efficient as that which a locomotive has with the trolley wire by which it is energized, and few haulage locomotives are equipped with motors having a total capacity less than 100 hp.

The connection between a trolley wheel and trolley wire is poor even under the best of conditions, such as are found immediately after a new bushing and axle-pin have been installed. As the bushing wears and the axle-pin becomes pitted and roughened, the contact becomes bad. Springs are

often neglected, with the result that the wheel has much lost motion between its sides and the trolley harp. Of course, these conditions may be caused by the motorman not taking proper care of his trolley equipment. But you can find them in almost any mine, and this seems to indicate that something should be done to improve the performance of trolley wheels.

However, not all is said when it is stated that the contact is defective. It is expensive to be replacing bushings and axles constantly, and still more expensive to be discarding wheels before they are worn out, just because someone neglected to put in a new bushing. When the whole trouble is traced down, it seems to be a question of proper lubrication. Most motormen oil their wheels several times a day, but they pour the engine oil only on the outside, and in consequence it never gets to the center of the wheel where it is most needed. When a bushing is new it is too tight for the oil to penetrate very far, and if the bushing is old and worn, the thin layer of oil that clings to the surface does not last very long.

Not long ago, we decided to use a larger trolley wheel with a 3-in. axle instead of the 4-in. wheel we had been

using. When we received the new wheels and harps, I noticed the axle pins were made of ordinary 3-in. pipe with a small hole in each end for cotter pins. This hollow axle gave me an idea. I plugged one end of it and bored a small hole at the center of the axle and tapped the other end so that it would take a 3-in. high-pressure grease gun fitting similar to those used on automobiles. I also bored a hole at the center of the wheel bushing and marked its position on the wheel so that it could be aligned with the hole in the axle. With this arrangement, it is possible to fill the grease reservoir in the wheel through the hollow axle. When the wheel is in operation the grease will be forced out of the reservoir and lubricate the bushing and axle. A light grade of grease was used in the reservoir so that it would flow as required. The motorman filled the reservoir in the morning and gave his trolley wheel no more thought for the rest of the day.

The first trolley-pole head fitted in this way was still working without any appreciable wear on the bushing or axle after three trolley wheels had been worn out. There is no reason why one bushing should not outwear a dozen trolley wheels. We now make our own axles from solid steel, using a 3-in. elbow fitting instead of the straight one, thus making application of grease easier and avoiding a few minor defects that developed in the first axle.

C. L. LOGAN.

Superintendent.

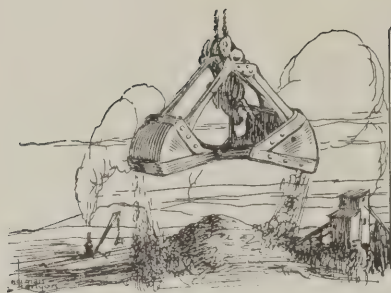
Greenbrier Coal & Coke Co.
McDowell, W. Va.

Cleaning Insulation From Copper Coils

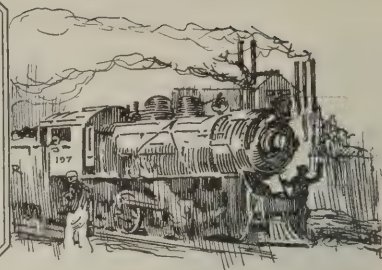
It has been common practice to burn the insulation from old coils. This should not be done where the coils are to be reinsulated and used again. The question then comes: How are we going to remove the old insulation? One big operator places the coils in an oven and passes steam through the coils for 12 or 14 hours. He finds that the insulation peels off easily while hot. Another operator dips the coils in a weak solution of muriatic acid for a time (approximately 24 hours), so that the acid weakens the insulation, but not long enough to give the acid a chance to eat into the copper. The necessary time required can easily be established by checking carefully and removing the coil when the brightening of the copper commences. After the acid treatment the coils should be thoroughly washed in clear water.

Circumference of Chestnut Poles In Inches

Length of Poles	Class A 6 Ft. from Butt		Class B 6 Ft. from Butt		Class C 6 Ft. from Butt	
	Top	Butt	Top	Butt	Top	Butt
30	24	40	22	36	20	33
35	24	43	22	39	20	36
40	24	45	22	42	20	39
45	24	48	22	46	20	43
50	24	51	22	49	..	..
55	22	54	22	53	..	..
60	22	57	22	56	..	..
65	22	60	22	59	..	..
70	22	63	22	62	..	..



Production And the Market



Parting Blast of Winter Gives Brief Stimulus To Soft-Coal Markets; Prices Still Slipping

A blast of honest-to-goodness winter weather in a large section of the Middle West during the last week served to instill some sadly needed vim into the coal business. The improvement was not very broad in character, however, being confined mostly to domestic business, where consumers have been buying from hand to mouth for some time. Large consumers continue to place dependence to a large extent upon stockpiles, confident that they have nothing to lose—perhaps something to gain—by waiting to see what April 1 will bring forth. Continued price adjustments seem to justify the policy.

Another cloud in the industrial sky will soon be cleared away, an agreement being near between the Northern West Virginia Coal Operators' Association and the union mine workers after a conference at Baltimore lasting ten days. Wyoming also has signed up. Union representatives of the central Pennsylvania field wound up their meeting at Altoona last week with the adoption of a recommendation to seek the best scale obtainable for three years at a conference with the operators in Philadelphia this week.

Coal Age Index declined 3 points to 176, as of March 24, the corresponding average price being \$2.13. This compares with \$2.16 on March 17.

Raw Weather Awakens Midwest Markets

Domestic coal has been moving rather freely in small lots from Illinois and Indiana fields as a result of a parting blast of winter. Steam coals have their own troubles, however. The closing of a number of mines that is expected April 1 probably will have the effect of bolstering up this market somewhat. Mines in the Duquoin, Jackson County, Mt. Olive and Standard fields are working from two to four days a week and some of the mines are preparing for a long suspension.

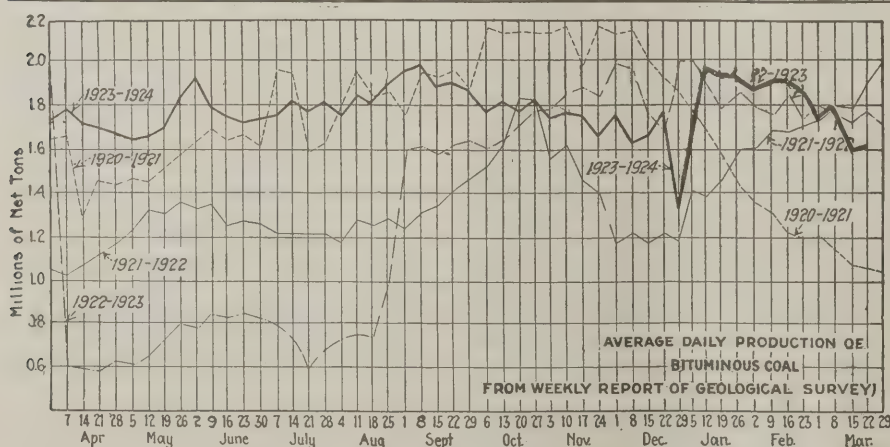
In western Kentucky the mines are running only about a day and a half a week. Prepared sizes are moving better than expected, but in spite of an effort to hold prices firm, operators have been forced to accept the low side of the market range. Even with the light production of screenings in eastern Kentucky selling has been at low prices, the range being 75c. @ \$1.15. With a low market reigning there is a hope that there may be some early buying by lake shippers to load vessels at lower lake docks for early movement, though the normal start of the lake shipping is still rather remote.

Northwestern Markets Lifeless

Coal markets in the Northwest are absolutely without life, business being conspicuous by its absence. With about 1,300,000 tons of coal on the docks and demand lacking, prices have taken a tumble. Kentucky coal alone holds its level—because of the short supply. The Southwest is doing better, as a suspension is looked for, there being insufficient time to reach an agreement on wages between March 28, when the parley begins, and April 1.

A deadly dullness has settled over the Ohio markets. Similar conditions prevail in the Pittsburgh district and New England, and the situation in the Atlantic seaboard markets is little better. The Birmingham market is more optimistic, an improvement in inquiry and bookings having been noted.

Production of bituminous coal during the week ended March 15 amounted to 9,640,000 tons, according to the report of the U. S. Geological Survey, which was 23,000 tons more than was produced in the previous week. Output of anthracite totaled 1,941,000 tons, a gain of 59,000 tons compared with the previous week, when 1,882,000 tons was produced.



Midwest Domestic Coals Move

A burst of raw, wintry weather throughout the Middle West during the past week has moved a good deal of domestic coal from almost all Illinois and Indiana fields. This has enabled producers to maintain the new reduced circular on southern Illinois coals fairly well although there has been a good deal of selling of \$3 lump at \$2.75 in spite of the awakening of the market. All purchases have been in small lots, of course. The reduction of March 13 on Franklin County coals won back a good deal of dealer trade that has long been lost to cheaper coals. Downward adjustments in all other competing fields were made then or since.

Steam coals are in trouble, however. Southern Illinois moves with difficulty at \$1.90. A good deal is sold at \$1.75. Central Illinois is back to \$1.50@1.60 in spite of its short rate advantage to Chicago market. Indiana screenings are in a slight slump also. This is not expected to continue more than a few days because everybody feels the domestic business cannot run strong very long. A reasonable volume of it may be expected right through April, but probably the number of mines that will shut down April 1 will reduce the total production to a point that will bolster up the steam market.

Continued cold weather keeps domestic tonnage fairly active, principally on lump, with egg and nut moving slowly. The mines seem to have a pretty fair surplus of all sizes generally left over, however, and are getting from two to four days a week. Railroad tonnage is easing up and the car supply is plentiful and transportation good. Independents are having a hard time cutting prices on the association members, but they are temporarily getting away with it, although prices are below cost of production.

Illinois Mines Prepare to Suspend

In the Duquoin and Jackson County fields miners are getting about three days a week—those that are working—while several are idle. Throughout both of these fields mines are beginning to prepare for a long period of suspension. In the Mt. Olive district everything has slowed up, though there is a better demand for steam than the supply. Mt. Olive proper is asking \$3 for 2½- and 3-in. lump, while in the surrounding territory the price is \$2.75 for 6-in. lump. In the Standard field the future looks bad and prices now are cut to the bone. Mines continue to suspend operations and those that are working on commercial coal are getting two and three days a week with a hard time to find a market.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Market Quoted	Mar. 26 1923	Mar. 10 1924	Mar. 17 1924	Mar. 24 1924†
Smokeless lump	Columbus	\$7.00	\$3.85	\$3.85	\$8.50@	\$3.75			
Smokeless mine run	Columbus	4.50	2.10	2.10	2.00@	2.25			
Smokeless screenings	Columbus	4.50	1.55	1.55	1.50@	1.75			
Smokeless lump	Chicago	6.35	3.60	3.60	3.00@	3.50			
Smokeless mine run	Chicago	4.00	2.20	2.20	2.00@	2.25			
Smokeless lump	Cincinnati	6.75	3.35	3.25	3.00@	3.50			
Smokeless mine run	Cincinnati	4.60	2.40	2.25	1.90@	2.50			
Smokeless screenings	Cincinnati	4.50	1.60	1.75	1.50@	2.00			
*Smokeless mine run	Boston	6.50	4.70	4.65	4.60@	4.75			
Clearfield mine run	Boston	2.60	2.00	2.10	1.65@	2.50			
Cambria mine run	Boston	3.60	2.60	2.60	2.25@	3.00			
Somerset mine run	Boston	3.10	2.20	2.35	1.85@	2.75			
Pool 1 (Navy Standard)	New York	4.25	3.00	3.00	2.75@	3.25			
Pool 1 (Navy Standard)	Philadelphia	4.50	3.00	3.00	2.75@	3.25			
Pool 1 (Navy Standard)	Baltimore								
Pool 1 (Super. Low Vol.)	New York	3.50	2.25	2.20	2.00@	2.40			
Pool 9 (Super. Low Vol.)	Philadelphia	3.70	2.30	2.30	2.10@	2.50			
Pool 9 (Super. Low Vol.)	Baltimore		2.05	2.30	2.00@	2.50			
Pool 10 (H.Gr. Low Vol.)	New York	3.00	2.00	1.95	1.75@	2.15			
Pool 10 (H.Gr. Low Vol.)	Philadelphia	3.20	1.85	1.85	1.70@	2.00			
Pool 10 (H.Gr. Low Vol.)	Baltimore		1.80	1.90	1.85@	2.00			
Pool 11 (Low Vol.)	New York	2.50	1.60	1.40	1.25@	1.60			
Pool 11 (Low Vol.)	Philadelphia	2.60	1.65	1.65	1.55@	1.75			
Pool 11 (Low Vol.)	Baltimore		1.65	1.75	1.60@	1.70			

High-Volatile, Eastern					Market Quoted	Mar. 26 1923	Mar. 10 1924	Mar. 17 1924	Mar. 24 1924†
Pool 54-64 (Gas and St.)	New York	2.35	1.60	1.50	1.40@	1.65			
Pool 54-64 (Gas and St.)	Philadelphia	2.35	1.60	1.60	1.50@	1.75			
Pool 54-64 (Gas and St.)	Baltimore		1.60	1.85	1.55@	1.90			
Pittsburgh sc'd gas	Pittsburgh	3.60	2.55	2.55	2.50@	2.65			
Pittsburgh gas mine run	Pittsburgh		2.35	2.30	2.25@	2.35			
Pittsburgh mine run (St.)	Pittsburgh	2.35	2.10	2.10	2.00@	2.25			
Pittsburgh slack (Gas)	Pittsburgh	2.50	1.35	1.45	1.30@	1.40			
Kanawha lump	Columbus	4.50	2.60	2.55	2.40@	2.70			
Kanawha mine run	Columbus	2.75	1.50	1.50	1.45@	1.70			
Kanawha screenings	Columbus	2.40	1.05	1.05	1.00@	1.10			
W. Va. lump	Cincinnati	3.60	2.85	2.85	2.85@	2.75			
W. Va. gas mine run	Cincinnati	2.75	1.50	1.40	1.35@	1.60			
W. Va. steam mine run	Cincinnati	2.75	1.50	1.40	1.35@	1.60			
W. Va. screenings	Cincinnati	2.35	.90	.85	.75@	.95			
Hocking lump	Columbus	3.75	2.60	2.55	2.40@	2.70			
Hocking mine run	Columbus	2.45	1.85	1.85	1.60@	1.85			
Hocking screenings	Columbus	2.05	1.15	1.05	1.00@	1.10			
Pitta. No. 8 lump	Cleveland	3.10	2.35	2.30	2.00@	2.75			
Pitta. No. 8 mine run	Cleveland	2.35	1.80	1.80	1.75@	1.90			
Pitta. No. 8 screenings	Cleveland	2.10	1.30	1.30	1.20@	1.30			

Midwest					Market Quoted	Mar. 26 1923	Mar. 10 1924	Mar. 17 1924	Mar. 24 1924†
Franklin, Ill. lump	Chicago	\$3.85	\$3.25	\$2.85	\$2.75@	\$3.00			
Franklin, Ill. mine run	Chicago	3.10	2.35	2.35	2.25@	2.50			
Franklin, Ill. screenings	Chicago	2.05	1.80	2.00	1.75@	1.90			
Central, Ill. lump	Chicago	3.10	2.85	2.60	2.50@	2.75			
Central, Ill. mine run	Chicago	2.60	2.10	2.10	2.00@	2.25			
Central, Ill. screenings	Chicago	1.60	1.60	1.70	1.50@	1.60			
Ind. 4th Vein lump	Chicago	3.60	2.85	2.85	2.75@	3.00			
Ind. 4th Vein mine run	Chicago	2.85	2.35	2.35	2.25@	2.50			
Ind. 4th Vein screenings	Chicago	1.85	1.80	1.85	1.75@	2.00			
Ind. 5th Vein lump	Chicago	3.10	2.60	2.60	2.50@	2.75			
Ind. 5th Vein mine run	Chicago	2.10	2.10	2.10	2.00@	2.25			
Ind. 5th Vein screenings	Chicago	1.60	1.60	1.70	1.50@	1.75			
Mt. Olive lump	St. Louis		2.85	2.85	2.75@	3.00			
Mt. Olive mine run	St. Louis		2.50	2.50	2.50@	2.50			
Mt. Olive screenings	St. Louis		1.55	1.55	1.60@	1.60			
Standard lump	St. Louis	2.60	2.70	2.70	1.90@	2.75			
Standard mine run	St. Louis	2.10	1.95	1.95	1.90@	2.00			
Standard screenings	St. Louis	.95	1.15	1.30	1.25@	1.35			
West Ky. lump	Louisville	2.50	2.85	2.85	2.75@	3.00			
West Ky. mine run	Louisville	2.05	1.70	1.70	1.40@	1.85			
West Ky. screenings	Louisville	1.70	1.30	1.30	1.25@	1.35			
West Ky. lump	Chicago	2.85	2.60	2.60	2.50@	2.75			
West Ky. mine run	Chicago	1.80	1.45	1.35	1.16@	1.25			

South and Southwest					Market Quoted	Mar. 26 1923	Mar. 10 1924	Mar. 17 1924	Mar. 24 1924†
Big Seam lump	Birmingham	2.50	3.85	2.60	2.50@	2.75			
Big Seam mine run	Birmingham	2.10	1.80	1.80	1.75@	2.25			
Big Seam (washed)	Birmingham	2.35	2.10	2.10	2.00@	2.40			
S. E. Ky. lump	Chicago	3.75	3.10	2.85	2.75@	3.00			
S. E. Ky. mine run	Chicago	2.85	1.85	1.85	1.40@	1.85			
S. E. Ky. lump	Louisville	4.00	3.00	3.00	2.75@	3.25			
S. E. Ky. mine run	Louisville	2.85	1.75	1.75	1.40@	2.00			
S. E. Ky. screenings	Louisville	2.25	1.05	.95	.75@	1.15			
S. E. Ky. lump	Cincinnati	3.50	2.75	2.85	2.75@	3.00			
S. E. Ky. mine run	Cincinnati	2.50	1.60	1.45	1.35@	1.60			
S. E. Ky. screenings	Cincinnati	2.25	.90	.85	.70@	1.00			
Kansas lump	Kansas City	4.50	5.00	4.50	4.50				
Kansas mine run	Kansas City	3.50	3.50	3.25	3.25				
Kansas screenings	Kansas City	2.60	2.25	2.50	2.50				

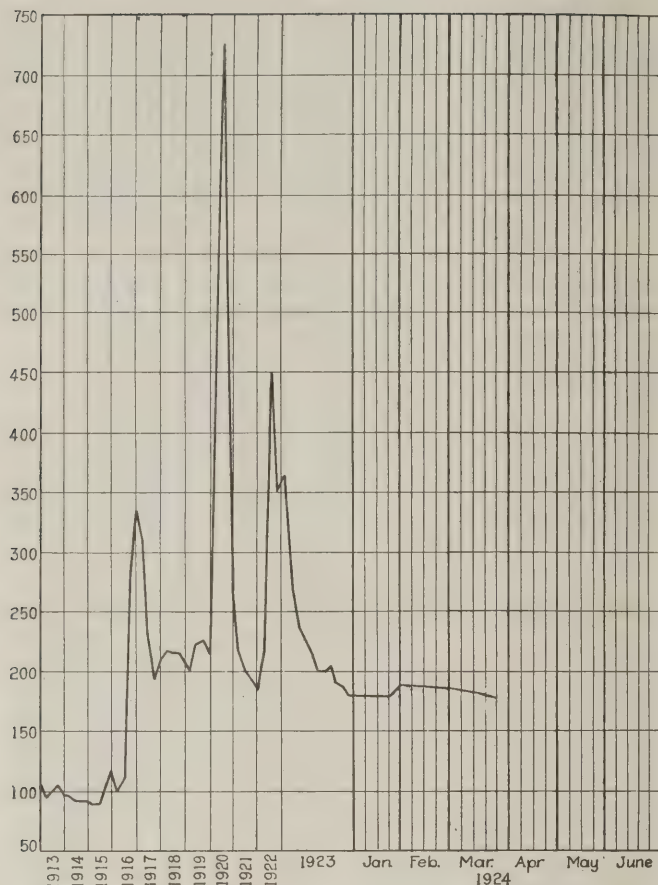
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	March 26, 1923		March 17, 1924		March 24, 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken.	New York.	\$2.34	\$9.00	\$7.75@ \$8.25		\$8.00@ \$9.25		\$8.00@ \$9.25
Broken.	Philadelphia.	2.39		7.90@ 8.10				
Egg.	New York.	2.34	9.25@ 11.00	8.00@ 8.35	\$7.75@ \$8.25	8.75@ 9.25	\$7.75@ \$8.25	8.75@ 9.25
Egg.	Philadelphia.	2.39	9.25@ 11.00	8.10@ 8.35	8.50@ 10.00	8.75@ 9.25	8.50@ 10.00	8.75@ 9.25
Egg.	Chicago*.	5.06	12.00@ 12.50	7.20@ 8.25	7.50@ 8.80	8.00@ 8.35	7.50@ 8.80	8.00@ 8.35
Stove.	New York.	2.34	9.25@ 11.00	8.00@ 8.35	9.25@ 9.75	8.75@ 9.25	8.75@ 9.25	8.75@ 9.25
Stove.	Philadelphia.	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Stove.	Chicago*.	5.06	12.00@ 12.50	7.35@ 8.25	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Chestnut.	New York.	2.34	9.25@ 11.00	8.00@ 8.35	9.25@ 9.75	8.75@ 9.25	8.75@ 9.25	8.75@ 9.25
Chestnut.	Philadelphia.	2.39	9.25@ 11.00	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Chestnut.	Chicago*.	5.06	12.00@ 12.50	7.35@ 8.35	7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Range.	New York.	2.34		8.25		9.00		9.00
Pea.	New York.	2.22	6.30@ 8.50	6.15@ 6.30	4.75@ 5.25	6.15@ 6.65	4.50@ 5.25	6.15@ 6.65
Pea.	Philadelphia.	2.14	7.00@ 9.00	6.15@ 6.20	4.75@ 6.50	6.35@ 6.60	4.75@ 6.50	6.35@ 6.60
Pea.	Chicago*.	4.79	7.00@ 8.00	5.49@ 6.03	4.50@ 5.60	5.40@ 6.05	4.50@ 5.60	5.40@ 6.05
Buckwheat No. 1.	New York.	2.22	3.40@ 4.25	4.00@ 4.10	2.25@ 3.00	3.50	2.25@ 3.00	3.50
Buckwheat No. 1.	Philadelphia.	2.14	4.00@ 5.00	4.00	2.25@ 3.00	3.50	2.25@ 3.00	3.50
Rice.	New York.	2.22	2.25@ 2.75	2.75@ 3.00	1.75@ 2.25	2.50	1.75@ 2.25	2.50
Rice.	Philadelphia.	2.14	2.25@ 3.00	2.75@ 3.00	1.75@ 2.25	2.50	1.75@ 2.25	2.50
Barley.	New York.	2.22	1.25@ 1.75	1.50@ 2.00	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley.	Philadelphia.	2.14	1.40@ 2.00	2.00	1.25@ 1.50	1.50	1.25@ 1.50	1.50
Birdseye.	New York.	2.22		2.10	1.60@ 1.75	1.60	1.60@ 1.75	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924			1923
	March 24	March 17	March 10	March 26
Index	176	179	181	246
Weighted average price...	\$2.13	\$2.16	\$2.18	\$2.98

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

St. Louis Market Fairly Active

Continued cold weather with flurries of snow has kept the St. Louis domestic market fairly active for small orders and cheaper grades principally. Dealers are able to keep their yards cleaned up and a little coal continues to move regularly. Country domestic shows up fairly well on the cheaper grades. There is no demand for anthracite or smokeless, though there is a little activity in coke. Local wagonload steam is easing up and country steam is fairly active. Effective the 15th new retail prices were: Carterville, \$7.25@7.50; Mt. Olive, \$6.50; Standard, \$5.75; smokeless, \$14.50; anthracite grate and egg, \$15.75; anthracite stove and chestnut, \$16; byproduct coke, \$11; gas-house coke, \$10.50.

Kentucky Has Hard Sledding

Things are generally quiet in the Louisville market. It is reported that big buyers in many instances bought heavily in January and February, in the belief that there might be a general coal strike, and have been using up supplies on hand, with the result that even light production of screenings in eastern Kentucky has been selling at low prices. The present screenings market in Eastern Kentucky is 75c.@\$1.15 for nut and slack, including fine gas-coal screenings.

In western Kentucky, where mines are running only about a day and a half, screenings are quoted at \$1.25@1.35 for pea and slack, due to small production along with the fact that consumers who use pea and slack in automatic stoker feeds have been taking supplies rather freely in a

belief that there may be a shutdown of part of the field, which would almost close up production of the small size.

Prepared sizes are moving in spurts, and have been better than anticipated, due to continued cold weather in March. Western Kentucky is trying to hold prices firm, but is forced to accept the low side of the market range which is around \$2.75 for best block, \$2.50 for lump, \$2.40 for egg, and \$1.75@2 for nut, with mine run at \$1.40@1.85, and some stripper mine run at less than that.

In eastern Kentucky block is quoted at \$2.75@3.25, but \$3 is about the top on sales, as lump is \$2.50@3, egg \$1.75@2.25; nut, \$1.50@2 and mine run, &1.40@1.90.

In view of the present low markets there may be some early buying on the part of Lake shippers to load vessels at dock at the lower end of the lakes for movement in the early shipping season, but lake business hardly gets started as a rule before late May or early June.

Northwest Market Dormant

It would be hard to conceive of anything deadlier than the bituminous market at Duluth at present. There is absolutely no business. Mild weather and uncertainty over the question of railroad rates, and resulting prices, has caused the buyer to hold off in hope of lower levels. As a result of the fact that approximately 1,300,000 tons of free bituminous is on the docks at present and that this amount is not needed now, prices have taken a tumble. Kentucky is the only coal that is holding its level, and this because of shortness of supply. Screenings are firm only because of short supply. The general reduction has been about 25c., prices being as follows: Kentucky lump, \$7, run of mine, \$6; screenings, \$4.25; Youghiogheny lump, \$6; run of mine, \$5; screenings, \$4.25; Hocking lump, \$5.75; run of mine, \$4.75; screenings, \$4; split lump, \$6.25; run of mine, \$5.25; screenings, \$4.25; Pocahontas lump, \$7.50; run of mine, \$6; screenings, \$4.75@5.

The coal market at Milwaukee is dormant, with little or no demand from city or country. There has been no change in the established schedule of prices on either hard or soft coal, but something is expected to happen by April 1. Mild weather continues to reduce coal consumption to the minimum.

West Does Better

A suspension of work for at least thirty days is expected in the Southwestern district as a result of the delay in the wage scale parley between operators and miners, which will begin in Kansas City March 28. It is considered unlikely that an agreement will be reached by April 1, when present contracts expire. In the meantime, as a result of continued cold weather and the recent reduction in price of domestic grades of Kansas coal, the market is absorbing the full output of the mines, which are working better than 60 per cent of normal time. Tracks are virtually clear of screenings, and only a few "no bills" of lump and nut are reported. Kansas coal is quoted at \$4.50 for lump; \$4 for nut; \$3.25@3.50 for mine run and \$2.50 for screenings.

The coal market in Colorado was considerably stimulated in the last week. Mines worked on an average of about four days in the southern fields. The present spell of seasonable weather has contributed much toward the coal industry and it is expected that business will be much better if this weather continues. Prices remain unchanged. The transportation and equipment situation has been very favorable throughout the state except in Routt County, where practically 90 per cent of the working time was lost on account of extremely bad weather preventing any railroad movements.

Steam coal is finding a better market in Salt Lake City now than domestic sizes, but the market is still characterized by dullness. Mines are working not more than two days a week, which is making it difficult for most of the operators to supply the demand for slack coal, now selling all the way from \$1 to \$1.50.

Sogginess Pervades Ohio Markets

In spite of reports that production has been edging off elsewhere and that here and there mines are closing down south of the river the record of car interchange at Cincinnati shows little diminution. Everything is up in the air. The market is soft and soggy. Domestic and run of mine prices got the worst of the slicing, so far as the price lists on high volatile is concerned. Producers of

standard Pocahontas and New River are standing by their guns and holding tight to the circular prices that came out March 1. Talk of contract business is being heard, though few are being entered into. Specialized coals are quoted as follows: Egg, \$2.50@\$3; block, \$3.50@\$3.75.

Dullness is the prevailing note in the Columbus market. Both the steam and domestic trade are quiet, not much business being booked. Retailers have fair stocks and with the winter practically over are loath to increase their stocks. Buying is from hand to mouth. Retail prices are irregular and there is considerable cutting among dealers in order to clean up before the stocking season. Utilities are using reserves largely. Railroad contracts are now being considered and they are going at extremely low figures. Several large railroad contracts were let during the past week. Steam prices are weak and irregular and there is a fair amount of distress coal on the market. Weakness in screenings has developed, but this is expected to be temporary.

There is little or no change in general market conditions at Cleveland. Operators and jobbers say that inquiries are mighty scarce; that there is little or no negotiation for contracts, and that there is still plenty of stock or surplus fuel in the coal piles of industries, public utilities and railroads. A taste of early spring weather during the past week has, if anything, depressed the retail market, and the yards still have good stocks from which present demands are being supplied. Inquiries from brokers for quotations on contract tonnage in large quantities are looked upon simply as feelers.

Production in the Pittsburgh district continues to decrease. The spot market is practically stagnant. Inquiry is limited and sales are hard to make. Some further wage reductions are being made in the Connellsville region, but at mines that ship steam coal.

The situation at Buffalo shows no change for the better. Complaints of poor business seem to increase, though they have been widespread for several months.

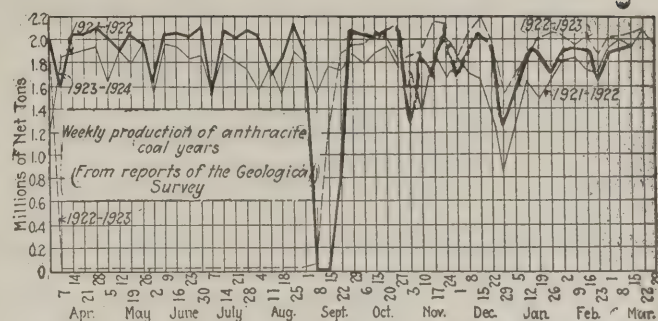
New England Dullness Unrelieved

In New England the market continues without relief from the dullness that has prevailed now for several months. In no direction are there signs of immediate improvement; both all-rail and by water there is a great dearth of business, and buyers are quite content to await developments. Among a few small consumers there is a certain amount of inquiry, but the larger steam users are well stocked for the present and there is no anxiety whatever over price or supply.

The Hampton Roads coals are holding reasonably well at what for most of the producers is the bare cost of mining. No. 1 Navy standard Pocahontas and New River can be had at \$4.60@\$4.75 per gross ton f.o.b. vessel at the Virginia terminals, but in some instances the agencies are withholding sales at this range and are sending prepared coals west, where the current market will yield a slightly more favorable return. Occasionally a sale offshore will net more than coastwise business, but there is no volume in that direction and there are few orders to pick from.

At Boston, Providence and Portland for inland delivery there are ample supplies available, and prices are none too strong. Those factors who are equipped with rehandling plants have a distinct advantage and quotations are held low enough to discourage others from sending coal forward on the market. On-car figures range from \$5.80 to \$6.25, but most of the current sales are at less than \$6.

Retail prices in Boston continue fairly weak, due to local



trade conditions. The published price is \$6.50 per net ton delivered, but the average figure paid by larger users is much less than that. About the only favorable aspect of this situation is the pause it is giving to the oil business.

Vim Vanishes from Seaboard Markets

Spot soft coals are moving slowly in the New York market. Consumers are not disposed to add to their reserves although prices are about at the lowest level possible. Stockpiles of many consumers are large enough to last for several weeks and the tendency appears to be to drive the market further downward. Most contracts expire in another week and many of them have not as yet been renewed, many consumers still clinging to the thought that there will be plenty of free coals at low prices. The daily average number of cars at the harbor terminals sticks close to 2,000, most of which is on contract.

While the Philadelphia market shows some signs of weakness, quotations have been fairly well maintained at about the same level as last week. Consumers are still working off a great deal of their stockpiles and will likely continue this practice for several months. Naturally this has checked current sales, and the producers are looking forward to the time when they will again buy in excess of current needs to build up the stockpiles for another season.

With the announcement, following the ten-day conference in Baltimore between the Northern West Virginia Coal Operators' Association and the United Mine Workers, that agreement had been reached on nearly all points in controversy, the last cloud in the industrial sky has almost disappeared. The new contract undoubtedly will be signed before March 31, when the old agreement expires. Meanwhile the market is in poor shape, with production large despite the fact that much of the coal is being produced at actual loss to operators, and wherein the demand is comparatively small.

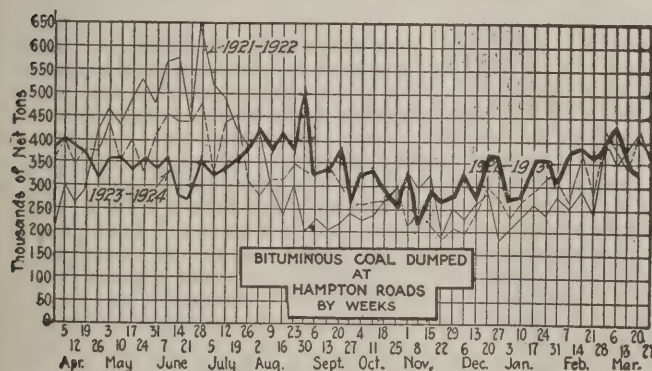
Anthracite Bought Only as Needed

Notwithstanding the nearness of April 1, New York retail anthracite dealers are taking in all the company domestic sizes they can store. At the same time they are soliciting their trade for orders based on last winter's requirements, and in some cases are informing the customer that his quota is being reserved for him subject to his order, stating the time of delivery. Nothing is being said of prices. There is a subnormal demand from wholesalers. Consumption is no heavier and users are not buying more than is actually needed. Prices for independent coals are easy with many orders placed at below the maximum figure. Stove coal is the strongest in demand while many dealers are anxious to put in a supply of chestnut. The trade at Philadelphia has been fortunate that the weather all this month has been conducive to coal burning. The consumer continues to order meagerly. The Pennsylvania Retail Coal Merchants' Association suggests that mine prices be reduced 50c. a ton and the dealers reduce 50c., making \$1 in all for April, and then advanced 25c. a ton for two months, but the operators are silent and no intimation is to be had as to their decision.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended March 8, 1924.....	929,505	169,807
Previous week.....	945,049	186,470
Same week in 1923.....	905,344	186,264

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
March 7, 1924.....	144,426	64,115	2,001	.....
Previous week.....	134,273	56,618	3,991	2,475
Same date in 1923.....	13,229	4,127	79,270	34,642



Foreign Market And Export News

Strong Demand in British Coal Market; Production Advances

The Welsh market shows marked improvement. Shipments have been seriously delayed by the lack of tonnage, but this is now coming forward much more freely, and the docks are busy again. There is still much talk of a strike in April, though the union leaders are at much pains to emphasize that a strike is not necessarily the natural outcome of the termination of the wage agreement.

These circumstances tend to increase the demand for Welsh coal, and the operators are quoting firm prices.

Negotiations have been reopened for the purpose of obtaining resumption of the three-shift working system. All collieries are overbooked with orders until the middle of April, and the trade is reluctant to accept new business.

The Newcastle market is somewhat stronger due to pressing European demands in anticipation of a strike in April. Most of the collieries are well booked into early April. France is in the market for gas and coking coals. German demand is slow and Scandinavian inquiries are hampered by ice in the Baltic. The French State Railways are asking tenders for 100,000 tons of Durham coking coals for delivery over the next six months.

Production by British collieries during the week ended March 8 a cable to *Coal Age* states, was 5,742,000 tons, according to the official reports. This compares with 5,702,000 tons in the week ended March 1.

Hampton Roads Business Slumps; Storms Hamper Shipping

Business at Hampton Roads during the last week has been slower than for many weeks, prices taking a slump and consumers apparently using all their old contracts prior to the new contract period, beginning April 1. Fair dumping at the piers was mostly of coal sold on old orders.

Recent storms have had the effect of

tying up shipping to a great extent, and many vessels were long overdue for cargoes. The result was a piling up of approximately 7,500 cars of coal, with nearly 500,000 tons at Hampton Roads piers. Coastwise business is slack, and the bunker trade fair. Overseas shipments of spot coal were negligible.

The tone of the market is weak, with little hope for better business before April 1. Overproduction also is indicated in advices from operators to agents.

French Producers Balk at Wage Rise; Markets Active

Wage negotiations in the coal fields hold the center of interest in the French coal market now. The wage settlement arranged last November was to be effective until Feb. 29. Because of higher living costs the miners, at a recent meeting asked not only for the maintenance of the old wage, but for a further increase. Having just reduced their selling prices the companies refused to accede to the demand, but agreed to maintain the present rates to the end of June. Although the miners are not entirely satisfied with the terms, there was no threat of a strike, though there may be some trouble raised by extremists.

Demand for household coals continues to be rather active, but owing to a shortage of trucks, the collieries have to store their output. Inquiry for industrial coal is larger and the output sells freely, and the movement would be greater still if supplies were sufficient.

Production in the Ruhr is steadily increasing, and Allied reparations shipments in February were only a quarter of a million tons below the reparations program. A new organization has been formed to succeed the S. C. O. F. in distribution of reparations coal, but the extent of its functions has not yet been defined.

According to statistics for the last quarter of 1923, just given out, for all French mines, the production is 810 kilograms (about 1,782 lb.) per day per underground worker and 569 kilograms (about 1,242 lb.) for underground and surface. Before the war, the average daily production per day was 978 kilograms (about 2,156 lb.) per underground worker and 695 kilograms (about 1,529 lb.) for underground and surface.

Progress in the restoration of the devastated mines of the Nord and Pas-de-Calais is indicated by the fact that production of coal in January totaled 2,082,821 tons; coke, 140,663 tons and patent fuel, 156,875 tons, compared with December output of 1,834,015 tons of coal, 133,364 tons of coke and 147,864 tons of patent fuel.

Export Clearances Week Ended March 24, 1923

FROM BALTIMORE

For Dutch Guiana	Tons
Am. Schr. Isabelle Parmenter.....	1,230
For Argentina	
Fr. AA Lierentz.....	6,202
For Porto Rico	
Am. Str. Gov. John Lind.....	822

FROM HAMPTON ROADS

For West Indies	
Nor. Fram for Curacao.....	4,054
For Jamaica	
Nor. Str. Gefion for Kingston.....	2,186
For Brazil	
Du. Str. Hardenberg for Santos.....	4,879

FROM PHILADELPHIA

For Cuba	
Nor. Str. Asbjornsen for Havana....	

Hampton Roads Pier Situation

	March 13	March 20
N. & W. piers, Lamberts Pt.:		
Cars on hand.....	2,212	2,601
Tons on hand.....	129,096	153,717
Tons dumped for week.....	155,098	152,104
Tonnage waiting.....	10,000	12,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,730	2,016
Tons on hand.....	117,450	138,200
Tons dumped for week.....	86,650	63,353
Tonnage waiting.....	10,000	10,791
C. & O. Piers, Newport News:		
Cars on hand.....	1,920	2,346
Tons on hand.....	90,385	117,685
Tons dumped for week.....	69,383	88,867
Tonnage waiting.....	5,750	50

Pier and Bunker Prices, Gross Tons

	PIERS	
	March 15	March 22†
Pool 9, New York.....	\$4.75@ \$5.25	\$4.75@ \$5.25
Pool 10, New York.....	4.60@ 5.00	4.60@ 5.00
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.65@ 4.75	4.60
Pool 2, Hamp. Roads.....	4.40@ 4.50	4.25
Pools 5-6-7 Hamp. Rds....	4.10@ 4.20	4.10@ 4.15
	BUNKERS	
Pool 9, New York.....	5.05@ 5.55	5.05@ 5.55
Pool 10, New York.....	4.90@ 5.30	4.90@ 5.30
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.09@ 5.20
Pool 11, Philadelphia.....	4.65@ 5.10	4.65@ 5.10
Pool 1, Hamp. Roads.....	4.75	4.60
Pool 2, Hamp. Roads.....	4.50	4.35
Pools 5-6-7 Hamp. Rds....	4.20	4.10@ 4.15

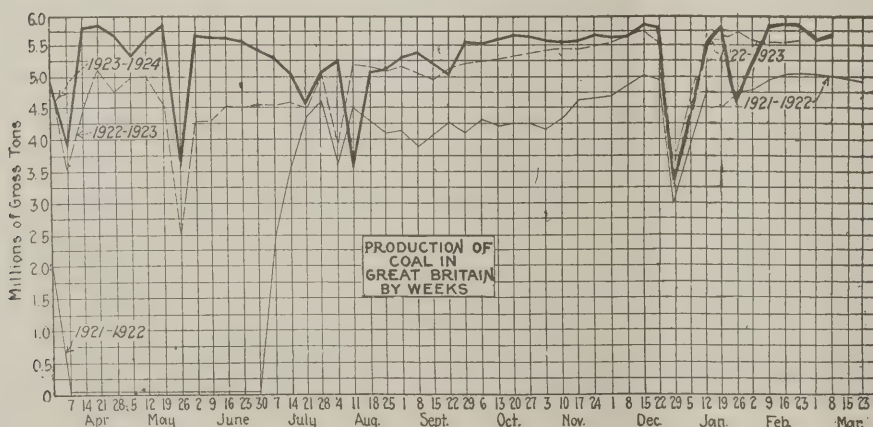
Current Quotations British Coal f.o.b.

Port, Gross Tons

Quotations by Cable to *Coal Age*

	Cardiff:	March 15	March 22†
Admiralty, large.....	31s. @ 32s.		32s. @ 33s.
Steam smalls.....	23s.		23s.
Newcastle:			
Best steams.....	25s. 9d. @ 26s.		26s. @ 26s. 3d.
Best gas.....	25s. @ 25s. 3d.		25s. @ 25s. 6d.
Best bunkers.....	23s. @ 23s. 6d.		25s.

† Advances over previous week shown in heavy type, declines in italics.



Traffic News

Rates in Bash-B. & O. Case Not Unreasonable

Interstate Commerce Commission Examiner Carter has recommended to the commission that findings substantially as follows be submitted in the case of C. E. Bash & Co. vs. the Baltimore & Ohio R.R.:

"Rates on bituminous coal from Ohio and the inner and outer crescents to various Indiana points are found not unreasonable, unjustly discriminatory or unjustly prejudicial except as provided in the commission's orders in the Ohio-Michigan coal cases and the Indiana State Chamber of Commerce case.

"Rates on bituminous coal, carloads, from Ohio to Huntington, Ind., prior to March 1, 1922, are not unreasonable.

"Rates from West Virginia to Gary and Michigan City during the period from Aug. 26, 1920, to June 30, 1922, were not unreasonable.

"Rates from the inner and outer crescents and from Cincinnati to Ben Davis, Ind., have not been and are not unreasonable.

"Rates from Louisville & Nashville mines in Kentucky to Wabash, Ind., from June 11, 1920, to Sept. 14, 1921, were not unreasonable."

Central Indiana R.R. Now in Better Condition

Recall of an order for sale of the Central Indiana R.R., a coal line operating between the southern Indiana coal fields and Muncie, and which has been in the hands of a receiver, William P. Herold, of Indianapolis, for several months, was issued recently in federal court by Judge A. B. Anderson. The order was issued on petition of the Central Trust Co., of New York, trustee for the bondholders, in which it was set forth that the decree and judgment of the court in favor of the company had been complied with, and asking the return of the railroad property to the Central Indiana Corporation, with the exception of the cash and accounts of the receiver. The stock is held by the Big Four and Pennsylvania railroads, which, it is understood, will continue to operate the railroad.

Modifies Western Rate Findings In Wyoming-Colorado Traffic

The Interstate Commerce Commission has modified its findings in the Western coal-rate case in so far as it applies to interstate rates from Rock Springs-Kemmerer to certain points in Colorado. The commission points out that in view of the substitution of certain rates by the Wyoming commission and with these intrastate rates in effect, the rate relationships which were found proper at Cheyenne, where the coals meet, will be disturbed to the disadvantage of the Colorado operators unless a

modification is prescribed. "The rates which the Wyoming commission now has prescribed," says the commission's decision, "may be used for the purpose of fixing relationships with the interstate rates from the Colorado district."

Seek Lower Short-Haul Rates In West Virginia

Several chambers of commerce and industries in the northern part of West Virginia having asked an adjustment of rates on fuel from the mines to distances not to exceed ten miles, a hearing was held by the Public Service Commission of West Virginia about the middle of March. A general reduction of about 10 per cent is asked, the complainants contending that short-haul rates on fuel in West Virginia are higher than similar rates in Ohio and Pennsylvania. The Public Service Commission inquired as to the absence of traffic officials of the railroad companies and indicated that unless traffic officials appeared, the commission would be disposed to grant the request of the complainants.

Indiana Roads to Fight Rate Cut

Indiana railroads have decided to oppose the order of the Indiana Public Service Commission for a reduction, effective April 1, in freight rates on coal amounting to approximately 10c. a ton. The reduction, the roads contend, means an annual loss in revenue of about half a million dollars. It will be contested in the courts, the way to carry it to the courts having been paved when the Indiana commission refused the carriers a rehearing. On the refusal it is possible to file briefs in court against the cut, which was obtained through the Indiana Chamber of Commerce, Indiana coal operators and the United Mine Workers of Indiana.

Final Argument on Hard-Coal Rate From Buffalo to Twin Cities

Final argument on the rescinding of the joint rate on hard coal from Buffalo to the Twin Cities will be heard on March 28. The Twin City Coal Exchange will be represented by its attorney, S. B. Houck, of Minneapolis.

I. C. C. Suspends Cancellation Order

The Interstate Commerce Commission on March 19 suspended until July 18 certain schedules which proposed to cancel rates on bituminous coal from mines in Kentucky, Virginia and West Virginia moving via La Crosse, Ind., in connection with the Pere Marquette Ry. to certain destinations in Michigan and Wisconsin, which would result in the application of highest combination rates via the eliminated routes.

Industrial Notes

As the result of a recent survey the General Electric Co. has established service and repair shops at Atlanta, Chicago, Los Angeles, New York, Kansas City, Minneapolis, Oakland, Philadelphia, St. Louis and Seattle, in addition to such service maintained at the factories. Each of these shops has the personnel and facilities for any form of service work on machines up to 500 hp., some of the larger shops being equipped to handle apparatus of any size. These shops also are prepared to furnish competent men on short notice in case of accidents or for any emergency work.

The name of the business heretofore conducted as L. A. Green has been changed to the L. A. Green Railway Equipment Co., First National Bank Building, Pittsburgh, Pa. The policy, purpose, personnel and organization of the company remains unchanged. The company distributes rails, machinery and equipment for mills, mines and contractors and manufactures "Durabil" steel frogs, switches and crossings.

Obituary

Henry Kulp Stauffer, vice-president of the Pittsburgh Terminal Coal Co., of Pittsburgh, Pa., died March 12 at his home in that city, aged 51. Mr. Stauffer entered the coal business 31 years ago as a clerk in the employ of the Berwind-White Co., at Punxsutawney. Later he was associated in various capacities with the following companies: David E. Williams & Co., Allport Coal Co.; Flenner, Hendrickson & Stauffer, Watkins Coal Co., Lennox Coal Co., B. Nicoll & Co., and since last November as vice-president in charge of sales for the Pittsburgh Terminal Coal Co. He leaves a wife and two daughters and is also survived by his brother, J. C. Stauffer, of W. L. Irish & Co., and by his mother.

Coming Meetings

Association of Iron and Steel Electrical Engineers. Fuel Saving Conference, April 2 and 3, William Penn Hotel, Pittsburgh, Pa. Secretary, J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

Canadian Retail Coal Association. Annual meeting, April 3 and 4, King Edward Hotel, Toronto, Ont., Can. Secretary, B. A. Caspell, Brantford, Can.

American Institute of Electrical Engineers. Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

News Items From Field and Trade

ALABAMA

Chickasaw Shipbuilding & Car Co., Fairfield, subsidiary of the steel corporation, has been awarded a contract for 1,800 freight cars by the Louisville & Nashville R.R. which is 47 per cent of a total of 3,900 cars which the railroad company has placed orders for. The Chickasaw order represents an expenditure of \$4,200,000. The Southern Ry. also has placed an order with the above company for 750 hopper cars.

Salmon & Cowin, mining engineers and contractors, Birmingham, have been incorporated with an initial capital stock of \$3,000, to do a general engineering business. Herbert S. Salmon is president; Percy C. Cowin, vice-president and treasurer.

The Wadsworth-Cahaba Coal Co., Inc., Birmingham, has increased its capital stock \$23,000.

ILLINOIS

The Operators' Association of the 5th and 9th Districts has decided to restrict its activities and expenses by discontinuing its statistical department. Paul H. Greenlaw, of St. Louis, Mo., who is in charge of statistics and has been associated with the organization for eight years, will sever his connection as soon as he winds up the department's affairs. During the Fuel Administration he was appointed assistant district representative by Dr. H. A. Garfield, U. S. Fuel Administrator, and Deputy Fuel Distributor by Wallace Crossley, Federal Fuel Administrator for Missouri. During the strike of 1919 he was appointed member of the Southwestern Regional Coal Committee by Dr. Garfield, and by this committee was chosen its chairman.

The Melike brothers, Rudolph, Fred and Herman, have bought Section 1 coal mine, located about three miles southeast of Coal Valley. It was formerly owned and operated by J. M. Pryce and son. The mine employs about twenty-five men. Mr. Pryce was formerly the operator of the Eureka mine, located one mile southwest of Coal Valley. This mine closed about two years.

Mine No. 2 of the **Mount Olive & Staunton Coal Co.,** near Williamson, produced 5,128 tons of coal March 4, which was a record for that mine and is said to be the record for Madison County. The mine is 317 ft. deep, the deepest in the county. This mine operated 212 days last year, more than any other mine in the county and produced 787,792 tons of coal, also the peak for Madison County. Normally, 700 men are employed.

Production of 400 tons of coal has now been reached by the **Shuler Coal Co.,** at its new mine at Alpha. Operation of the mine was begun last fall and production has steadily been increased. A considerable part of the output is sold in the Davenport-Rock Island-Moline district.

The Superior Coal Co., at its No. 1 mine, Gillespie, hoisted 3,001 tons of coal March 3, in eight hours. To accomplish this output 1,625 mine cars were hoisted at the rate of 203 pit cars per hour, which required a railroad train of 103 cars to convey from the mine.

On March 12 the **Kathleen mine,** at Dowell, brought up 5,286 tons, breaking its record again. The prior record was 5,262 tons.

INDIANA

Charles W. Whitlock, an attorney, was named receiver by Judge John P. Jeffries in Terre Haute, for the **Otter Creek Coal Co.,** following the filing of a suit by the Wolverine Coal & Mining Co., of Chicago, in Circuit Court, against the Otter Creek Co., asking for a receiver.

KANSAS

Five months back pay to Alex Howat, deposed president of District 14 of the union, was proposed at the March convention of the District. John L. Lewis, International president, checkmated this attempt to aid the disturber, Howat, by

warning the district that if it made such payment it would be prosecuted for misappropriation of union funds. The convention then directed the district board to appeal the matter to the International executive board.

KENTUCKY

The Merchants Ice & Cold Storage Co., Louisville, has placed a contract for **Harlan screenings** at \$1.50 a ton. A contract which had until June to run was cancelled as of March 15 giving the company the advantage of 15c. a ton over the period to June, when the old contract would have expired according to an official of the company. It is said that the contract went to the **Blue Diamond Coal Sales Co.,** Cincinnati, and that the former contract was at \$2.25, later scaled down to \$1.65.

MARYLAND

The J. D. Walker Coal Co. has purchased property in Caton Ave. near Frederick Ave. on the Pennsylvania R.R., Baltimore, for a coal yard that is to be one of the largest in the city. The company, which mines its own anthracite and bituminous coal, will specialize in a substitute for anthracite, which is intended especially for households.

MISSOURI

The Harmony Coal Co. of Kansas has been incorporated to do business in Missouri and will have headquarters in Foster. The company will mine coal and sell it at wholesale and retail. W. R. Schooley, of Foster, is the principal agent in Missouri.

The Central Coal & Coke Co., Kansas City, announces the appointment of G. L. Parsons as general sales manager and of F. H. Oliver as sales manager.

John Woodruff, a coal miner, has sued the **United Mine Workers** for \$30,000 damages for injuries he says he received three years ago when a crowd of union miners from Richmond visited a mine near Excelsior Springs where he worked and tried to convince non-union men they should join the union.

The Federal Trade Commission has issued a complaint against the **Boehmer Coal Co.,** of St. Louis, charging it unfairly represented its coal to be "Victory coal," causing the trade to confuse this with "Victory coal" produced by the **Victory Collieries Co.**

NEW YORK

Stockholders of the Consolidation Coal Co. have approved the issue of \$10,000,000 7 per cent cumulative preferred stock. It will be offered to stockholders of record March 29, at par on the basis of one share for each four shares of common.

Governor Smith on March 21 signed the McGinnies bill as chapter 55 of the laws of 1924, amending chapter 581 of the laws of 1923, entitled "An act making an appropriation for the preparation of plans and specifications by the State Engineer and Surveyor for the construction of tipples for coal at Ithaca and Watkins, with a view of facilitating the transportation and delivery of coal," by extending until Feb. 1, 1925, the time such report shall be filed and providing for an estimate of cost to accompany such report of needed equipment and facilities. A reappropriation of \$9,782.27 is made to carry out the provisions of the act.

The Consolidation Co. reports for the year ended Dec. 31, 1923, a net income of \$2,585,473, equal to \$6.43 a share on the \$40,205,448 capital stock outstanding, after deducting depreciation, interest, federal taxes, etc. This compares with a net income of \$2,558,445, or \$6.36 a share, on the same amount of capital stock outstanding as of Dec. 31, 1922. The surplus for the year amounted to \$173,403, as compared with \$146,411, making the profit and loss surplus \$5,485,735 against \$5,442,955 for 1922. As of Dec. 31, last, the current assets stood at \$21,824,164 and current liabilities \$18,810,843 leaving net working capital of \$3,013,321, as compared with \$15,827,416 at the close of 1922. During

the year the company advanced substantial funds to carry forward the development of its mines in the Pocahontas-New River Division, acquired in 1922, says President Watson. It also was found possible, he added, to re-enter foreign markets on a somewhat larger scale. The increased expenditures required for this expansion account for the principal increases in the floating indebtedness of the company, according to Mr. Watson. F. W. Wilshire, vice-president, has been elected to the board of directors to succeed Frank Anschul.

Arthur Lathrop Zerbey, formerly with W. A. Marshall & Co., has joined the **Fuel Service Co.,** 17 Battery Place, New York City, as vice-president.

NORTH CAROLINA

The first trainload of coal mined in North Carolina was hauled into Raleigh by the Norfolk-Southern R.R. The train consisted of 18 standard cars, each carrying 50 tons of coal. Ten cars of this coal came from the Cumock mine, in Lee County and eight from the new Carolina mine. The Norfolk-Southern has been using this regularly for many months and finds it satisfactory for railroad purposes. This shipment was the first of such magnitude to be hauled away from these North Carolina mines, but it promises to be the precursor of thousands of other shipments.

OHIO

"Getting the Most Out of Your Coal Fire" is the title of a booklet being distributed by the Columbus Coal & Lime Co., of Columbus. The booklet is not an advertisement for any particular brand of coal or any make of heating apparatus but to insure the coal users of getting the most heat from fuel. Methods of firing suggested for different coals are said to be the result of tests made by the author, L. R. Taylor, during his years as a heating engineer. In his introduction Mr. Taylor says: "Method of operation, although it may not be so recognized, is unquestionably the prime factor in determining fuel consumption and freedom from operating troubles, no matter what fuel is being used."

Suit for the recovery of \$84,000 was filed in the federal court at Columbus by the ten heirs of the late Lorenzo D. Lively, of Jackson, against the **Chapman Coal Co.,** of Columbus. The heirs of Lively, who died in 1901, claim that in 1919, 1920 and 1921 the Chapman Coal Co. wrongly forced underground entries into 30 acres of land of the Lively estate and removed 12,158 tons of coal, for which the above amount is sought. The plaintiffs in the action are widely scattered.

William O'Toole, former vice-president of the central Pocahontas Coal Co. and minister to Paraguay, arrived on the Str. "Southern Cross" at New York on March 17, for a furlough of three months in this country. A telegram to manager Heitzman at Cincinnati carried the information that he intended to visit former acquaintances in Cincinnati after a few weeks at Welsh and a visit to his father, General O'Toole at Gary, Va.

PENNSYLVANIA

By a unanimous vote of the stockholders the capital stock of the **Lehigh & Wilkes-Barre Coal Co.** has been increased from \$10,000,000 to \$30,000,000 divided into \$10,000,000 7 per cent preferred and \$20,000,000 in common stock. The increase, it was said, was to bring the authorized capital in line with the price paid for the purchase of the coal company's holdings from the Central Railroad of New Jersey. Officers were elected as follows: C. F. Huber, president; Douglas Bunting, vice-president and general manager; Daniel Anthony, vice-president and general agent; Charles E. Ash, secretary-treasurer and Jackson E. Reynolds, John L. Kemmerer, S. B. Thorne, George R. McLean, Gilbert S. McClintock and Douglas Bunting, directors.

There were 180 fatal accidents in the mines of Pennsylvania during the first two months of 1924, the number being unusually high because of the mine catastrophe in Indiana County on Jan. 26, when 37 lives were lost. In January, according to the records of the Bureau of Workmen's Compensation of the State Compensation Board, there were 39 fatalities in the anthracite mines and 65 in the bituminous mines. In February there were 46 deaths in the anthracite and 30 deaths in the bituminous mines. The total compensation paid or awarded, including \$550,146 awarded in fatal cases, amounted to \$751,974 in January, and \$784,811 in

February, including the sum of \$444,727 paid or awarded in fatal cases.

The partnership of Geo. E. Henry & Son, of East Brady, will be dissolved April 1 and its affairs terminated as promptly as possible. J. Wilson Henry is organizing the Henry Coal Mining Co., which will take over the business. None of the assets or liabilities of the partnership will be transferred to the new company which will stand on its own feet.

VIRGINIA

The City of Norfolk is asking for bids on 9,000 tons of steam coal, and the State of Virginia is asking for bids on 60,000 tons of steam coal. The Chesapeake & Ohio R.R. is in the market for 1,800,000 tons, and Norfolk agencies will submit bids in all cases.

WEST VIRGINIA

With a view to operating on a large scale the Big Otter Collieries Co. has been organized with a capitalization of \$300,000, the general offices of the company to be at Wheeling. Principally interested in the new coal corporation are J. E. McClay, Charleston; R. J. Cotts, R. B. Herndon, H. A. Crowther, of Wheeling, and C. E. Molloy, of Heaters.

The Philadelphia & Cleveland Coal Co. has begun excavations for its new coal-loading terminal on the Ohio River at Twenty-sixth Street, in Huntington—an improvement which will involve an expenditure of about \$150,000. At the new terminal the company will transfer coal coming from the mines in cars to barges and will ship to Addyston, Ohio, near Cincinnati, where the coal will again be loaded into cars and shipped to the Lakes or to inland Western markets. The company has already expended about \$250,000 on its plant at Addyston. In building a river loading tippie at Huntington the company is arranging to install from 1,800 to 2,000 ft. of track together with a concrete overhead crossing at Twenty-seventh street. After the coal has been dumped into a large concrete basin it will be conveyed through a trench-like arrangement on a broad rubber conveyor to the barges where there will be a fall of not more than 4 ft. It will require about six months to complete work on the Huntington river terminal.

The Banfi Coal Co., of Follansbee, has been organized with a capital stock of \$25,000, the general offices of the company to be at Follansbee. Actively interested in this company are Andrew M., Helen M. and John M. Banfi, all of Follansbee.

The Three States Coal Co. with general offices at Bluefield, at its annual meeting elected officers as follows: C. A. Clyborne, president; F. T. Beazley, vice-president; J. Coy Pearce, secretary; V. H. Campbell, treasurer. The treasurer of the company also will act as assistant to the president. He was until recently district manager of the W. E. Degans Coal Co., of New York.

The Sitnek Coal Mining Co. has elected the following directors: Louis Sitnek and R. L. Rankin, of Philadelphia; S. H. Harold, of Uniontown, Pa.; Edwin Cramp, of Fairmont, and Harvey H. Stagers, of Fairmont. The directors elected the following officers: Louis Sitnek, president and general manager; Edwin Cramp, general superintendent; R. L. Rankin, secretary and treasurer; H. H. Stagers, assistant secretary. The Sitnek company recently purchased the Katherine mine of the Antler Coal Co. at Lumberport, and is making extensive improvements, including the installation of mechanical loading machines. These machines are said to be the first to be tried out in the Pittsburgh seam in northern West Virginia. According to general report, the company will extend its holdings in northern West Virginia.

A meeting of the stockholders of the Killarney Smokeless Coal Co. of Killarney; the Ingram Branch Coal Co., of Ingram Branch, and the Smith Pocahontas Coal Co., of Caloric, was held at Lynchburg, Va., about the middle of March, when Green H. Nowlan, of Lynchburg, was elected to succeed the late James Gorman as president of the three concerns.

M. M. Tyree and associates, of Huntington, who recently organized the M. M. Tyree Coal Co., with a capital stock of \$100,000, have moved into offices in the Robinson-Prichard Building, in Huntington, about the middle of March.

The Lawrence E. Tierney Fuel Co. has moved its general office from Powhatan to Bluefield.

The Wysong-McCoy Coal & Land Co., with extensive coal and timber holdings in Webster County, on the Baltimore & Ohio R.R., has been reorganized as the Multi-Seam Coal & Land Co. and arrangements are being made to refinance this company and put it on a sound running basis, according to news from the general office of the company at Princeton. S. J. Evans is president of the reorganized corporation.

Employees are to be given the opportunity to buy stock in the Bethlehem Mines Corporation, a subsidiary of the Bethlehem Steel Corporation, which marks a new departure in the policy of the mining company at least in so far as the Barrackville and Dakota mines, in the Fairmont region, are concerned. The plan is to be known as the "Employees Saving and Stock Ownership," by which an employee may subscribe for shares of stock at the rate of one share for each \$400 annual earnings. The price on the first year's offerings will be \$94 per share. The plan makes provision for credits of dividends and interest charges that will result in a net cost to the employee substantially below the purchase price. As an added incentive to employees to hold the stock and to continue in the employ of the corporation, it has been agreed to make special bonus payments every year for five years from the time stock is purchased, amounting to \$1 per share for the first year; \$2 per share for the second year and so on up to \$5 per share at the end of the fifth year.

Rumors of a sale of the Simpson and Galloway mines, three in all, and of 2,700 acres of Pittsburgh coal land in Barbour and Taylor counties by the Simpson Creek Coal Co. to the Simpson Creek Collieries Co. have been confirmed by an announcement made at the annual meeting of the first-named company. The officers of the purchasing company are identified with the Hanna interests of Cleveland and with the Youghiogheny & Ohio Coal Co. of that city.

John J. Lincoln, one of the well-known operators of the Pocahontas field, has invited the American Institute of Mining and Metallurgical Engineers to visit the Pocahontas district on its annual tour next October.

The Rosebud Coal Co., of Clarksburg, and the Gilbert-Fairmont Mining Co. have just been organized by virtually the same interests, the former company having a nominal capital and the latter \$50,000. Active in organizing the Rosebud company were J. M. McDonald, of Cincinnati; D. Kinnard, Karl B. Kyle, C. M. Barnes and L. J. Shahan, of Clarksburg. Incorporators of the Gilbert-Fairmont company were H. F. Mannix, of Cincinnati; K. B. Kyle, James A. Laislip, C. M. Barnes and L. J. Shahan of Clarksburg. W. VA.

Milburn By-Products Coal Co. at Milburn is installing a Roberts & Schaefer revolving dump and belt conveyor machinery.

The Meriden Smokeless Coal Corporation has just been organized with a capital stock of \$250,000 and with headquarters at Elkins and Meriden. The names of E. A. Bowers, William A. Arnold, Bertram Berger, G. B. Southward and A. H. Hoefar, all of Elkins, appear as incorporators, some of them being connected with the West Virginia Coal & Coke Co.

Latest information concerning the organization of the Meriden Smokeless Coal Co., capitalized at \$250,000 is to the effect that this simply represents a reorganization of the Albert Thompson interests and is for the purpose of giving title to the estate. W. H. Cunningham, of Huntington, has been elected president and Lee J. Sandridge of Philippi vice-president and general manager. The company operates at Meriden.

Of the total of 70,188,203 gross tons of coal produced in the mines of West Virginia in 1922, it is shown by the report of the State Department of Mines that there was produced of the Monongahela series, No. 15, a total of 14,652,987 tons; of the Conemaugh series No. 14, or Elk River, series a total of 1,916,895; of the Alleghany-Kanawha series No. 19, a total of 24,195,779 tons and of the Pottsville-New River-Pocahontas series No. 12, a total of 29,422,542 tons. Production in the same year by geographical districts was as follows: Panhandle, 3,796,904 gross tons; Fairmont district, 9,625,112 gross tons; Preston-Barbour district, 3,066,657 gross tons; Elk Garden, 1,080,042 gross tons; Mason, 48,253 gross tons; Putnam, 170,552 gross tons; Kanawha, 6,110,150 gross tons; New River, 11,900,162 gross tons; Logan, 13,904,980 gross tons; Pocahontas, 18,354,975 gross tons; Mingo, 2,130,416 gross tons; small wagon mines, 700,000 gross tons.

Fourteen resident and one non-resident coal corporations were organized in West Virginia in January with an aggregate capital stock of \$3,055,000, as follows: Agee Coal Co., of Huntington, \$200,000; R. S. Smith Coal Co., of Huntington, \$100,000; Gilbert Fairmont Mining Co., of Clarksburg, \$50,000; Rosebud Coal Co., Clarksburg, \$50,000; Brockman Smokeless Coal Co., of Charleston, \$300,000; Monarch Smokeless Coal Co., of Bluefield, \$400,000; Bonafield Coal Co., of Tunnelton, \$125,000; Braxton Fuel Co., of Clarksburg, \$25,000; Miners & Consumers Coal Co., of Huntington, \$275,000; Mine-to-Consumers Coal Co., of Martinsburg, \$25,000; Otter Creek Coal Co., of Hambleton, \$5,000; Dry Fork Sewell Coal Co., of Clarksburg, \$25,000; Meriden Smokeless Coal Co., of Meriden, \$875,000; Kistler Coal Company of Kistler, \$550,000; Sanderson Mining Co., of Greensburg, Pa., \$50,000.

WASHINGTON, D. C.

The Navy Department awarded contracts for 24,600 tons of navy standard coal to be delivered in April, May and June to the Government Fuel Yard, at Washington, to the Lake & Export Coal Co., at \$2.22 net mines; Raleigh Smokeless Fuel Co., \$2.24, and C. G. Blake & Co., \$2.24, each taking an equal share of the contract.

CANADA

The outlook for coal mining on Vancouver Island is blue. Owing to the general slackness of the coal trade on Vancouver Island, the Canadian Collieries, Ltd., has closed its South Wellington mines and the Granby Consolidated Mining, Smelting & Power Co. has reduced the working crew at its Cassidy Colliery 50 per cent. It is steadily replacing smelting with concentration, thus reducing its coal needs. Some of the men at the South Wellington mines are being given employment at the Wellington Extension mine. Unless some other outlet is found for the coal the cut of the crew at the Cassidy colliery is likely to be permanent. The bulk of the Cassidy coal is high in ash, and does not find a ready market. For smelting purposes, of course, it is crushed and washed before conversion into coke, so the high ash does not matter so much.

Gordon F. Dickson, general manager of the Blue Diamond Coal Mines at Brule, Alberta, has left for eastern Canadian points. Production at Brule has ceased since the discontinuance of coal orders by the Canadian National Ry.

The Pacific-Alberta Coal Bunkering Co., Ltd., has been organized, with an authorized capital of \$300,000, for the purpose of erecting coal bunkers for Alberta coal at Vancouver and possibly other towns on the British Columbia coast.

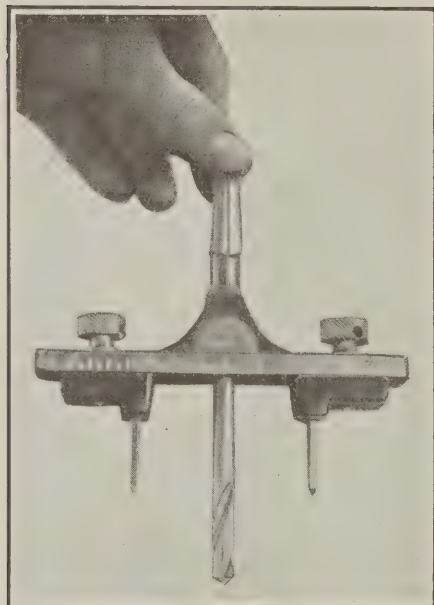
Association Activities

At the annual meeting of the Pittsburgh Vein Operators' Association, held at Cleveland March 11, Ezra Van Horn, general manager of the Clarkson Coal Mining Co., was elected president of the association, succeeding Michael Gallagher, of the M. A. Hanna Co., who had held the office three years. Mr. Gallagher led the association in difficult and intricate negotiations with the United Mine Workers and frequently was elected chairman of joint conferences for the whole central competitive field. Mr. Gallagher remains a member of the executive committee, representing the Wheeling & Lake Erie Coal Co. Walter I. Robinson, vice-president of the Youghiogheny & Ohio Coal Co., was elected vice-president. H. R. Sullivan, general manager of the Central Coal Mining Co., was re-elected treasurer. D. F. Hurd, who has been secretary for a number of years, was re-elected. The following members were elected to the executive committee: Mr. Van Horn, chairman; Mr. Gallagher; Mr. Sullivan; A. W. Dean, secretary-treasurer of the Barton and Fairview coal companies; J. L. Good, sales manager of the National Coal Co.; T. H. Johnson, secretary of the West Wheeling Coal Co., Bridgeport; J. C. Nelms, general manager of the Ohio & Pennsylvania Coal Co.; S. H. Robbins, president of the Youghiogheny & Ohio Coal Co.; C. W. Troll, president of the Troll Coal Mining Co.; Whitney Warner, vice-president of the Warner Collieries Co.; R. L. Wildermuth, vice-president and general manager of the Lorain Coal & Dock Co., Columbus; W. R. Woodford, president of the Rail & River Coal Co. Charles J. Albasin, labor commissioner, Bridgeport, was re-elected.

New Equipment

Drill for Cutting Circular Holes in Sheet Metal

A new tool is being manufactured for cutting circular holes in metal, wood or fibre by the Cincinnati Tool Co., Norwood, Cincinnati, Ohio. This device has knurled thumb screws which adjust the steel cutting blades so that the holes from 1 to 4 in. in diameter may be readily and accurately cut. The drill in the center is for the purpose of guiding the outer cutting blades so as to cut a true circle.



Drill for Cutting Large Holes

This device is designed for cutting true large size circular holes in metal, wood or fibre material. The long center drill is for the purpose of guiding the outer cutting blades.

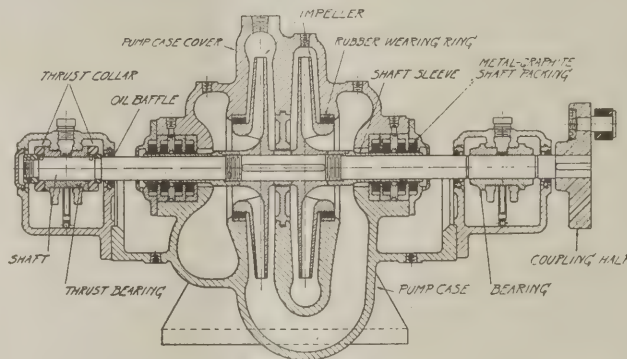
Electric Power Trammer Readily Transferable

A small power driven caging device has been developed by the Mancha Storage Battery Locomotive Co. of St. Louis, Mo. It is known as the Mancha little trammer, and with it, mechanical haulage on every level of the mine is

made possible. It is built to run onto a mine cage like a coal car, and go to another level without the necessity of dismantling any part. By reason of its ingenious construction, one end of the locomotive, consisting of a bumper and seat for the motorman, can quickly be raised up over the top of the storage battery, thus shortening its total length.

When used in places where a spare battery is kept, this device can be used continuously by changing the battery. It does away with costly, inefficient mule haulage, or hand tramping, thus reducing cost and increasing tonnage.

The company is also prepared to furnish the necessary charging equipment for use with the trammer. Where alternating current is the only power available, motor-generator sets of suitable capacity are furnished with the battery charging panel.



Well-Balanced Centrifugal Pump

In the design of a new centrifugal pump it is always necessary to incorporate all points of excellence developed to date. The Moore Steam Turbine Corp. of Wellsville, N. Y., has just announced a new centrifugal pump in which they have incorporated several points of excellence.

This pump is designed so that rubber sealing rings may be used on the impeller between the suction and discharge chambers, and also for the use of metal graphite packing instead of the ordinary packing.

The metal graphite packing rings rest lightly upon the revolving shaft, there is no pressure to retard rotation and spoil the drive shaft. This feature is especially important where the workmen are not skilled in the care of pumps.

The pump is horizontally split, and perfectly balanced. Part of this balance is accomplished by placing the two impellers of the two-stage pumps in such a position that they will be back to back. The steel shaft is protected by brass sleeves. The pumps are suitable for motor, turbine, or belt drive.

Air Cooler for Generators.—The Griscorn-Russell Co., Massillon, Ohio, Bulletin No. 1216, "U-Fin Cooler," illustrates and describes a cooling device especially suited for turbo-electric generators. It is a surface type air cooler set in an enclosed duct, the air being used over and over again in cooling the windings. The cooling air is thus dry and free from dust, and in the event of fire in the windings, the oxygen in circulation is soon used up and the fire extinguishes itself.

Centrifugal Pump

The metal graphite packing rings provided with this pump rest lightly upon the revolving shaft and are not effected by heat or moisture, thus it is possible to operate the pump with the minimum amount of leakage. These pumps are now built with either one or two stages.

Instruments, Electrical.—Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., Circular 1664, describes indicating instruments for direct and alternating currents.

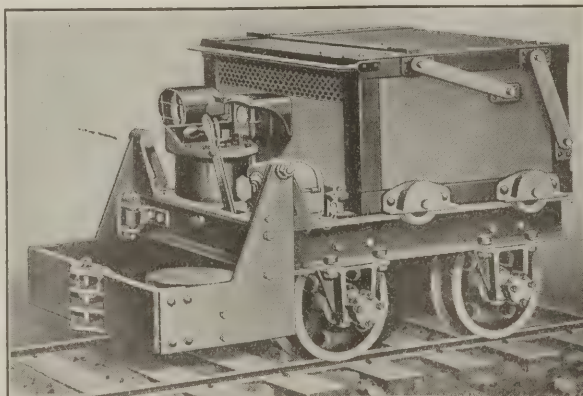
The introductory chapter of the booklet includes a brief and interesting resume of the development of electricity with special reference to the development of alternating current and the earlier alternating-current instruments.

The research that resulted in these new instruments began with analyses of all activities requiring the use of electrical measuring instruments, and all the known principles of operation and construction. In the second chapter the story of this research is related, and there, also, are discussed the principles of operation and construction of the instruments as they are now manufactured.

The remainder of the book is devoted to the instruments themselves. One chapter dwells on questions of standardization and sizes, insulation, compactness, readability, sturdiness, accessibility, simplicity, damping, accuracy and calibration. Another chapter offers a detailed description of the parts making the completed instrument. The last chapter is devoted to instrument applications. According to the company, these instruments work at a very low maintenance cost.

Power Driven Car Trammer

This illustration shows the bumper and motorman's seat in the normal operating position. When the trammer is to be taken to a new location this bumper and seat is turned on its hinges to a position on the top of the locomotive. This arrangement shortens the over-all length



COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, President
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That Blind Spot

EVERY eye has its *punctum cæcum*, its blind spot, the point which affords no vision, and similarly every man has one or more mental inhibitions. Probably if Napoleon with his administrative ability had tried to do the work of Faraday he would have failed. That errand boy and retort washer looked out through what, to Napoleon, was probably only a blind spot, and he discovered the art of generating electricity by motion. Many a man has today administrative ability, even engineering ability but only a relatively blind spot or at least a point of obscured vision for electricity.

Unfortunately, he tries to be a universal mining genius and endeavors to operate his mine without an electrical engineer, suffering all the time because he has not courage enough to admit that electrical engineering is not in his line. Many a mine is hampered because some man in its management is incapacitated by some mental shortcoming and will not get help and advice from someone who has a preference for what creates in him merely a distaste. Fortunately most companies have realized this, and as a result are getting good results by delegating their electrical or their mechanical details to someone who has a penchant for such problems. Some still there are which try to find men of a universality of genius, but these men are hampered even if they do find them, for any man who attempts to cover every field thoroughly and to control everything is too busy to do anything well or fails utterly in a comprehension of some one or more of his many diverse duties. Thus we get plants which reflect the mind of one man and not the combined genius of several.

Marvelous or Only Inevitable?

“WHY is the coal industry so disturbed by labor troubles?” asks the man on the street. Let us look at the postal service for an answer. Some time ago the cost of living rose rapidly, but the U. S. Government failed to recognize that fact with sufficient clearness and failed to raise the wages of postal employees, so the latter banded themselves together to obtain justice. They could have left the service—some of them did—but most of them stayed and sought by agitation to get increases in wage.

Whether because it was necessary to pay more to get employees or because of union pressure or because of a sense of justice—who shall determine?—the rate of pay was increased. Possibly all three causes combined to effect the result. However, whatever the cause, in 1920 wages were raised, and the change in rates cost \$63,000,000 to the nation.

Today the postal clerks and carriers are getting \$1,400 to \$1,800 yearly, fully more than half of each class getting the larger stipend. They start in with the lower figure and rise in five years to the higher level and then, unless they become of a special grade and super-

wise other clerks, they continue to receive \$1,800 a year. That is a wage larger than that paid to employees of like character in private industry, as an investigation has proved. It is far more than is paid in country districts.

One would think the postal clerk and mail carrier would be satisfied, but they are not. There is the union for one reason. It is necessary that any man you are employing shall do something for you. If he isn't busy serving your interests you are defrauded. He must earn his wage. So the union must try to do something, just as it does in coal mining. Furthermore if you got an increase of \$63,000,000 by united effort in 1920, why not duplicate that or do better in 1924. Once the habit is formed it is not easily broken. We often have seen that state of affairs around the coal mines. “It has been done before, why not do it again?” is the well known expression.

Then again, the public is friendly. The people are writing letters to congressmen advocating an increase to postal clerks and carriers. In the coal industry we have seen a similar condition. The public is kind hearted. It likes to expend what it believes is another man's money. How bitterly it cries when it finds that it is its own.

So the clerks and the carriers are clamoring for a living wage just as the mine workers have clamored, and, just as there are too many men willing to “starve” as miners, so there are many men willing to “starve” as letter carriers and postal clerks. Over 6,000 men are certified as eligible for the service, having passed their examinations, but so far there is no room for them. Over 15,000 have written the Civil Service Commission asking when there will be another examination. So with little unemployment in the country, except around the coal mines, there are plenty of men anxious for these jobs.

The incentives are organized agitation, the hope of doing a second time what already has been done before and the good will of the public. This explains why the postal clerks and the carriers are fussing; it also furnishes a reason for the constant labor troubles of the mine workers. The U. S. Government says it can't pay the increases in wage that are demanded, for if they are paid the money must come out of increased postal rates or taxes. That answer seems insufficient.

If wages were inequitable or would not attract the men needed, there would seem to be ample reason for demanding that the money be found somewhere, even the \$123,000,000 which the Kelly-Edge Bill would demand in its first year and the \$150,000,000 more or less that in all would be required later. But the wages are not inequitable nor are men scarce, so the readjustment should not be made except perhaps in large cities where rates and other living costs are inordinately high.

The gods in the gallery are laughing however that the Government which has meddled so often in mine labor difficulties and has sobbed so loudly that the operators and miners could not solve their differences

promptly and amicably has now a trouble of its own and finds that with agitation becomes a business and with protest raised to a practice and with a populace willing to sympathize with wage earners, right or wrong, disputes are chronic. No sooner is one settled than another starts.

Alex Howat Is Not Dead

SOME things that have been going on down in Kansas indicate that the Alex Howat issue is by no means dead within the United Mine Workers. The forcible ejection of Howat, deposed former president of the Kansas union district, from the Indianapolis convention of the union did not strengthen President Lewis in the estimation of many Kansas miners. Instead, it excited them so that Howat was considerably in the ascendent at the recent Kansas district convention. What he demands is reinstatement in the union with full and immediate rights to hold union office and attend international union conventions.

It is plain that if the Kansas district had the power it would give him what he wants. But, unfortunately for Howat, the district has not that power. In its convention the district went on record in favor of abolishing the rule that after a union man has once been expelled he cannot, for three years after reinstatement, hold office. It appears obvious that if it were possible for the Kansans to reinstate Howat and nominate him for election to the presidency of the district, he would certainly be elected in spite of what President Lewis could do to prevent this disturber from getting back into control in the Southwest.

The district convention wanted to pay Howat for the five months which elapsed between his expulsion for calling an unauthorized strike and the end of his term. Lewis may bluff the Kansans out of this with his threat that he will prosecute them for misappropriation of union funds. But the fact remains that Howat is not dead in his own stamping ground and without doubt will continue to harass Lewis from outside the union.

Your Place in Cincinnati

AMONG the misfortunes of executives is the fact that in conversing with their subordinates they are prone to start the conversation and not always wisely. The subordinate puts in an idea here and there to round out the detail of the picture that the executive draws, but it is on the whole the executive's picture and not the subordinate's, and if the executive is disposed to follow the practice at some other man's mine there is little the subordinate can do to get a wholly new method of operation adopted.

The time is here for radical changes. You can no longer be content to follow old courses with trifling modifications here and there—modifications within the authority of subordinates. You must get a new vision or you face a deficit, and if you cannot see one you must get with other men who perhaps can; you must battle with first principles rather than box with trifles.

This is what makes the Cincinnati meeting different from the meetings that have preceded it. It is to deal with fundamentals. It is to widen concepts. Men without travel, without discussion, fall in a rut. Cincinnati will be outside that rut. Executives and engineers will meet to find a new way; they will meet more numerously than ever. The darker the night, the greater the need of light.

"Stay at home and save money" is foolish counsel. "Travel and learn a better, more economical way" is better advice. Go to Cincinnati prepared to find an answer to the troubles that perplex you. Have your subordinates meet you there. See that they absorb all that offers. Encourage them to give their views. Have them make their reports and listen to their counsel, prepared to follow or reject it as your judgment directs.

Your progress depends on using the best your assistants can devise, in giving your subordinates the information on which to direct their judgment. Time devoted to study and business contacts is not lost, it is invested. If you are at the Cincinnati show, you will be able to see that the time expended, by your staff, is well spent, and you can profit by the repercussions of other minds, of fellow operators, of superintendents, of engineers and of your subordinates.

"On to Cincinnati for lower costs per ton."

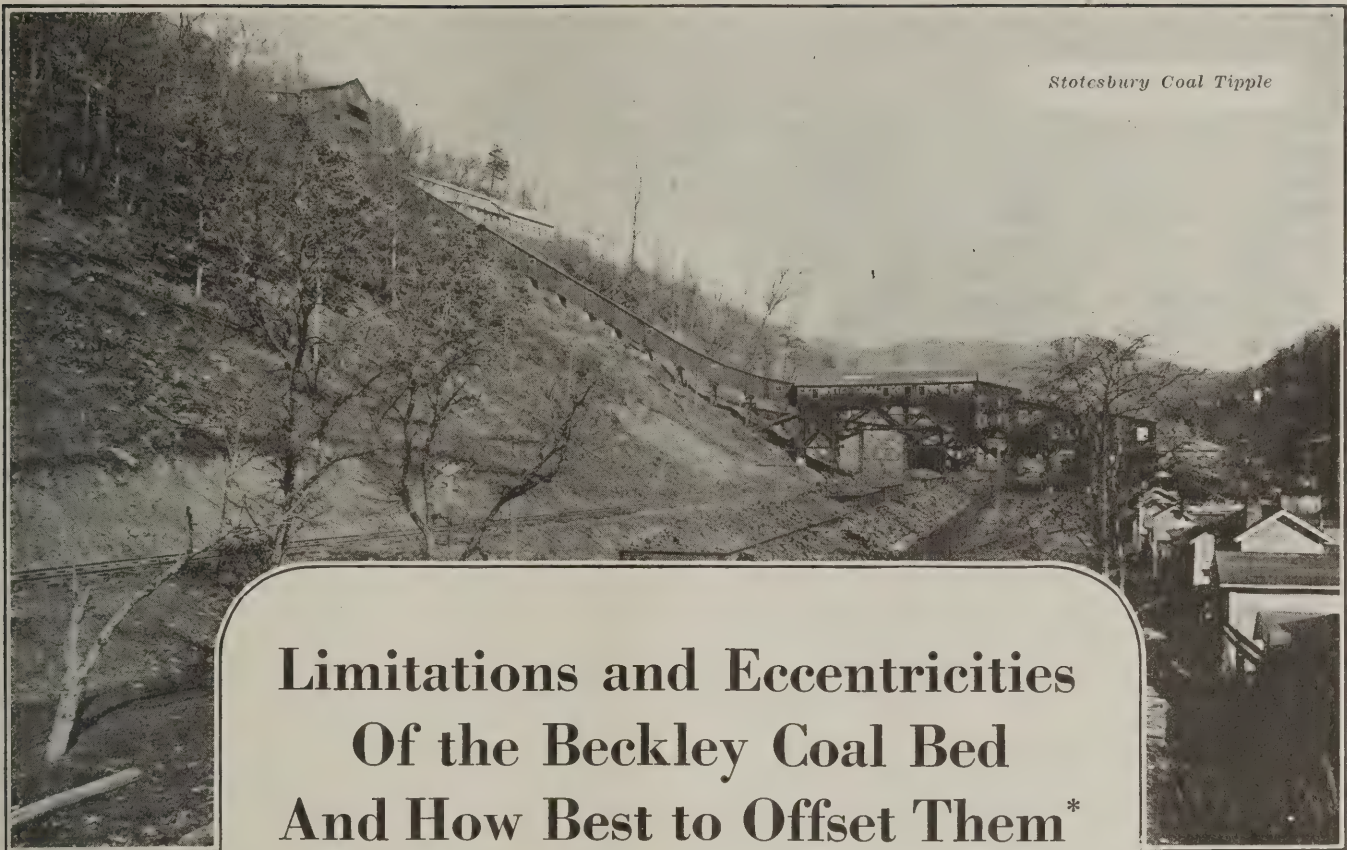
What About Western Kentucky?

MR. LEWIS and the international union have a job on their hands in western Kentucky, for that field is nearly lost to the union. In some of the other outlying fields, notably in the far West, it has been able to continue the expiring agreement for three years as was directed from Jacksonville, although it must not be overlooked that the scale in the state of Washington was at least \$1.25 a day less than that in the Central Competitive Field. But in western Kentucky the situation is different. That field is much closer to regular \$7.50-a-day union territory and therefore the course of unionism there is important.

As the situation now stands, western Kentucky is already divided between unionism and the open-shop. The western half of the region is covered in spots by a contract signed at Madisonville a year ago and which runs another year. Several important companies have not been operating under it but have paid approximately the contract scale which called for 90c. an hour to machine runners, \$6.59 to \$7.20 to other inside labor and \$6.06 to outside labor.

In the eastern half of western Kentucky negotiations are now on for a new contract to replace the old one, the duration of which in consequence of the deadlock between miners and operators has been extended from April 1 to April 15. There the operators demand a 25-per-cent reduction and insist on it in cold terms. The weakness of the union's hold on even this part of the field is such that district-union leaders well know they cannot compel every operation to sign a continuation of the old contract. If Lewis is determined that his Jacksonville ultimatum to outlying districts must be obeyed by the union organization in western Kentucky, then unionism is dead in the whole field.

The question is, will Lewis manage to devise some sort of compromise when the district organization has failed to do this very thing in two weeks of negotiation? or will he cave in and officially sanction a wage reduction of 25 per cent to save the union's skin. Of course he has already been consulted in the western Kentucky matter, and since a stay of fifteen days has been agreed upon, it is logical to suppose that Mr. Lewis is putting off surrender as long as possible so as not to prejudice the case against the union in the Southwest where the operators demand relief and where in order to get it, they are ready to shut down the field and keep it shut down if it takes all summer.



Limitations and Eccentricities Of the Beckley Coal Bed And How Best to Offset Them*

Usually the Upper Split of the Bed Is Worked and This Is Extremely Uneven in Contour Making, Pumping, Haulage and Supervision Problems Severe and Standardization Difficult

BY C. R. STAHL
Glen White, W. Va.

BECKLEY coal was named from the town of Beckley, in Raleigh County, West Virginia, the point where it is most extensively mined. Assuming the Fire Creek seam to be a separate measure, the Beckley bed is the lowest commercial bed, but one in the New River group which forms part of the Pottsville series.

The interval between the Beckley and Fire Creek seams often thins so that the two form one bed, according to the correlations of investigators of the West Virginia Geological Survey, whose conclusions are provisionally accepted and adopted by the authors belonging to that organization. Recent core-drill records, however, tend to upset this theory and convince its opponents that the Beckley seam is a peculiarly eccentric geologic formation composed of two parts, the lower split always lying in its true position with regard to other coal beds of the series adjacent, while the upper split varies from its regular position directly over the lower one, to intervals that baffle all methods of accurate determination in advance of mine development.

The commercial value of the Beckley bed in the past has lain in the top split. Still the lower split has its value. In some places where the parting is thin or has disappeared entirely, the two splits are worked together. A few mines also are working the bottom split where the top split is too thin to mine. Furthermore, there is reason to believe that the splendid coal deposit

now being developed in the Laurel Basin in Wyoming County is the bottom split of the Beckley instead of the top split as has been heretofore supposed.

Beckley coal varies in thickness from 0 to 12 ft. and has been correctly described by the West Virginia Geological Survey as a multiple-bedded, soft, columnar coal. The principal overlying strata is a massive current-bedded sandstone varying in thickness from 50 to 100 ft., and named by Dr. I. C. White, State Geologist, the Lower Raleigh Sandstone.

Underneath this sandstone, and separating it from the Beckley coal bed is a dark-gray argillaceous shale varying in thickness from 0 to 17 ft. A typical analysis of the Beckley coal in its pure state is given in Table I:

Table 1—Analysis of Beckley Coal

Moisture.....	0.88	
Volatile matter.....	17.37	
Fixed carbon.....	78.25	
Ash.....	3.50	
Total.....	100.00	
Sulphur.....	0.53	
British thermal units.....		15,095
Phosphorus.....		Negligible
Fusing point of ash.....		2,600 deg. F.

The thickness of this coal, its purity and excellent heating qualities make it a highly desirable fuel, and long ago it established itself on the market as one of the finest steam coals in the world.

As yet no coal of merchantable value has been found in this bed along New River. It begins to assume commercial proportions in the deep canon of Piney River, in the vicinity of Stanaford Branch, and from there

*Paper read before the West Virginia Mining Institute.

south-westward, it is a seam of great value, forming as it does the bed from which the great Winding Gulf coal field has received its reputation.

In the southern zone of that field the Beckley coal is mined chiefly from drift openings, while in the northern portion it is produced principally from shafts of varying depths. Approximately 1,250,000,000 tons of this coal remain to be mined in the areas now under development in Raleigh and Wyoming Counties.

Fig. 2 shows a longitudinal section developed along a line beginning at Thurmond, W. Va. (See Fig. 1) and extending S. 28 deg. W. The section line passes through the city of Beckley, crosses the Winding Gulf at Hot Coal, touches Stone Coal at the mouth of Tommy Creek, and crosses the main line of the Virginian Ry. about $1\frac{1}{2}$ miles northwest of Herndon. At this point the Norfolk & Western coal fields are reached. The line above referred to crosses Elkhorn Creek at the town of Northfork, touches Tug River at Pageton, and crosses this stream just east of the Black Wolf coal-mining plant.

A glance at the longitudinal section, Fig. 2, will show the relative positions of the Beckley, the Sewall, and the Pocahontas No. 3 and 4 beds which latter up to this time have been the major commercial seams of the Pocahontas group.

The relation of the Beckley coal to the principal valleys in the Winding Gulf-New River area as well as the relation of the Pocahontas No. 3 and 4 beds to the valleys in the Norfolk & Western zone are plainly shown on this section, and indicate the accessibility that determines the methods followed in attacking the deposits in the different fields.

Peculiarly enough, the Beckley bed, which is the

major producing measure in the Winding Gulf field, is underlain with the thin and sometimes laminated Pocahontas No. 3 bed throughout that region. On the other hand, the Pocahontas No. 3 becomes the major bed in the Norfolk & Western field, the Beckley, or War Creek seam, which lies high up in the mountains, becoming in that area a thin and laminated bed. It seldom happens that both the Beckley and Pocahontas No. 3 beds are found in prime condition on the same lease.

Prospecting a lease for Beckley coal should be placed in the hands of parties experienced in that particular bed; otherwise a prospective lessee stands a chance of losing a good lease by reason of insufficient and improperly placed drill holes; or on the other hand, a lease may be taken up and a costly plant installed, only to meet conditions so faulty as to wreck the mining venture. Examples of both conditions can be found in the territory where the Beckley seam is worked.

The vagaries of the Beckley seam that confront the prospector become the problems of the operator. The producer's real troubles might thus be said to begin at the drift mouth or shaft bottom.

The general dip of the coal is nearly due northwest on an inclination of about 3 deg. It seldom happens, however, that a new mine can be projected with regard to this general dip. Usually the drills show a local dip with the inclination extending over a sufficient area to justify laying out the mine in accordance with it. Rarely indeed can the original mine projection be followed to its conclusion. Fortunately, the Beckley coal is so soft that it can be worked equally well in any direction regardless of the face and butt cleats. In consequence, the projection can be changed at will.

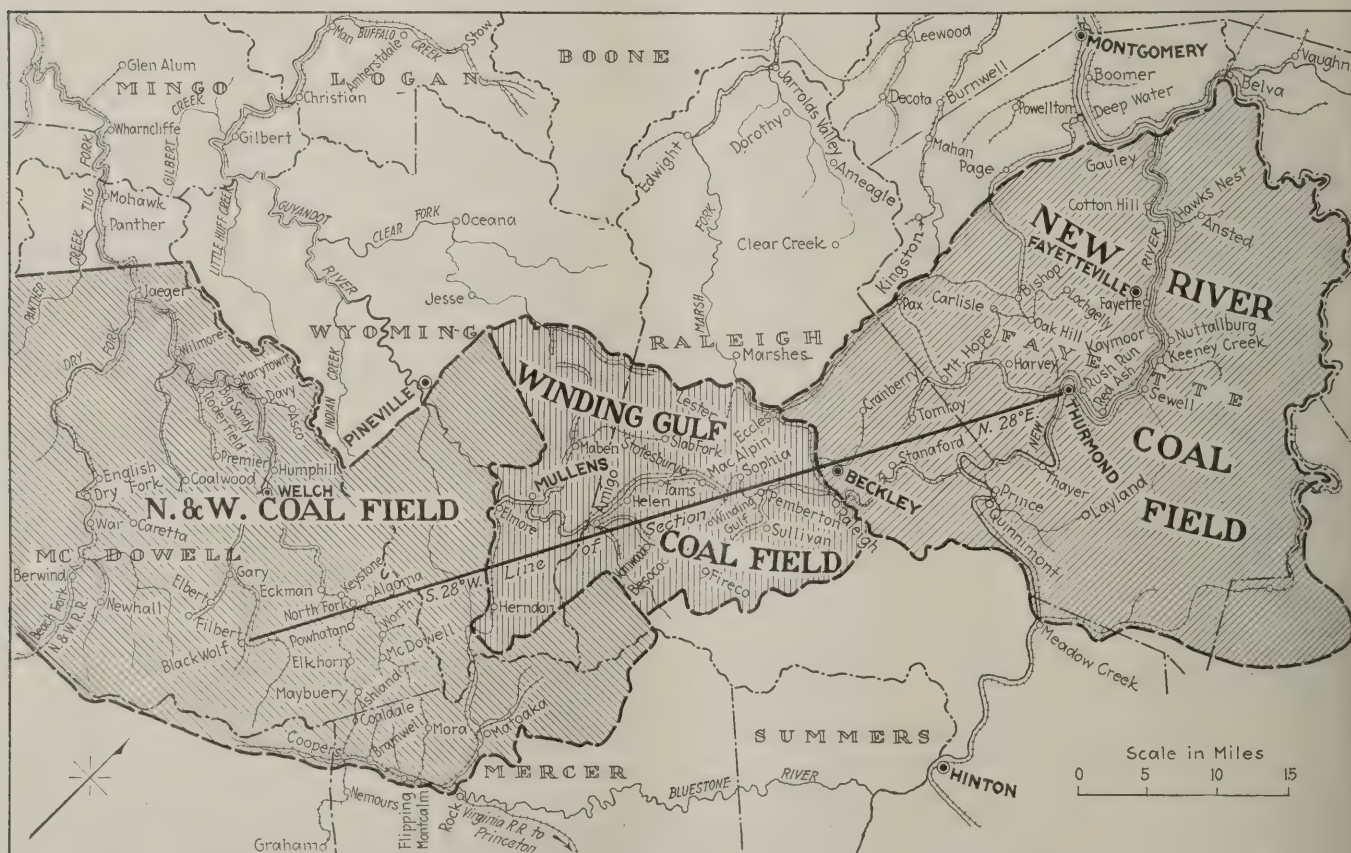


Fig. 1—Map of the Region Where Beckley Coal Is Found

The line extending from Thurmond to Black Wolf is the line upon which the cross-section shown in Fig. 2 is taken

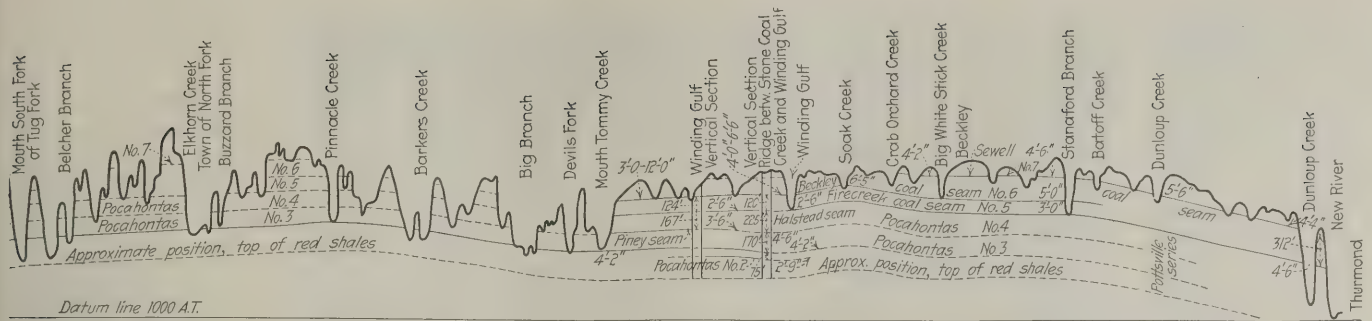


Fig. 2—Cross-Section of the Region Where Beckley Coal Is Found

This shows the Beckley bed not only in relation to the other coal deposits of this region but also to the surface. It is a strange coincidence that where the Beckley bed is most workable the Pocahontas measures are of poor quality and vice versa.

In opening a new mine in this coal bed, particularly if it be a shaft mine, it is well to make only a temporary main pumping installation and to provide only temporary pumping room. The permanent layout around the shaft bottom should be delayed until sufficient development proves what is the most favorable location.

In the past the operator mining the Beckley bed has usually not made sufficient allowance for the temperamental mood of Dame Nature. He has opened up his mine in a basin of clean coal, often ignorant of the fact that the local variations mentioned were present. He has started out with favorable grades and good top, these conditions continuing in some cases over an area of 200 or 300 acres. He has built himself a reputation and made money for his stockholders.

For this man there has been a day of sad awakening. He will have bought his equipment for mining thick coal, but will find some day that his entries have been driven into places in the seam that do not suit such equipment. He may then, if bold enough, change the character of his equipment to meet the new conditions; or, he may, as many have done, shoot bottom in his rooms, maintain his tonnage as long as he can, sell his mine, get a new job and leave someone else to work his way out of the difficulties.

This bed as it changes from thick to thin, varies also to some extent in character. In the top split of the Beckley bed, which is the split usually mined, there is a characteristic gray band consisting of low-ash coal located about $3\frac{1}{2}$ ft. from the top. In thick coal this may be loaded out with the rest of the mine product and sent to market. When the coal gets thinner, however, this gray band thickens and becomes a hard bone, that must be separated from the coal, either in the working places or at the tippie. One thing may be said for the Beckley bed, in this connection, however; it is usually possible to send it to market without any other preparation than hand-picking.

As the entries go to the dip, the coal thickens; as they go to the rise, it thins. It is the rule rather than the exception to find the extremes of these two conditions within a thousand feet of each other with the grades varying from level to 12 or 15 per cent.

Another variable is the character of the top. Where the coal is thin, say from 3 to 4 ft. thick, the top is nearly always a hard sandstone. It sometimes is broken up and mixed with a little slate and coal; but it is probable that this portion of the measure will lend itself to longwall mining. With about 4½-ft. coal we have a top that may be either sandstone or shale. It may be good with no drawslate, or it may be consistently bad, with 3 ft. of that material ready to fall. The character of the bottom in this thickness, however, is

such that pillaring is easy. And I would say also that this represents the Beckley bed in its best average condition.

Where the coal is thick the top may be slate, it may be shale, or it may be hard sandstone. However, the bottom is usually soft, making pillaring rather difficult. It is impossible to make a room-and-pillar system applicable to all of the changing conditions of the Beckley bed. Consequently, the width of the rooms and the thickness of the pillars should be altered to suit the conditions found.

It will be seen that the conditions outlined make main-line haulage difficult. I know of one mine that, in re-shooting its main entry after this passage had been driven in a mile, could do no better for a distance of 2,600 ft. than establish a grade of 3 per cent against the loads. The power cost of mining Beckley coal is

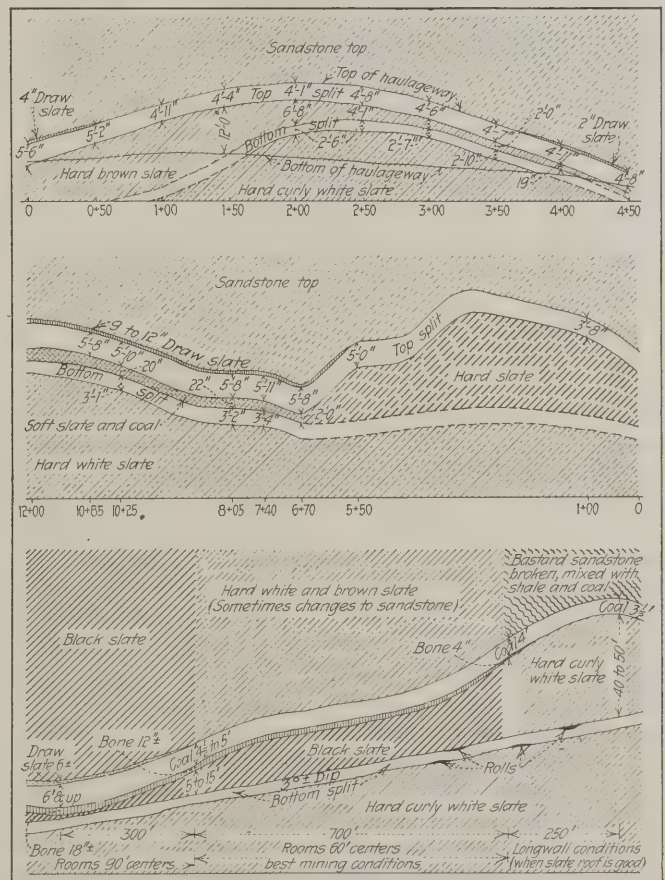


Fig. 3—Typical Cross-Sections of the Beckley Bed

Sometimes the top and bottom splits unite and form one coal bed. More often, however, the splits are distinct. The bottom split is far more regular in contour than the top split which is almost remarkable for its irregularity.

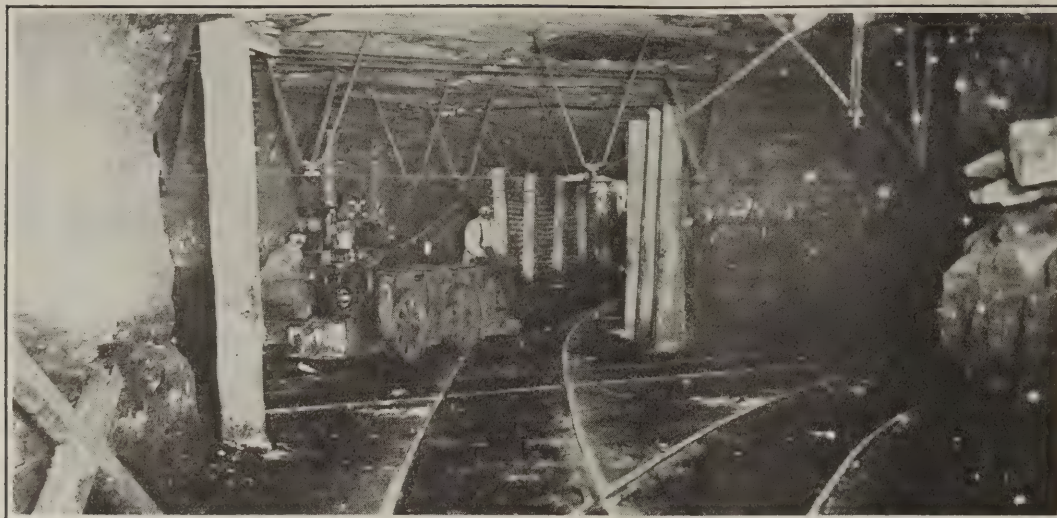


FIG. 4

A Shaft Mine

The Upper Split is the one usually worked but it is so uneven both in thickness and contour that much dead work must be done. Pumping is a difficult but not a serious problem, and it is frequently impossible to project advance workings and adhere to such a projection.

naturally high, and the wear and tear of the machinery used is heavy. It is probable that the repair bills of the Beckley operator are two or three times as high as those of operators working coal measures on uniform grades.

The operator can provide for future haulage and mining in only one way if he desires to maintain tonnage and show a cost that will have bad conditions distributed along with the good. This is to keep the entries three or four years ahead of any known requirement. By this means he is enabled, when he shoots slate for height and grade, to do so intelligently and to lay out his work in each section of the mine for two or three years with the advance knowledge gained from having the territory developed by entries driven as mentioned. This means, however, that he will have thousands of feet of development open at all times upon which he receives no return. Air currents must be maintained in these sections; and airways must be kept clear of falls; furthermore gas must be swept out.

Cutting and shooting, fortunately, do not present any particular difficulties. The coal is mined, where thin, with shortwall, and where thick, with arc-wall machines. Pick mining in the Beckley bed, like mule haulage, is a thing of the past. Sometimes the coal will be "burned" to the bottom or to the top, making shooting and scraping difficult. In this respect, however, the Beckley bed, by and large, presents no great obstacles. Heavy grades, however, cause excessively heavy wear and tear on the cutting machines, as they must go where conditions are bad as well as where they are good. Machine runners also must be skillful, so that they may direct the cut to the dip or to the rise or on a side pitch, as the conditions encountered may demand.

Another difficulty encountered in working the Beckley bed is found in the variable thickness. The mining man likes to use thick-coal equipment for thick coal and thin-coal equipment for thin coal. The thickness of a bed does not in itself mean either smaller or larger tonnage. There are mines in the vicinity of Windber, Pa., that produce large tonnages from thin beds. Such mines, however, are equipped for doing so. The Beckley operator, on the other hand, is confronted with the choice of working thick coal equipment in thick and thin beds alike, or of employing thin coal equipment in both thin and thick measures. He may, of course, use thick coal equipment in his thick coal and thin coal equipment in his thin coal, but these conditions are

local and change so rapidly that he soon has some equipment in a section of the mine not suited to it.

Ninety-five per cent of the Beckley coal now produced is mined by the room-and-pillar system, and it is unlikely that more than 30 per cent can ever be mined successfully by any longwall method. When, therefore, the Beckley operator attempts to use a loading machine, he must adopt a device that will work in room-and-pillar mining and in variable thicknesses of coal, but which can be transported over heavy grades.

WORKERS OUTPUT ALSO VARIES GREATLY

Not only must the variability in the coal bed be considered but also the variation in what constitutes a day's work. The standardization of mining, which is much to be desired, can hardly be accomplished in the Beckley bed. Motormen, machine-runners and tracklayers can do more work under favorable conditions in thick coal than under unfavorable conditions in thin coal; but it is difficult to secure this extra accomplishment from the men. The motorman's idea of a day's work is all too likely to be established by the motorman who labors under unfavorable conditions in thin coal.

The motorman working in the thicker sections, as well as other day men, is prone to believe that if he gets as many cars per day as the other fellow, he has accomplished his day's stint. The man in the thin coal, however, is constantly trying to get a job in thick coal, whether he be motorman or tracklayer; and if he is held to work in the thinner place is likely justly to consider that he should gather fewer cars and lay less track than his brother in the thicker coal. In considering the work that he might legitimately be called upon to perform, he is more apt to do too little than too much. Likewise, the loader wants to work in the thick coal, and a high differential has to be paid him in order to induce him to stay in the thinner place. As indicated elsewhere, the thinner portions of this bed will likely be worked in the future more and more by means of mechanical devices.

All of this means that the supervision given to mining in the Beckley bed must necessarily be of a high order, and that it takes constant vigilance and hard work to secure reasonable efficiency from the men. This combined with the fact that conditions constantly change, necessitating alterations in plans and methods of mining, is apt to result in a high cost for day labor in producing this coal.

Countless swags encountered in this coal measure entail big pumping bills, numerous pumps, many pump-runners, and high repair charges. The quantity of water found in any one swag is not excessive as a rule, but it is a continuous source of trouble unless expensive drainageways are driven to draw it off. The bottom split of the bed is nearly regular and usually too thin to be worked on its merits. The drainageways can usually be driven in it to tap the swags that are found in the top split. Many miles of such drainageways have been driven in the Winding Gulf field.

Swags usually occur where the coal is thick and the bottom soft. In many instances the bottom will begin to heave in these swags before any pillaring is done, the water appearing to have a softening effect on the slate. The wise operator, therefore, in pulling his pillars, will

mine out the swags first. And here again he is confronted with the difficulty that every pillar job has to be planned separately from every other; no systematic method, to be followed throughout the life of the mine, and to which the men can be trained, is suited to the Beckley bed. Here again we have another necessity for the high order of supervision given to mining and the large number of bosses required, all of which adds to the expense of operation.

In conclusion let me say that the man who wishes to make a success of mining this splendid, if irregular deposit of coal, must have ample capital. He must be prepared to stand hard knocks, and spend considerable sums of money in overcoming at the outset any adverse conditions that may be encountered never letting them accumulate to overwhelm him later.

Six Per Cent of Methane Makes Mine Air Dangerously Explosive

At Low Limit Methane Propagates More Readily Up Than Down—Air Vitiating by Carbon Dioxide Explodes Only When Methane Content Is High

"ONLY in percentages between 6 and 14.6 is methane dangerous," said Dr. R. V. Wheeler, director of the Mines Department of the Government Experiment Station, Eskmeals, Cumberland, England, in addressing a body of mining men at Scranton, Pa., March 20. Dr. Wheeler said that though the explosive action of methane is entirely unaffected by the intensity of the source of ignition it does depend in an important degree on the position of that source.

An explosion of methane at its lower explosive limit will propagate more readily upward than downward. The flame rises more readily into the stratum above it and propagation is thus made easy. If a 5.3 per cent mixture of methane and air is ignited near the floor of the mine it will burn upward slowly in a long column and without spreading till the roof of the mine is reached. Then it will spread laterally slowly for some distance without any speed or violence. With 5.4 per cent of methane the flame will involve the whole area containing the gas providing that area has that same percentage of methane and is ignited from below.

If, however, the proportion of methane is 6 per cent the firedamp will ignite and burn in all directions even when lighted near the roof. Similar phenomena may be noted at the upper limit of ignition. A firedamp having 13.4 per cent of methane will flare upward if ignited at the bottom. If the percentage of methane is 13.5, the firedamp will propagate flame laterally but not upward. If 14.6 per cent of methane has accumulated, the flame will extend its ravages downward but not upward or laterally. Any larger percentage of methane than that forming the upper limit will not propagate at all in any direction. These figures may be expressed in a table:

Explosive Limits of Methane in Air

	Lower Limit Per Cent	Upper Limit Per Cent
Upward.....	5.3	13.4
Downward.....	6.0	14.6
Horizontally.....	5.4	13.5

The stratum above a 14.6-per cent body of firedamp is vitiated by the products of combustion and will not burn. The stratum below it is free from that vitiation

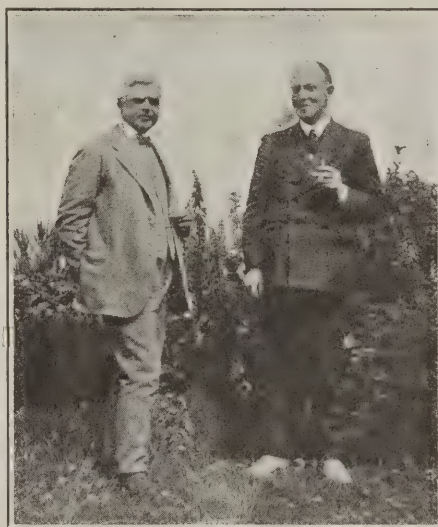
and the flame will travel downward, not readily, but slowly. Dr. Wheeler declared that by the explosive limit is meant the point in percentage where a flame is self-sustaining. The combustibility of methane is an entirely different matter. The firedamp that is explosive is not merely capable of being burned but capable of burning without an exterior

source of combustion once it has been ignited. He put the danger limits between 6 and 14.6 per cent,

He fully agreed with the American point of view that trolley locomotives wisely might be permitted in mines where the air in the mine continuously could be kept well below the explosive limit. Henry Walker, the deputy chief inspector, who was accompanying him on his trip to America, might question, he said, that statement and in saying what he did he spoke for himself alone. The British regulations prohibited any but armored cables, but he believed that the British rules were too conservative, for the explosive limits were well known and never were any lower than the low limits stated.

Speeds of propagation vary from about 20 ft. per second to about 100 ft. At 9 and 9.5 per cent the speed of the explosion reaches a maximum. On either side of that maximum the propagation speed falls rapidly. At 7 per cent the speed is less than half that at 9.5 per cent.

Dr. Wheeler said that the explosive limits were narrowed where the air was vitiated by the presence of carbon dioxide. If only 14 per cent of oxygen instead of 20.9 as in pure air be present, the lower limit of upward propagation instead of 5.3 per cent becomes 6.2, and the lower limit of downward propagation becomes 6.4 instead of 6.0 per cent. The speeds given



George S. Rice and R. V. Wheeler

Mr. Rice says this picture was taken at Eskmeals, Cumberland, England, which shows that the sterile dunes of that region can show in places a little thrifty vegetation.

referred to explosions at the open end of a heading. They were greater where the explosion started at the far, or closed, end. The speed of propagation was a little greater where the roadway was large.

Where the explosion starts at the far end of a heading it becomes more violent as it progresses toward the open end. Hydrogen has explosive limits far wider than methane. They lie between 10 and 80 per cent. Dr. Wheeler said that methane ignited sluggishly. Thus glowing coals would not ignite firedamp if their temperature was below 600 deg. C. (1,112 deg. F.). No matter how hot the source, methane would not ignite unless it had been exposed to the flame arc for ten seconds. That was why the flame of "permitted explosives" as they were termed in Great Britain would rarely ignite firedamp. Black powder gave a flame of longer duration and was dangerous in consequence.

ANTHRACITE DUST CAN BE EXPLODED

Dr. Wheeler questioned G. S. Rice's statement that anthracite dust would not explode. Given a sufficiently violent source of ignition it would propagate flame, but fortunately, he added, such a source was not likely to be provided so no one in anthracite mines need be apprehensive of that form of hazard.

Henry Walker, deputy chief inspector of Great Britain, said that a gaseous mine was defined in the law as one where the methane in the return was normally one-half per cent or over, or where a man had been

injured in an explosion of methane. He said that to protect the lives of the men from falls of roof the mine-inspection department specified the distance between supports, between the rows of supports and between the rows and the face. He declared he could not approve the American anthracite practice of blasting out timbers but favored rather the use of prop pullers. A new device provided for the twisting of the prop as a pipe is twisted by a wrench. This seemed to give excellent results enabling the prop to be removed with ease.

Asked by E. T. Conner whether men should be withdrawn if the percentage of methane rose to $4\frac{1}{2}$ per cent, Dr. Wheeler said in such a case he would exercise every precaution, feeling fearful that the point from which the methane came would have an explosive quantity of that gas, but until he found such an explosive source, if he were a mine owner, he would not remove the men. Mr. Walker in further answer to Mr. Conner added that it would be his painful duty under the hypothetical case to prosecute Dr. Wheeler for violating the law which required that the men be withdrawn after $2\frac{1}{2}$ per cent of methane had been noted.

Prior to the meeting, which was held in the auditorium of the Scranton High School, E. T. Conner entertained the British delegation and a number of the principal engineers of the anthracite region at the Scranton Club. The meeting was held under the auspices of the Engineers' Society of Northeastern Pennsylvania with President Dimmick in the chair.

Crush Coal to Meet Market Needs

BY H. M. KILLMAN

Mining Engineer, Mount Olive & Stanton Coal Co.,
St. Louis, Mo.

The coal at our No. 2 mine is a high-grade bituminous steaming coal and the percentage of lump and fine coal cannot be adjusted to meet our contracts without some crushing device. For this reason we have installed an American coal crusher. The coal comes directly from the shaker screen to the crusher where the large lumps are broken by the impact of a series of rings. After the coal is crushed it is conveyed by a belt conveyor to the screens where it is sized and then delivered to the railroad cars.

Since the installation of the pulverizer, 140,000 tons of coal have been crushed. Although the equipment is capable of handling 350 tons of coal per hour, it has produced our requirements by operating about four

full days' time for four months of the year when its operation becomes necessary.

In order to take advantage of the market conditions at all times our company has found it advantageous to be always in a position to ship either lump or crushed coal. At times, the market for fine coal is better than lump, and when such a condition arises we crush enough of our lump coal output to satisfy the demands of our market.

Previous to 1918, the annual cost of crushing at our No. 2 mine at Williamson, Ill., was \$0.0643 per ton, but in that year when we installed the present equipment we reduced the cost to \$0.0195 per ton—less than one-third of the former cost. With this new apparatus we effected a saving of \$0.0448 per ton, or an annual saving of \$1,253.22 on an average of 28,000 tons crushed per year. Repairs to the crusher have not cost a single cent to date and the estimated life of the device is forty years.



Fig. 1—Efficient Coal Crushing Plant

When coal may be quickly crushed at the cost of only 2c. per ton, contracts for sized coal can be readily fulfilled.

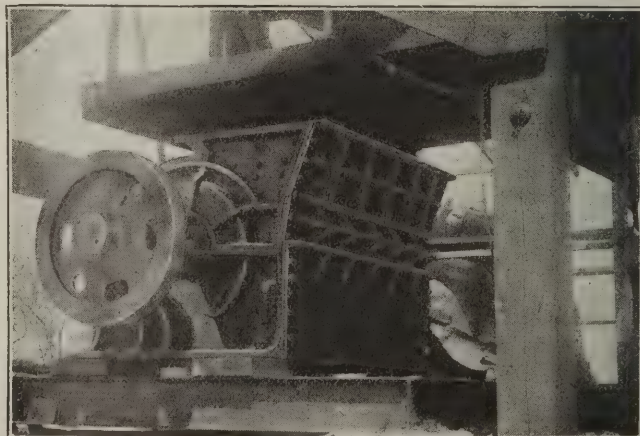


Fig. 2—Crusher With Capacity of 350 Tons of Coal per Hour

The coal comes directly from the shaker screen to the crusher, the large lumps being broken by the impact of a series of rings.



A Plantation of the Kingston Coal Co.

Wood Preservation and Reforestation Advances Reviewed by American Mine Institute

Expenses of Replacement Make Use of Untreated Timber Inadvisable—Two Mines Take Advantage of Their Own Fungus-Killing Water—Almost Four Board Feet Used for Every Ton Mined

A SUBJECT which is daily becoming of more and more interest to mine owners and operators throughout the entire country is that of provision of the timber necessary to mining operations. As is well known, the original forest areas of this country have been largely denuded and the mines are consequently having to go farther and farther afield for their timber supply. A round table discussion of this topic was held at the recent annual meeting of the American Institute of Mining & Metallurgical Engineers and several interesting phases of this important problem were brought out.

There is no panacea or even palliative that is immediately available for the difficulties which the coal mines of the country are now facing in the way of timber supply. As was brought out in this discussion, however, there are three well defined methods whereby the present situation may be at least partially relieved. These are:

- (1) The use of less timber in mining.
- (2) The preservation through chemical treatment of the timber used, and,
- (3) The employment of various substitutes for timber.

USE 3,516,000 M. BOARD FEET YEARLY

No single one of these alternatives will solve the present problem, but the use of all three may go far toward alleviating it.

The use of mine timber throughout the United States has increased from 201,000,000 cu.ft. in 1905 to 293,000,000 cu.ft. in 1919. Of this latter quantity about 250,000,000 cu.ft. were used in the round form or as logs.

It was brought out that in the United States the life of untreated mine timber varies from a few months to as much as ten years, but that the average is only from three to five years. Furthermore, the cost of renewing a timber, whether in shaft or in gangway sets, is several times the cost of its preservative treatment. If by means of treating with preservative, the life of a timber is appreciably prolonged, the investment in such treatment is well justified.

As to the cost of treating mine timbers, this is something which varies with conditions. It was stated, however, that treatment by means of Aczol costs about 10c. per cubic foot, whereas treatment by means of other preservatives ranges from 10 to 90c. per cubic foot. The second largest item of expense in timber for the mines is that for track ties. On main haulage roads, these at least, are put in place and left undisturbed until they must be taken out because of decay.

Many preservatives are available to the American mine owner. Some of these are well known, while others are but little used. The best known preservatives are coal-tar products, such as creosote, and various chemical salts such as copper sulphate and zinc chloride. There are also various mixtures of these salts marketed under several trade names, the best known of which is the Aczol previously mentioned.

Several different methods of treatment also are available, but, in general, only three treatments are in use. The first of these is the pressure treatment wherein the wood is placed in a closed cylinder. The air is first exhausted and then the timber is flooded with preservative and pressure applied over a period of several hours. This forces the preservative into the inner pores of the wood. The second type of treatment is



Land Denuded of Timber with Tents Erected for the Accommodation of Tree Planters

Acres and acres of such land can be found. If we wait ten years to plant them, when the decade is past and lumber soars higher than ever, we shall wonder why we left the planting so long.

known as dipping, or soaking, and consists in immersing the timber to be treated in a tank of preservative for a certain period of time. The third type of treatment is known as "brush treatment" and consists in painting the outside of the timber with preservative by means of a hand brush or air spray. There is little question but that the pressure treatment of timber previously framed and made ready to be put in place gives the most lasting results.

Most European mines are using some form of wood preservative treatment for a large portion of their timber. As a rule, these mines prefer pressure methods. At least two American metal mines are soaking their timbers in the mine water to preserve them, the preservative effect of this soaking being probably due to copper salts held in solution by the mine waters of these mines. A treated timber is not subject to the attack of fungus as is one that is untreated. Furthermore, it is far more resistant to dry rot. Some European mines, as stated by Mr. Rice, are using a hot salt brine as a preservative.

WOOD IS MORE ENDURING THAN CONCRETE

Howard N. Eavenson said that in some shafts the concrete linings do not last as long as those made of timber. In western Pennsylvania, several concrete-lined shafts, which were supposed to be permanent installations made at a considerable expense, had failed in less than ten years. Most of these shafts are on in the intake air, but the exact cause of the failure of the concrete is not definitely known.

Underground, both concrete and metal timbers are used as substitutes for wood. In European mines, brick and stone masonry are employed to a certain extent as substitutes, although these fail under heavy pressures, particularly if the pressure does not come upon the supports uniformly.

In speaking on this phase of the problem, Mr. Rice stated that in Europe where heavy pressures must be resisted, I-beams bent in the shape of an inverted U were being extensively employed. These would deform to a certain extent under excessive pressure, but would not fail.

It was suggested that the United States Forest Service might well work out the comparative effectiveness of the dipping and pressure treatment. It was also stated that seasoned timber lasts much longer than green timber when used in the mines. Furthermore, that 24½ per cent of the timber used in coal operations might well be treated with preservative. The paper

contributed by Newell G. Alford which will appear later in *Coal Age*, stated that the net use of timber was 3.71 board feet for each ton of bituminous coal produced. This paper also stated that approximately 2,022,000,000 board feet of lumber was used in bituminous mines in 1923 and that the possibilities are that by 1940, this will increase to approximately 3,005,000,000 board feet.

As is well known painting does much to lengthen the life of timber used in surface construction. This is so thoroughly appreciated nowadays by mining men that no further mention need be made of it.

A national and state forestry policy is greatly needed in this country. The various states must be induced to pass statutes which do not conflict with national laws and which foster forestation. It was suggested that the American Institute of Mining & Metallurgical Engineers might well appoint a permanent committee on this subject in order to correlate information regarding it and foster interest therein. Some engineering bodies already have committees of this kind and each has a different viewpoint. Probably the State of Pennsylvania has gone further towards fostering the reforestation of mining areas than has any of the others. This state now furnishes trees for planting without cost. These consist mostly of pine, larch and ash. It takes about fifteen years to produce a three sufficiently large to make a mine prop.

Some mining companies, particularly those operating throughout the anthracite region, have already given much care and thought to the subject of reforesting their areas. In the bituminous region, however, little reforestation has been done. It was pointed out that one of the greatest difficulties to reforestation, whether by mining companies or any one else, was the prohibitive taxes levied by the state. In Europe, it is customary to tax reforestation areas merely a nominal sum during the growth of the trees, but to levy reasonable income taxes when the trees are cut. It is probable also that long-term loans by the banks at reasonable rates of interest would do much to foster timber growing.

The round-table discussion, of which this is a brief reproduction, adjourned with the recommendation that the Institute establish a reforestation section, or that a committee on this subject be appointed. It is probable that some such step will be seriously considered in the immediate future.



Tree Planters on Kingston Coal Co. Lands

A little labor places a tree; no costs but those for fire protection and taxes follow. As for fire protection, the public should be willing to pay the bill, for it is the public and not the timber owner that fires the forest, putting timber guarding on equal ground with other property protection. As for taxes, these should be levied only when the crop is taken off and a profit received.

Calls Coal Commission's Deductions on Anthracite At Variance with Facts Compiled in Report*

Conclusions Characterized as Hasty, Biased and Contradictory—Failure to Speak Firmly and Definitely When Wage Negotiations Were in Progress Caused Loss of Confidence—Comment on Herrin Massacre

BY EDWARD W. PARKER

Director, Anthracite Bureau of Information,
Philadelphia, Pa.

THE wage agreement of September, 1922, between the anthracite operators and the United Mine Workers of America, which followed the 5½ months' strike during the summer of that year, contained the following provision:

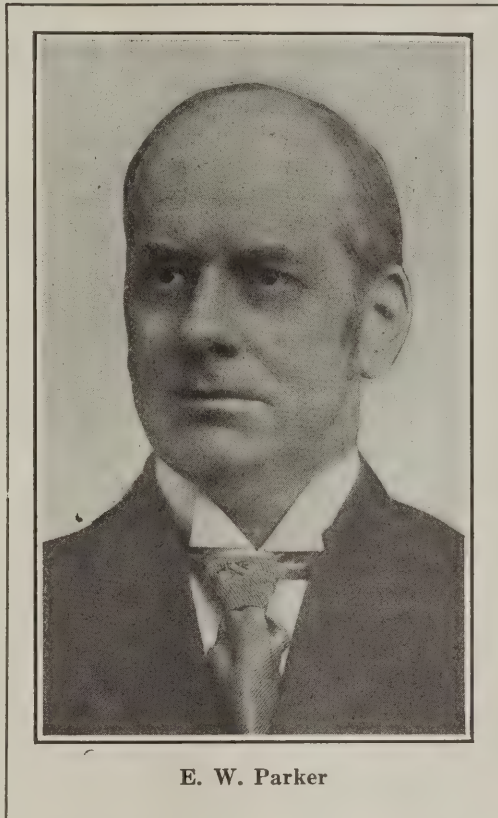
The parties unite in a recommendation to Congress that legislation be forthwith enacted creating a separate anthracite coal commission with authority to investigate and report promptly on every phase of the industry, and the parties hereby ask the President to request the enactment by Congress of the recommended legislation.

The continuance of production after Aug. 1, 1923, shall be upon such terms as the parties may agree upon in the light of the report of the commission.

The request for a separate commission to study and report upon the conditions in the anthracite industry was not granted, but that fact did not relieve the U. S. Coal Commission, which was appointed to investigate and report upon both the anthracite and the bituminous-coal industries, from the responsibility of handing down a report on conditions in the anthracite industry, in the light of which an agreement in 1923 might be negotiated. The commission was instructed to make a separate report on anthracite, and it did—not only one but several of them—but if they contain any suggestions of a concrete and workable character that will lend aid to the negotiating of wage agreements, careful study of thousands of mimeographed pages issued by the commission has failed to find them.

The commission, most unfortunately, surrounded itself with a somewhat motley assembly of communists, sociologists and social and industrial uplifters, through whose doubtless entirely well-meaning efforts the main object for which the commission was appointed—the spreading of a light upon a path toward peaceful wage negotiations—was lost sight of.

The commission expended approximately \$600,000 appropriated for it by Congress. It has been estimated that the work of furnishing the mass of detailed



E. W. Parker

information called for by the "expert advisers" to the commission cost the anthracite operators in the neighborhood of \$1,500,000, and the bituminous-coal operators not much less than \$5,000,000. And with what result? The mimeographed reports of the commission, which I have heard will occupy 8,000 pages of printed matter if Congress ever concludes to publish them, contain many valuable facts regarding the coal industry—many of them were already known, it is true, but we'll let that pass—but because of the hurried manner in which the work was done and the unfamiliarity of the commission's experts, as well as some bias on their part, the information as collected was not properly or, in many cases, intelligently digested; contradictions of a serious character are found in different reports and even in the same report, and many of the conclusions drawn, which express the opinions either of the commission or of its hired experts,

are not in accord with the facts that they themselves compiled.

It will be remembered that the representatives of the anthracite operators and the United Mine Workers met in Atlantic City in July, 1923, for the purpose of negotiating a new agreement to succeed the one that was to expire on Aug. 31, this new agreement to be arrived at "in the light of the commission's report." Under the law creating it, the commission was to hand down its report on anthracite on or before July 1, 1923. The coming of that report was eagerly looked for by the contending parties, for both sides anticipated, hopefully, that it would furnish a plan upon which they could come to an amicable understanding.

Two copies of the report were received by the operators by special messengers Saturday afternoon July 7, and a good part of that night, the next day, Sunday, and Sunday night were devoted to the study of that report in the hope that something constructively suggestive would be found. To say that they were grievously disappointed is to express it mildly. There was some consolation, however, in the fact that the other side derived no more comfort or benefit from it than did the operators, and after a brief discussion of some

*Part of address entitled "A Few Comments on the Work and Reports of the U. S. Coal Commission," delivered at the meeting of the American Institute of Mining and Metallurgical Engineers, coal and coke committee, held at New York City in February. Mr. Parker's paper will be concluded in a later issue.

of its paragraphs, the following day (Monday) the report was by common consent, figuratively speaking, consigned to the scrap heap. Instead of helping, it actually aggravated the situation.

When the first break came in the negotiations at Atlantic City and each side lay resting on its oars waiting for some move by the other, the commission injected itself into the controversy, called the negotiating committee together at the Hotel Pennsylvania, New York City, poured a little oil and persuaded the joint conference to resume its deliberations at Atlantic City. When it appeared that an agreement was not even then going to be reached, the commission boldly announced that if an agreement were not reached it "would fix the responsibility." How we all shuddered at that dire threat! Do not let it be forgotten that the anthracite operators offered to submit all matters in controversy to arbitration—even to the inclusion of the "check-off," which up to this time they had absolutely refused to concede. In spite of the fact that the operators had offered arbitration, which the leaders of the miners refused, and that public opinion desired and was entitled to guidance, and in spite of its bold declaration that it would fix the responsibility, the U. S. Coal Commission remained mute. Why?

COMMISSION SHOULD HAVE TAKEN STAND

There is a general feeling that whether it possessed authority or not, the commission should have spoken firmly and definitely at that time, and that in its failure to do so, particularly having stated that it would, the commission lost an opportunity to perform a distinct public service. The omission cost the commission much in loss of respect and confidence. It might have assumed a virtue (of authority) if it had it not.

In a later report on Labor Relations, the commission does apparently recognize that the primary cause of its appointment was the stoppage of the flow of coal from mine to consumer because of strikes. It says:

The frequency with which labor troubles have stopped production of anthracite coal, the disregard of public interest shown on occasions in the attitude of one or the other of the parties to these controversies, and the apparent impotence of the public to protect itself has created a situation that the public considers intolerable. In the search for a remedy certain citizens are advocating even so drastic a measure as nationalization of the mines while others are insisting on compulsory arbitration and outlawry of strikes. The demand for some sort of remedial public action is practically universal.

This statement was well justified by the pronouncement of President Harding on Aug. 18, 1922, when he said that but for the unorganized miners "the country is at the mercy of the United Mine Workers." It is borne out by another statement of President Harding and the commission: "Industry and the home alike must be freed from the menace of constant interruption of their coal supply." The danger is emphasized by the fact that the United Mine Workers in 1922 officially boasted: "We refused arbitration from the President of the United States notwithstanding that all the pressure of the government was back of the proposal," with the result, as further stated by the United Mine Workers, that "the greatest industrial dislocation in the history of the world" ensued.

Bearing in mind this critical situation, the General Policies Committee of Anthracite Operators submitted a statement to the Coal Commission on the strike of 1922, which closed as follows:

The strike is a legitimate weapon to drive an economic

bargain with a selfish employer, but there is no moral right, and should be no legal right, to organize strikes or lockouts in basic industries or transportation where disinterested agencies for adjustment and adjudication are available. A national combination, controlling coal production, whether it be of employers or employees, which disregards the public interests and wilfully seeks to produce a coal famine by refusing to arbitrate industrial disputes, deserves correction and regulation at the hands of government. A government which is unafraid can do no less than meet this issue. If society has a right to protect itself against abuses in the coal industry, here is occasion to act. If this major problem goes unremedied, there is no consistency in proposing remedies for minor problems.

In substance the commission found the real cause of this major difficulty was refusal of the miners to accept the operators' offers of arbitration. It attributed strikes and lockouts to "unwillingness to present controverted points to any sort of arbitration," and added, "compulsory arbitration is not only impossible but undesirable. Voluntary arbitration is desirable."

The commission did feel that something should be done to overcome "the disregard of public interest shown on occasions in the attitude of one or the other of the parties to the controversies and the apparent impotence of the public to protect itself," and it recommended that "90 days prior to the expiration of the agreement the parties should indicate which provisions they desire to have changed and should immediately confer on the proposed changes. If, within 60 days of the expiration of the agreement, they have not agreed, they should report to the President, who shall appoint a person to make public report of the facts."

SOUGHT TO GIVE PRESIDENT A FREE HAND

The commission was itself in existence while the negotiations were being conducted in 1923 and the stoppage of coal by strike was threatened and it kept silent.

The Coal Commission also recommended the following emergency power be vested in the President of the United States in time of industrial disputes:

The President of the United States should be authorized by act of Congress to declare that a national emergency exists whenever, through failure of operators and miners in the anthracite industry to agree upon the terms of employment, or for any other reason, there is a suspension of mining operations, seriously interrupting the normal supply of anthracite fuel in interstate commerce; and to take over the operation of the mines and the transportation and distribution and marketing of the product, with full power to determine the wages to be paid to mine workers, the prices at which the coal shall be sold, and, subject to court review, the compensation to be paid to land and mine owners. (July 9, 1923, pp. 4, 5.)

The objections to this recommendation and the possible injustice of it are obvious. If the operators are willing to be bound by arbitration directed by the President of the United States, and the unions refuse to be bound by that arbitration, it would seem unjust to take the mines away from the operators and then have the President arbitrate the wages. If governmental authority can fix the conditions under which the men are to work and the operators are willing to be bound by such authority, it is unjust and unnecessary to take over the operation of the mines.

The failure of the commission to exert effectually its influence in the settlement of the controversy last summer resulted eventually in passing the buck to the Governor of Pennsylvania, who effected a "settlement."

Another matter that is to be regretted in regard to the work of the U. S. Coal Commission is the fact that it steadfastly denied the requests of the operators and

the miners for open hearings in which parties to the controversy could be given an opportunity to learn what manner of information was furnished to it and upon which it based some of its conclusions. The proceedings were of the star-chamber character and no opportunity was afforded to deny statements made by witnesses or to cross-examine them. Both sides presented elaborate briefs, it is true, and they were made public, but not in such a way that the public itself, the party most concerned, was able to obtain an intelligent and comprehensive idea of the subject. The anthracite operators presented no less than eight of these briefs. They covered the following subjects:

- The Anthracite Coal Strike of 1922.
- The Anthracite Emergency of 1922-1923.
- Outlaw Strikes in the Anthracite Fields.
- Union Rules and Practices Limiting Output and Impairing Efficiency in the Anthracite Fields.
- Need for Greater Democracy in the Union.
- Competition in the Anthracite Industry.
- Summary and Recommendations as to Industrial Relations in the Anthracite Fields.
- The Union Ultimatum: The Check-Off or No Anthracite.

So far as the operators know, the United Mine Workers did not attempt to contradict any of the statements in the briefs of the anthracite operators. It certainly did not in all the numerous and lengthy documents filed by it. It is gratifying to be able to say, however, that on all major points of fact the findings of the commission sustained the statements contained in those papers.

I have said that some of the conclusions of the commission were not in accord with the facts as found and published by it. The commission states, for instance, that anthracite is a necessity and that in consequence its production is charged with a public interest.

LESS ANTHRACITE THAN BITUMINOUS USED

The use of anthracite, even for domestic purposes, is the exception rather than the rule. There is more bituminous coal used for domestic purposes in the United States than there is anthracite. In England, where the great Welsh anthracite fields are not far removed from London, anthracite is not generally used for domestic purposes. Throughout the entire world it is only in the Northeastern United States where the use of anthracite predominates. It is not a necessity of life and never has been. It is really a luxury fuel.

Secretary Hoover's commission of experts appointed to investigate the subject of community storage says emphatically that anthracite is not a public necessity; that in no community examined was it an exclusive fuel, its use varying with its price, as compared with other fuels, from 2 per cent of the total fuel used in a city like Indianapolis, to 60 per cent in a city like Buffalo. Even in the heart of New England only 42 per cent of the fuel of Worcester was anthracite.

The proof of these assertions lies in the substantial encroachments now being made by other fuels upon the anthracite supply. In New York City alone within a few months more than 400,000 tons of anthracite were displaced by oil.

Anthracite does not enjoy any particular franchise from the state and has no exclusive privileges. The only reason for suggesting that it is impressed with public interest lies apparently in its limited supply, but in view of the fact that it is not an essential of life and is used only in a limited way in a limited territory, it cannot justly be said that its production is impressed with a public interest. One of the members of the Coal Commission, Dr. George Otis Smith, has

since admitted that the commission's statement that anthracite is a necessity was an error.

The commission is, in the minds of some, equally loose in some of its other statements, among which may be included its remarks about monopoly and lack of competition in the anthracite industry.

The detailed facts as found by the commission show a total commercial production of about 72,000,000 tons (page 11, Report on Cost of Production); 140 operators produce about 98 per cent of the product (page 11, Report on Cost, etc.); 10 companies produce about 73 per cent; the larger independents produce about 16 per cent; small independents produce about 11 per cent



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Herrin, the Town Where Men Were Massacred
for Mining Coal

The illustration shows the county court house and some other buildings. Of the population in Williamson County, of which Herrin is the county seat, 54,052 people at the last census, out of 61,092 were native-born and only 3.2 were illiterate.

(page 10, Report on Cost, etc.); culm-bank operators produce about 5 per cent (page 12, Report on Cost, etc.).

The largest company produces about 15 per cent and it takes four or more companies to make up a total output of 50 per cent. Therefore, the industry does not show any greater centralization of production or any greater domination by any one concern than often exists in many industries. Whatever may have been the history of the industry in the past, as shown by court decisions, there is today no combination or arrangement, direct or indirect, restraining competition either as to price, production, distribution or allotment of territory. The commission could not have had any evidence before it to that effect except where the industry is co-operating with public officials in the public interest. If its numerous statements as to monopoly are by their implications or intendment contrary to this statement, then they are without foundation.

Various statements of the commission, however, convince us that, in spite of such general language, it intended to find that there was monopoly only in the sense that the supply was limited, with the result that when shortages are produced by strikes, there is always a so-called "sellers' market." The commission states:

There is and can be no such free competition because the supply is limited and controlled . . . The usual under-supply of anthracite and the frequently recurring extreme shortages together make unnecessary any overt act to control the market; even with a potential monopoly of production, it is not necessary that there should be a combination

in restraint of trade in the legal sense to explain present price levels.

The commission expressly points out that "if there be a monopoly in effect it is not in the sense of pooling cost and profit among the railroad companies but in the sense that practically uniform prices have been charged by the railroad group." It states that its studies have brought "to light no evidence that economic combination takes the form of concerted partition of territory either among the larger companies or between the railroad and the independent companies. . . . If there is any well-founded suggestion of concerted action, it is shown in the small range of circular prices, the extremes in prices of company coal of domestic sizes being only 35c. although all this coal could be sold at the higher circular price and probably much nearer the price level of the independent coal. Doubtless both business sense and regard for public opinion have led these strong companies to acquiesce in the noticeable differential between their own prices and the higher prices of the independents."

From these statements of the commission it may be concluded that conditions are such that no overt act or combination in any legal sense is necessary "to explain present price levels," and if there is "any well-founded suggestion of concerted action," it is only due to the fact that company prices show small differentials, and these companies, out of recognition of public interests, charge less than they are able to get for their coal and thereby permit a differential to exist between their prices and the higher prices of the independents.

PRICE DIFFERENTIAL EVIDENCE OF COMPETITION

We submit that the differential in prices charged by the companies who produce at a large profit as compared with the companies who produce at a low profit, as well as the differential between these companies and the independents, is evidence of competition, and that even if the prices were more nearly the same level it would be no evidence of combination, since prices of standard commodities, just as in the case of wheat, cotton, copper and like grades of bituminous coal, naturally tend toward the same level regardless of the cost of production. In a competitive market, which is compulsory under our laws, these prices gravitate toward the price

of the highest-cost company whose production is necessary to meet public requirements.

In addition to forbearance in the public interests on the part of the large-profit producers to keep down their prices, the commission also found that the operators had co-operated with the public authorities during the crisis of 1922 in an effort to effect equitable distribution of the short supply at reasonable prices. The commission says:

Realizing the hardships that a runaway market would inflict upon those least able to pay high prices, the Pennsylvania Fuel Commission, with the co-operation of all but a few operators, mostly irresponsible persons attracted to the business by the existing shortage, fixed a scale of "fair prices." According to the Pennsylvania Fuel Commission the coal mined by the "railroad companies" and certain independents—over 77 per cent of the total—was sold at \$8.50 or less, these circular prices being adhered to at this time of acute shortage just as in a time of abundance. Unquestionably, these large producers might have obtained from the retailers of anthracite during the past winter much higher prices. This commission desires to pay public tribute to the restraint and good judgment displayed by the responsible shippers of anthracite during that trying period.

The record shows that there is no combination in the anthracite industry which can be called a monopoly or which in any way seeks, except when acting at the direction of a public agency, to regulate distribution, production, or prices, or in any way to restrain competition.

STRONGLY FINANCED COMPANIES BENEFIT PUBLIC

The commission admits that "real benefits have flowed to the public from strongly financed companies, . . . that the anthracite mines have conserved the country's coal resources," by steadily increasing the percentage of recovery, and that they have economized in the capital employed and improved the economic condition of the mine workers, and while, as stated above, it pays tribute to the restraint and good judgment displayed by these companies during the trying period following the strike of 1922, it goes on to say that "the ability to stabilize prices that was used last winter by the larger companies to benefit the public contains also the inherent possibility of real danger." It has since developed that there was more than a possibility of real danger in that action of the anthracite operators, but it was not the kind of danger the commission had in mind. It developed when these same companies made their reports to the State of Pennsylvania on their receipts for the year that were subject to the much-discussed tonnage tax. These reports were rejected by the tax authorities of the state on the ground that the companies sold their product at less than the market warranted.

The commission finds that "in the anthracite region the union has won its fight for collective bargaining and now exercises a practical monopoly," and it suggested that the operators should unite into a stronger and more central organization in order to meet this situation. It found that because of the absence of such organization,

Each operator must depend on his own unaided power and ability in dealing with the union. A disproportion in relative bargaining effectiveness results. This is in large degree responsible for the fact that the union has been able within the agreement period successfully to bring pressure on individual operators resulting in a practical and irritating modification of the terms of the agreement. In case of complaint by the operator over this pressure the weight of the operator's objection is that of a single company. So long as this disproportion in bargaining effectiveness exists,



Law Is Defended When Union Is Not Involved

Prompt action in the Ku-Klux trouble defended the majesty of the law, but when in 1922 the United Mine Workers of America opposed itself to law and order and nineteen men were murdered in cold blood the authorities hesitated, holding that there was no occasion to call out the National Guard for the defense of those who were willing to work, or to maintain order thereafter.

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the process of attrition of the agreement will be likely to continue. Moreover, another course of great strikes is likely to ensue corresponding to those between 1900 and 1912. This time, however, it will probably be the operators instead of the union who will be appealing to the public for fair play.

Of course, in view of the anti-trust laws and the recent activities of the Federal Trade Commission and the Department of Justice, there might be some question as to the ability of the anthracite operators to carry out this suggestion, but little things like that have not worried the commission. We need not deceive ourselves, nor attempt to disguise the fact that the United Mine Workers has a throttle hold on the anthracite industry and on the anthracite-consuming public. The so-called certificate law of Pennsylvania makes this hold, in the vernacular, "a lead pipe cinch," and the Governor of Pennsylvania says it is a good law.

The act of Congress creating the U. S. Coal Commission provided that the commission should investigate every phase of the coal-mining industry, both anthracite and bituminous, but the commission evidently decided that the most potent influence affecting the supply of both hard and soft coal was not a subject to be investigated—namely, the United Mine Workers of America. True, the commission held some star-chamber interviews with the leaders of that organization, and it permitted the submission of briefs, which, with those of the operators, it designated as swashbuckling literature; but while it "poked through knotholes and pried through cracks" to learn every detail of the operators' business from the profits on investments to the care of children in the mine workers' families, and the sani-

tary conditions of dwellings and communities, it never attempted to get any real facts as to the affairs and activities of the mine workers' Union.

Its comments on the Herrin massacre are perhaps the most remarkable statement contained in the many pages of its report. It cites what it states are certain facts which it says it believes will give a clear understanding of the real situation, but out of its high regard for the president of the United Mine Workers, or for fear of offending his sensitive nature, it carefully avoids quoting the telegram from him which, according to common belief, precipitated the murders. But it does say that when "the promoter of the Southern Illinois Coal Co. started to operate his mine in defiance of the union he was inviting mob violence and was flirting with death; he knew it and prepared to meet it. . . . *He challenged the supremacy of the union.*" In other words, these murdered men got what was coming to them, because they defied the supremacy not of the laws of the land but of the United Mine Workers. The commission found that the tragedy might have been prevented, but it does not say how—and it concludes its discussion of this affair thus:

Clothed with all the charitable *excuses* [excuses, mind you] above set forth, these furnish no justification for the brazen audacity with which subordinate officials and members of the United Mine Workers defended the crime and the criminals. That they were espousing the cause and defending the law breakers is further shown to the commission by the fact that they have since bought the mine where the tragedy occurred and have paid therefor \$729,000.

I believe that this is the most remarkable statement that ever issued from an investigating body.

The Miner's Torch

"A Greased Mouth Cannot Say No"

APPROXIMATELY one-third of the front page of every daily paper these days is devoted to dispatches covering some phase of the Teapot Dome oil scandal investigation. If you happen to sit down beside a stranger reading a newspaper he is more than apt to open the conversation by remarking that politicians have always been classed as dishonest, but now we will have to coin a new word if we want to give them full justice, or something to that effect.

Far be it from me to pose as a defender of grafting politicians (I hope the ones who have been "oiled" will never be able to stand on their feet again), but it occurs to me that if we assume that politicians are the only ones who should benefit by the disclosures now being made at Washington we must be very ignorant of conditions in other lines of endeavor. Ministers tell us that their sermons do not bring hoped for results because so many of their hearers assume that the sermon is directed at a neighbor—Washington is releasing some pretty convincing sermons these days.

Getting personal, here are a few instances of graft recalled from my experience while employed in the coal industry.

A company operating a mine adjoining the one where I happened to be employed as mine superintendent obtained more than its allotment of empty cars from

the railroad during a period of car shortage by furnishing the station agent and some of the train conductors shirts, hats and other articles of wearing apparel. I have heard of the same results being accomplished by substituting whiskey for wearing apparel (that happened back in the days before prohibition had become the law of the land) but I only know of this by hearsay.

A superintendent of my acquaintance obtained a considerable amount of stock in a fake insurance company for no other consideration than the use of his name to lead on suckers from his list of employees. The insurance company was thrown into bankruptcy several years later and all of the investors who retained their stock lost every penny invested. The superintendent had disposed of his stock before that happened.

A mine foreman working for me "sold" the desirable working places in his mine over a period of more than a year before I could satisfy myself as to the truth of reports that were brought to me by men who were entitled to the places thus disposed of.

A commissary manager at one of the camps where I was employed practically furnished his home with articles given to him by drummers who were able to profit by his recommendations.

I have been told that an engineer employed by me augmented his income by favoring miners with yardage measurements but I can only repeat this as hearsay.

Probably there is less graft in business today than there was twenty-five years ago, but there is graft a plenty even now; if we are to profit by the discomfort of the politicians who have recently been exposed in Washington it were well not to emphasize too strongly the word politician.

Where the Power in a Coal Mine Is Used or Wasted

Each Mine Has Its Own Power Problem—Thus One Small Mine Uses Half Its Power for Pumping Yet Only Five per Cent of the Whole Load Is Spent in That Way at the Average Illinois Mine

By A. J. HOSKIN

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WHILE contemplating the more serious difficulties that labor and the market present, a coal operator is likely to overlook the importance of his power problem and fail to note the proportionate parts of his power bill which the several operating activities at the mines compel him to expend. Though it is universally true that the labor cost in coal mining exceeds the sum of all other operating costs, and that supplies stand in the second place in mining expenditures, it is well to remember that the cost of power to run the machinery takes third place and it appears to be slowly increasing. With the probable substitution of mechanical loaders for hand shovelers there will be an increased demand for power. Whether this added expense will be fully compensated by the decreased cost of labor consequent on the use of more power remains to be shown.

A close analysis of practical conditions in several Illinois mines shows that their power requirements vary greatly. Despite arguments to the contrary the study fully corroborates the statement that the power demand for every coal mine is a problem unto itself. Actual figures from fifty representative Illinois shaft mines substantiate this claim.

To permit reasonable comparisons between power consumptions at different mines, it was necessary at first to classify such consumptions. I therefore chose to separate the total power consumption into six classes; namely hoisting, ventilation, pumping, mining, haulage and miscellaneous. The last item included illumination, heating of buildings and wash-house water, driving shop machinery, surface pumping, and all tippie equipment, but it did not include coal-washing which is, as yet, practiced at few mines.

Every practical coal-mining operator or engineer will promptly express doubt as to the possibility of accurately apportioning the total power consumption of every mine to these six headings. The argument is

well taken. I admit that in certain cases the facts were not readily ascertained. Nevertheless I believe my findings were sufficiently accurate to afford dependable comparisons.

Among the fifty representative mines selected, the average daily tonnages ranged from a minimum of 650 to a maximum of 5,200. Ten of the mines produced less than 2,000 tons each; the next nine mines produced less than 2,500 tons each; the following nine had average daily outputs below 3,000 tons; then there were ten mines shipping nearly 4,000 tons; the last twelve had daily outputs between 4,000 and 5,200 tons. The average production of the fifty mines was 2,828 tons.

All the mines included in the survey are entered by shafts. Their hoisting depth ranges from 101 ft. to 650 ft., and the average depth is 325 ft. The seams of coal vary in thickness from 3 ft. 6 in. to 10 ft., the average being a little more than 7 ft. Most of the mines are operated by mixed power, that is, they use both steam and electric power. However, two of the mines utilize steam power exclusively for hoisting, ventilating and pumping, the mining being manual and the haulage by mules. On the other hand, five of the mines are wholly electrified.

Without explaining the methods of determining the distribution of the total power consumption at each mine, I cite a few interesting figures. The reader must bear in mind that each item is a percentage of the whole power consumption at the particular mine. Curiously the most consistent item was miscellaneous which at the majority of the mines ranged close to 10 per cent of the total consumption. In fact, the average for the fifty mines was 10.5 per cent. In the other classifications there was much variation.

HOISTS USE 1.4 TO 50.8 PER CENT OF POWER

The consumption of power for hoisting purposes varied between 1.4 per cent and 50.8 per cent of the total demands for power. The percentage was not a direct function of the depth of the mine nor of the production. The mine having the greatest proportional hoisting consumption averaged only 2,000 tons per day, whereas mines that produced around 4,000 tons used less than 20 per cent of the total power for this purpose. Mines whose depths were between 200 ft. and 300 ft. had an average hoisting percentage of 15.9 while those between 300 ft. and 400 ft. had a corresponding average percentage of 14.2. But these items must not be made the grounds for stating rules because many idiosyncrasies tend to wholly discredit only generalities. The weighted average demand for hoisting was 17.2 per cent.

The average demand for ventilating was 22.2 per cent but it varied from 2.2 per cent to 61.9 per cent. It is noteworthy that these extremes occurred in mines having small productions. Considerable variance appeared in the ventilation demands of mines having equal outputs regardless of the size of the output. Thus one of



Power Plant at No. 4 Mine, Superior Coal Co.

The extreme left hand end of the building houses the main hoisting engine. The remainder of the building encloses the boiler and generator rooms.

the 3,000-ton mines consumed 38.9 per cent of its total power for operating the fans whereas another 3,000-ton mine used only 17.3 per cent. The fans of one 4,000-ton mine consumed 12.7 per cent whereas those of another mine of the same production consumed 26.4 per cent. One mine with a daily output of only 1,600 tons showed this same percentage for ventilation.

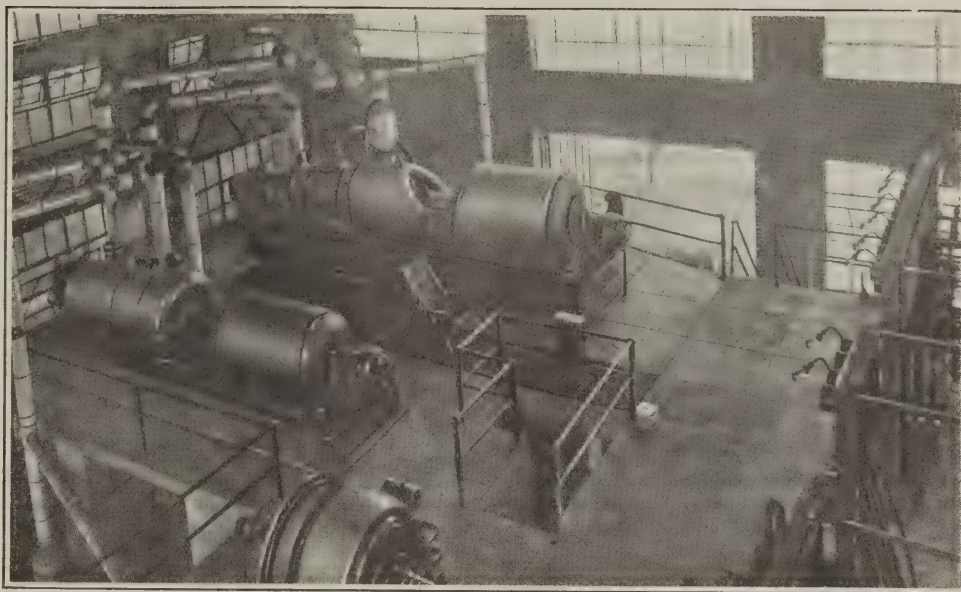
The smallest mine, from a production standpoint, had the greatest proportional demand for pumping, namely, 52.2 per cent. However, this was abnormal and not approached in another instance. The weighted average for pumping including some dry mines, was 5.0 per cent. No direct ratio or relationship could be discerned between production and pumping demands.

The classification under the term mining means the undercutting of the coal. From a power demand of nothing in mines where all coal was cut by hand, the percentage varied to a maximum of 45.7, this being in a mine producing 2,200 tons per working day. The true or weighted average demand was 22.1 per cent. Again the scale of production bore no consistent relation to the power requirements. The smallest mine had a percentage of 22.0 and the biggest a percentage of 22.8—paradoxically close to each other and to the general average. This item for one 2,000-ton mine was 2.5 and for another mine of same output it was 29.6. For one 4,000-ton mine it was 13.2 and for another it was 43.8.

Haulage had an average percentage of 23.0. Disregarding animals as power units, the percentage range was from nothing in mule mines up to 51.0. Still again the proportion was not a direct function of production. The weighted average for mines whose productions were below 2,000 tons per day was 31.2. The corresponding figure for the twelve largest mines was 30.4. These close figures are somewhat conclusive until we note that, for the mines in the lesser class, this percentage fluctuated from 6.2 to 34.9, and in the largest class the fluctuation was similarly between 6.2 and 41.1.

If any general deduction from the foregoing discussion is possible, it is that, in general, ventilation, mining and haulage consume approximately equivalent proportions of power, and that each is approximately equal to the sum of the hoisting and pumping requirements.

It must be borne in mind that I am discussing power requirements by percentages and not by magnitudes. One mine's 24-per cent demand for its hoisting might be less in horsepower-hours than that of another mine whose demand was say 17 per cent. At one mine whose mining demand stood at 34 per cent, the actual power consumption may have been less than that at another mine whose percentage was say 20. In other words, the figures permit no comparison of quantitative consumption. They prove conclusively, however, that it is impossible to fix any dependable relationship between the several consumptions of power in coal-mining operations.



Modern Coal Mine Power Plant

From this plant power is distributed to several nearby mines; there it is used both outside and inside. Large power cables hanging in boreholes supply the cutting and haulage machinery.

The weighted average percentages of total power consumptions at fifty representative Illinois shaft coal mines are as in Table I.

Table I—Percentage Consumption of Power at Fifty Illinois Shaft Mines

Hoisting	17.2
Ventilation	22.2
Pumping	5.0
Mining	22.1
Haulage	23.0
Miscellaneous	10.5
Total	100.0

This distribution, however, cannot be safely applied to Illinois coal mines in general. As a matter of fact, there is not one mine in the list for which this distribution is even approximately applicable. The distribution of total power is a distinct problem for every mine.

Progress Made in Mine Communication

In the course of experiments designed to perfect methods for the establishment of wireless communication between persons entombed in mine disasters and rescue workers on the surface, conducted by the Department of the Interior at the experimental coal mine of the Bureau of Mines, near Pittsburgh, Pa., signals have been transmitted obliquely through a distance of 800 ft. of rock by the use of the T.P.S., or ground conduction system, developed by the Signal Corps of the Army. Signals were also transmitted with little difficulty, by using compressed air piping, car rails, and other similar conductors. The intervention of such poor conductors as water, coal and mud, and the substitution of wooden for steel rails, did not interfere with the transmission of signals.

The T.P.S. method of ground telegraphy is a means of communication which requires no wire connection between the sending and receiving stations; but it is different from radio telegraphy in that the transfer of electrical energy from the transmitting to receiving apparatus takes place mainly by conduction, and to a much less extent, induction through the ground, instead of through the air as with radio. This method of signaling is for telegraphy only and cannot be used for voice or speech transmission.

Unless the Public Acts, Taxes Will Not Be Reduced

Surtaxes Higher in America Than Anywhere—Acquired Fortunes Favored by Surtaxes as Against Newcomers—No One Can Reasonably Assert War Was Fostered for Private Gain—Excessive Taxes Cripple Everybody

PEOPLE of small means are subject under the existing law to a far smaller rate of income taxation in this country than in any country of Europe," says Otto H. Kahn in a little booklet entitled "Why I Favor the Mellon Tax Plan." "On the other hand," he adds, "considering only surtaxes, people of wealth in this country are subject to higher rates than in any country of Europe, not to mention the fact that 'capital profits' are not liable to income taxation at all in England and in other European countries, whereas our taxation applies to all kinds of income or profits.

"That we are able in this country to meet our budgetary requirements while placing but a light burden of income taxation on those of small means and practically none at all on families with incomes less than \$4,000 a year, is a fortunate and desirable situation.

"But surely there must be some socially and economically sound reason for the fact that not a single European country has thought it wise to raise its surtaxes to the level of ours, notwithstanding the fact that they have greater need than we to find sources from which to draw revenue for the Government."

Mr. Kahn adds that "our highest surtax is 50 per cent, whereas in England, 30 per cent is its maximum figure. England's normal income tax rate, that is, the rate payable by the man with a small or moderate income, is 22½ per cent, which is approximately three to six times as high as our tax rate on small or moderate incomes. Consequently, taking the normal and surtax rate together, the comparison is less striking, being 58 per cent maximum with us as against 52½ per cent maximum in England."

PRESENT SYSTEM FAVORS ACQUIRING FORTUNES

Speaking about the effect of the surtax on the acquirement of wealth by the budding capitalist, Mr. Kahn remarks "The road to conspicuous material success is blocked to the newcomer by the barricade of the surtaxes. Surprising though it will sound to the advocates of extreme taxation, it is a fact that by these very imposts, existing wealth is fortified against would-be competitors, and the handicap against him who starts with little is made greater.

"Manifestly, when a man sets out with small capital the possibility of his accumulating large resources is greatly diminished by a law which compels him to turn over to the Government in cash the larger part of that which conspicuous ability, inventive genius, daring enterprise or good fortune may enable him to earn."

Combating the idea that the high surtax is justifiable because it merely recovers pelf from those who profited during a war which they fostered for their own gain, Mr. Kahn says that no one could accuse President Wilson, who declared war, of seeking any but his own counsel, and certainly not of truckling to Wall Street and the moneyed interests; that the period prior to the war was ideal for the making of money, for the Allies "had to buy large and increasing quantities of some of the products of our soil and industries, practically regardless of profit; that the war promised to Wall

Street only control of prices, differential war taxes on the well-to-do and rich, and that the war injured capital by draining the market by its bond issues of all available funds.

He adds that only 4 per cent of our population was conscripted and less than one per cent saw actual fighting, whereas the incomes of the wealthy were conscripted to an extent rising to nearly 80 per cent. The conscription fell more heavily on the well-to-do, for the children of the rich were not able to show that they "were needed at home to support dependents or to man essential war industries" and so were not exempt from the draft. Mr. Kahn adds, "The draft regulations discriminated, not, as was too often the case in former wars, in favor of the son of the rich man but in favor of the son of the poor woman."

HOW HIGH TAXES INJURE WORKMAN AND INDUSTRY

He argues that the surtax percolates downward and affects the man who does not have to pay it directly; that, as taxes must be paid in cash and not in book assets, bills receivable or inventories, they unduly unsettle business and make for instability of industry, and that the money taken from industry and given to the Government is of less potential value than when held in private hands. Mr. Kahn adds, "Even if capital did not have the refuge of tax-exempt securities, its dynamics would be bound to deteriorate under the influence of extreme surtaxes, and some of it would sullenly resign itself to a much lessened return rather than venture into a game governed by the rule that the player takes all the risk of possible loss, all the burden of work and worry, but gets only a minor share of possible profits.

"You can take a horse to water, but you cannot make him drink. You can starve capital, but you cannot make it take the risk, worry and effort of new enterprise, unless you hold out the eventuality of adequate reward.

Mr. Kahn declares that capital did not for some time after the war was over take refuge in tax-exempt securities. Convinced at last that the taxes were not justified but were the outcome of class privilege, political considerations and sectional animosity "capital took such steps as were lawfully open to it to escape from what it regarded as unwarrantably and unnecessarily burdensome taxation." This statement is clearly borne out by the following figures of surtaxes collected by the Government on incomes of \$300,000 or above:

1917.....	\$201,937,975	1920.....	\$134,709,112
1918.....	220,218,131	1921.....	84,797,344
1919.....	243,601,410		

The Citizens' Committee in support of the Mellon Tax Reduction Proposal, Hotel Biltmore, New York City, which publishes this brochure, announces a National Tax Reduction Week beginning Monday, April 7, and urges that representative community and industrial associations flood Washington with letters and telegrams during that week. Unless active steps are taken to turn the tide against self-seeking politicians, taxes will not be reduced.

News Of the Industry

Guaranteed Contract Urged to Restore Confidence in Coal Industry

Co-operative Plan Proposed to Insure Delivery in Case of District Strike—
Three-Year Pact with Customers Would Enable Union Producer
to Offer Inducements to Overcome Price Disadvantage

By PAUL WOOTON
Washington Correspondent of *Coal Age*

With the approach of the time when most coal contracts expire, there is a revival of the discussion of the advantages which could be obtained from new types of contract. The public utilities long have been insisting on more binding contracts. With consumers generally the present form of contract is in disrepute. Under existing conditions many believe contracts could be put on a basis which would be more satisfactory to the purchaser of coal and which would be of material benefit to at least the union operator.

Just at this time the ideal condition for the union operator would be to negotiate three-year contracts with his customers. Many believe there are contractual inducements which he can make which will tend to overcome the disadvantage he is under in the matter of price. If consumers could be insured constancy of supply, any price differential likely to exist between union and non-union coal, in many instances, would not be the controlling factor in the purchase.

Pledge Would Assure Buyer

If the union producer were to pledge himself to ship as long as he has any coal, sacrificing his own spot tonnage if need be, it obviously would be a bid more likely to be accepted than were it offered under the conditions of present contracts, which so frequently are unsatisfactory to the purchaser during periods of car shortage or strikes. If, in addition to the guarantee to ship coal as long as the producer has any coal not covered by other contracts, provision were made for an arbiter in case of dispute, it would have further appeal.

The present discussion of forms of contract, however, which really had its beginning during Mr. Wadleigh's administration as Federal Fuel Distributor, goes much further than the removal of the free coal provision. Some suggest that producers would be well advised at this time to interest consumers in sliding-scale contracts—the variable feature, applying to deliveries as well as to prices. Special rates would be offered during the off months so as to equalize the annual output.

In this way the operator could plan to have his surplus of spot coal entirely free from contract obligations at a time when transportation troubles are most likely.

There is a well defined feeling on the production side of coal that something should be done to re-establish the reputation of the coal contract. The suggestion has been made that meetings could be arranged by districts between operators and their customers at which agreement could be reached as to types of contracts. For instance, if the operators in one district were to invite representatives of the National Association of Purchasing Agents, of the wholesalers and of the retailers with whom they deal, and should they be able to negotiate certain standard forms of contract, it would do much to bring about mutual confidence and respect.

The suggestions being made go even further. In order to insure further the constancy of supply under contracts the thought is advanced that the producers in a given field could underwrite each other's contractual obligations. Twenty-five operators, for instance, might agree to fill collectively the contract of one of their number were his production to be interrupted. The collective action might go even further and arrangements be made between districts, whereby under certain conditions other districts would attempt to fill the contracts held by operators in the event of a district strike.

Miners Ratify

Naturally the miners ratified the wage agreement which the international officers of the United Mine Workers signed with the operators of the Central Competitive Field at Jacksonville, as foreshadowed in *Coal Age* last week. The official rank and file count of miners voting in the referendum was 164,858 to 26,253. Half the opposition, or exactly 13,032 votes, was cast in Illinois, where the rebel element in the United Mine Workers is strongest.

Scale Renewed for 3 Years In Central Pennsylvania

Representatives of the operators and union miners of the central Pennsylvania bituminous coal field signed an agreement at Philadelphia March 29 continuing the present wage scale for three years.

A modified set of demands was presented by the miners March 27 withdrawing the abolition of the "penalty clause," providing for suspension for the mining of "dirty" coal. The modified demands were presented at a meeting of subcommittees of miners and operators appointed to discuss the differences that had arisen in the negotiations and the breach was patched up.

To explain this scheme, southern Illinois is used as an example. Operators in that district are anxious to expand their market in the Northwest. Their chances would be greater were their salesmen in a position to make some such statement as this to the Northwestern consumer: "This contract will be signed by my company, which obligates itself to sell no spot coal until the contract is filled. Moreover, it is underwritten by twenty-five other operators producing similar coal, who collectively will make up this obligation should my company fail. In the event that southern Illinois should be tied up in a strike, we have an arrangement whereby operators in Colorado, Utah and Wyoming will undertake to supply the coal called for by this contract."

If any step toward co-operative marketing is not practicable at this time, the suggestion is made that co-operative advertising at least could be attempted. The success of the anthracite operators' coal economy shows points the way for similar action on the part of bituminous associations. The Illinois associations, for instance, by such means could call the attention of the Northwest to the advantage of the use of bituminous coal. If they were to set up standards of purity and sizing, that fact could be advertised in a market where the use of Illinois coal could be increased greatly. In that connection, attention is called to the fact that it was careful preparation as much as it was good coal which built up the trade value of the name "Pocahontas."

It is a new era in the coal business. Perhaps never before has such an opportunity existed for the exercise of ingenuity and initiative. Progress, however, is thought to lay more along the line of joint action by the operators than any other way.

Blast in West Virginia Mine Kills 26 Miners

An explosion in No. 2 mine of the Yukon-Pocahontas Coal Co., at Yukon, McDowell County, W. Va., early in the morning of March 28, caused the death of twenty-six miners. Fifteen bodies were recovered the same day by volunteer rescuers. A U. S. Bureau of Mines rescue car at Nemours, near Bluefield, was rushed to Yukon as soon as news of the explosion was received. R. M. Lambie, chief of the State Department of Mines, also left Welch immediately for the scene of the disaster.

Yukon is in an isolated section, without telephone service, and details of the catastrophe have been meager. Only six miners were rescued, but a number of others, who were late in arriving for work, escaped injury.

The presence of mind of T. J. Dawson, who became superintendent of the Yukon-Pocahontas Coal Co. at Yukon, W. Va., three weeks ago, probably saved the lives of 125 miners in No. 1 mine when the explosion in No. 2 mine occurred. When the blast came Superintendent Dawson rushed into No. 1 to warn the men there. Some of these workers were injured when they were knocked down by the force of the explosion.

Believe Head Lamps the Cause

Officials of the company and mine inspectors who have been in the mine since the blast believe the explosion was caused by the head lamps of three miners who took a short cut through an abandoned working to their places of work.

The mines of the Yukon-Pocahontas Coal Co. at Yukon, W. Va., are exceptionally dry. Describing No. 1 mine in *Coal Age*, June 1, 1922, A. F. Brosky, who made a visit to the mine, says that it had never had a pump underground and had never needed one, so dry were the workings. In the winter of 1917 seventeen men were killed at this mine in an explosion. In June, July and August the mine was sprinkled once a week and during the remaining nine months the roads were wetted down daily.

For this sprinkling, in which the whole mine participated, a 500-gallon water car was used. A 300,000-gallon tank standing 300 ft. above the coal was used as water supply and a 12,000-gallon tank at a much lower level was fed by gravity from the overflow of the larger tank. A 3-in. water line ran down the main entry for a distance of 7,000 ft. Four taps on this line at regular intervals provided for the filling of the water car, which was pulled along the roadways by an electric locomotive.

As far as possible doors were eliminated, and the machinemen carried safety lamps and were instructed to examine the mine face for gas before taking the machine beyond the room neck. Permissible powder exploded by blasting machines was used exclusively for shooting. Open lights were permitted, but the mine was examined twice daily prior to the entry of the day and night shifts.



E. S. Brooks

Mr. Brooks, whose death at his home at Rock Springs, on March 17, was recorded in *Coal Age* last week, was well known as a coal operator and mining man throughout the Central Western and Pacific states, having entered the service of the coal department of the Union Pacific Ry. in 1880, previously serving the railway company as a locomotive fireman. His first coal mining work related to the prospecting of the Gunnison County, Colorado, anthracite fields, thereafter serving in various capacities, including mine clerk, salesman, etc. He was appointed superintendent of the railroad company's Hanna (Wyo.) mines in 1894, and became vice-president and general manager of the coal company in 1920.

Bill Limits Trade Commission To Probes Authorized by Law

The Independent Office Appropriation bill, presented to the House at Washington March 27, specifies that none of the funds provided may be used by the Federal Trade Commission for investigations directed by the President or either house of Congress except those authorized by law. The adoption of this provision will make it necessary for each resolution of Congress directing an investigation by the Federal Trade Commission to authorize an appropriation sufficient to cover the expense of the investigation if it is one not relating strictly to a violation of the anti-trust laws.

The commission estimates that \$315,000 will be required during 1925 for this class of work. The Appropriations Committee, adopting the above mentioned limitation, allowed \$63,440 to provide for the normal growth of the work of the commission, the salary of the secretary of the commission being also included in this sum.

The work which the commission has this year had to do, and over which it has no control so far as the initiation of the work is concerned, has been so great that it has been slipping back, until at the present time it is about three hundred cases behind on its docket. That practically amounts to a denial of justice on the part of those who are seeking protection, Commissioner Huston Thompson told the Appropriations Committee when explaining the situation.

Union Signs Open-Shop Pact With Ky.-Tenn. Association

The open-shop four-year agreement which the union has officially signed with the Kentucky-Tennessee Coal Operators' Association is getting broad circulation at the hands of non-union operators. The new agreement now in effect in that region of union weakness runs to April 1, 1928, and contains some provisions interesting to those who struggle with labor in solidly unionized territory.

Mining rates are reduced in the region to a point 20c. a ton below the rates in effect from 1920 to 1922. Day rates for several classes of labor follow: Machine runners, \$5.40; blacksmiths and motormen, \$5; boss drivers, head trackmen, head timbermen and engineers, \$4.84; machine helpers, couplers, track helpers, wiremen and pipemen, pump men and timbermen's helpers, \$4.44; outside laborers, unclassified, \$3.72; yard couplers, \$3.64. "Inexperienced loaders" (a term unknown in union fields) are paid \$3.80 until they learn their trade.

There is no check-off except a deduction of \$1 per pay from each man's wages to be used to defray expenses of an arbitration system which the agreement sets up. The arbitration board comprises five men—two operators, one from each side of the state line, two miners of similar geographical representation and a chairman called an "umpire," to be chosen by the four. This board is to handle all cases under the agreement which cannot be adjusted by the mine committee and by direct dealing with company officials.

To Eliminate Small Abuses

There are clauses in the contract aimed at some of the most flagrant small abuses practiced generally in union fields. For instance the number of official holidays is distinctly limited and no miner may quit work to attend a funeral unless the deceased is a member of his family or an employee in the mine in which he works. Any miner who lays off to attend a funeral and doesn't attend is to pay a fine of \$2.50 to the family of the deceased.

The system of penalties under the contract applies to the companies too. In case a company shuts down a mine while some contract grievance is being threshed out it is required to pay the whole working force \$2 a day per man.

The open-shop clause reads as follows: "It is distinctly understood and agreed that men shall not be discriminated against on account of membership or non-membership in any organization nor shall any member of any organization interfere with or discriminate against those who are not members, nor shall men who are not members interfere with or discriminate against those who are."

This agreement was signed by the Kentucky-Tennessee Coal Operators Association, M. I. Roach, president, and T. J. White, secretary, and by the United Mine Workers of America, William Turnblazer, district president, and E. L. Reed, district secretary, and by the miners' district scale committee.

Hearing on New Mine-Rating Scheme To Be Held at Washington, April 23

An important hearing in the matter of the rules governing the ratings of bituminous-coal mines has been announced by the Interstate Commerce Commission to take place April 23 in Washington before Commissioner Aitchison. At that time consideration will be given the suggestions of the Harding Coal Commission in connection with car distribution. In announcing the hearing, a statement was given out by the Interstate Commerce Commission, in part as follows:

"On June 17, 1922, the commission instituted a general investigation, *In Re Rules Governing Ratings of Coal Mines Other Than Anthracite and the Distribution of Cars to such Mines*, under Docket No. 13,896. Extensive hearings were held in this matter during the summer and fall of 1922.

"An agreement was reached whereby the carriers would undertake to rate the mines through a mine-rating or inspection bureau, the members of which should be exclusively in the employ of the railway company. The principal factors used in determining the mine ratings were likewise agreed to. These factors included: (1) Physical conditions, (2) past performance, (3) labor supply, and (4) other factors that may affect the production and shipment of coal.

"The commission informally approved a fair trial of the code proposed as a result of the agreement reached after the conferences. The carriers accordingly promulgated new mine-rating and car-distribution rules, effective as of March 1, 1923, which have been maintained since that time.

Helping Off-Season Delivery

"To encourage the off-season delivery and storage of bituminous coal, the U. S. Coal Commission in its report dated Sept. 20, 1923, recommended that this commission allow the commercial ability to sell coal the year round to be the controlling influence in the distribution of railroad cars in months of transportation shortage. The principle suggested is not the controlling element in the distribution rules now in effect.

"The suggestion has been made to the commission that the principle embodied in the Coal Commission's report and embodied in the proposed code of rules attached would be legal and serviceable. The parties are invited to develop this phase of the case upon the record."

The proposed code embodying the rules recommended by the Coal Commission follows:

"(1) Whenever the supply of coal cars is inadequate to fill all orders of all mines within the limit of their physical capacity, distribution of such cars to mines shall be made upon the basis of mine ratings determined as herein-after set forth.

"(2) Mine ratings used as the basis of coal-car distribution shall be fixed

as a combination of two factors—physical capacity and commercial capacity—giving equal weight to each.

"(3) Physical capacity of mines shall be determined in accord with present methods, and expressed in terms of the number of equivalent 50-ton cars per working day. For the purpose of combining physical capacity and commercial capacity to fix mine ratings, the physical capacity shall be deemed to represent 100 per cent in terms of percentage, and that figure used in the manner set forth below.

Figuring Commercial Capacity

"(4) Commercial capacity shall be arrived at by:

"(a) Determine the actual number of equivalent 50-ton cars loaded and shipped per calendar day, not including Sundays, during the last period of not less than two months during which the number of available cars was in excess of the number ordered by all mines within the limit of their physical capacity. If the last such period of car surplus exceeds six calendar months, only the last six months of the period shall be used in determining the average. Full consecutive days in excess of one full day lost by a mine by reason of accident, strikes or railroad failure during the period used, shall be deducted in arriving at the average, when the mine throughout the calendar month in which the failure occurred loaded and shipped its full physical capacity rating on every working day that cars were furnished and the mine was not prevented from loading by accident or strike, but if a mine failed to load and ship on all days when it was not prevented by reasons enumerated, the number of days on which it failed shall be subtracted from the number of full consecutive days in excess of one full day lost by reasons enumerated, and allowance made for the remainder only.

"(b) The commercial capacity in average cars per working day determined as prescribed in sub-paragraph (a) shall be compared with the average physical capacity, in cars, for the same number of days and period of time, to determine percentage ratio of commercial capacity to physical capacity during the surplus period used.

"(5) To 100 per cent representing factor of physical capacity, add the percentage arrived at under paragraph 4, representing commercial capacity, and divide the result by 2.

"(6) To the current physical capacity, expressed in cars, apply the final percentage arrived at under paragraph 5, and the result will be the current mine rating in equivalent 50-ton cars.

"(7) Mines should be permitted to order cars up to the limit of their physical capacity. The distribution, however, should be made among mines in proportion to their mine rating, as arrived at under paragraph 6, or their order if less than mine rating under paragraph 6. If during any monthly period of distribution any mine or mines shall be unable to load its or their proportion of the available cars, the

Hatfield Removes Chafin's Appendix—by Agreement

Don Chafin, Sheriff of Logan County, West Virginia, had his vermiform appendix cut out by one of the Hatfields March 29. This cutting affray had the Sheriff's approval, however, as he went to hospital at Huntington to have it done by a member of the Hatfield family, Dr. Henry Drury Hatfield, formerly Governor of West Virginia and one of the most skilful surgeons in the state.

Bitter political feuds which have marked the relations of Chafin and Hatfield in the hectic history of Logan County were forgotten, and Dr. Hatfield smiled broadly when he announced the operation was a complete success. The appendix was placed in a bottle of alcohol for preservation.

A radio receiving station has been placed in Sheriff Chafin's room at the hospital.

average shall be distributable among the remaining mines in proportion to their mine rating, or order if less than rating.

"(8) In the absence of special provision the commercial capacity of a mine not in operation during the last period of car surplus would, in terms of percentage be expressed as 0 per cent. Adding this percentage factor to 100 per cent, representing physical capacity, and dividing by 2, would give a resulting percentage factor of 50 to be applied to current physical capacity for determining the mine rating. In other words, the minimum mine rating for any mine would be 50 per cent of the current physical capacity."

No New Cause Found for Castlegate Blast

Exhaustive investigation in the burned-out workings of No. 2 mine of the Utah Fuel Co., at Castlegate, Utah, has failed to reveal any new light on the cause of the explosion of March 8 which killed every man in the mine, according to B. W. Dyer, district engineer for the Bureau of Mines. The attempt of the fireboss to clear out a small quantity of gas in room No. 2 off the sixth left entry is still assigned as the primary cause. The explosion spread from there.

The investigating board was composed of Dan Harrington, supervising engineer of the U. S. Bureau of Mines; Mr. Dyer, Fred K. Gaethke, engineer in charge of mine rescue car No. 9; H. E. Mann, engineer in charge of mine rescue car No. 2; R. M. Magraw, general superintendent of the U. S. Fuel Co.; William Littlejohn, general superintendent of the Utah Fuel Co., and John Crawford, coal mine inspector for the State Industrial Commission.

Findings of the board will be submitted next week to the Industrial Commission and the Bureau of Mines, said Mr. Dyer.

Reach Wage Agreement for Northern West Virginia

An agreement has been reached upon a new contract between the representatives of Northern West Virginia Coal Operators Association and the United Mine Workers. As a result there will be no suspension in the district, wherein almost 28,000 miners are employed.

The conference was held in the Southern Hotel, Baltimore, and the negotiations lasted more than two weeks. It was announced at the close of the conference on Friday, March 28, that all basic day and tonnage rates now in force had been reaffirmed. Certain changes were agreed upon in relation to working conditions, these being for the most part concessions to the miners.

Day wage rates reaffirmed ranged from \$6.74 to \$7.26 a day. Tonnage rates vary from 62.7c. for machine loading to 87.6c. for hand work. The new contract is based upon "the Jacksonville agreement," just ratified in the Central Competitive Field. It is expected that the agreement reached in Baltimore will be indorsed by the operators association and the miners' union.

Barrett Resigns; Trouble Looms in Eastern Canada

Silby Barrett, provisional president of the United Mine Workers for the eastern Canada district, has presented his resignation to William Dalrymple, representative of the International board of the U. M. W. The resignation will be acted on at a meeting of the International board in Indianapolis, to be held in the near future. William Huston has been appointed acting provisional president until the International executive board meets.

The resignation follows the rejection of the agreement negotiated with the operators in eastern Canada. Barrett had advocated the ratification of the agreement. The vote of the miners, however, exhibited a substantial plurality against acceptance. Once more tension is felt in the eastern Canada coal fields, which have been in continuous ferment for the past four years. With the liberation from prison of J. B. McLachlan, deposed secretary-treasurer of the district, the tension is growing. Another strike looms ahead in the mines owned by the British Empire Steel Corporation.

Safety Council and Mining Institute Meetings

The next regular conference of sectional chairmen of the National Safety Council will be held at Cleveland, Ohio, Saturday, May 17, following the last of this season's meetings of the engineering section of the council, May 16.

The Coal Mining Institute of America will hold a meeting in Pittsburgh, Pa., Dec. 3-5, according to an announcement by H. D. Mason, Jr., secretary-treasurer.

Wage Agreement Deferred In Kanawha Field

The conference of union operators and the scale committee of District 17, United Mine Workers, scheduled for Friday, March 28, at Charleston, was postponed owing to the absence of miners' representatives at a meeting with northern West Virginia operators at Baltimore. Much uncertainty prevailed, therefore, as to whether it would be possible for union operators and miners in the Kanawha region to get together before the expiration of the old contract on March 31 in time to avert a strike of union miners in that section of the Kanawha field still in union territory, though it was hoped that some sort of an agreement would be worked out.

Early Conferences Barren

At the first conference held at Cincinnati several weeks ago, which lasted two days, the representatives of the miners demanded acceptance of the Jacksonville agreement. The operators refused. Another conference was held at Washington on March 25 but was of short duration, adjournment being taken until Friday, March 28, at Charleston.

The fact that non-union Kanawha operators are paying much lower wages than fixed in the Jacksonville agreement presents union producers with a difficult problem, as it will be impossible for them to compete with the non-union mines if the 1922-1924 wage scale is paid. Comparatively few union mines in the Kanawha field are working at the present time owing to low prices, poor markets and high wages. Whatever may have been evolved between the time this was written and the time it appears in print, it seemed almost certain that the miners would insist that the union operators of the Kanawha field accept the same terms as agreed upon with northern West Virginia operators.

Cut in West Kentucky Hangs Fire Until April 15

The western Kentucky deadlock between operators demanding a 25-per cent wage reduction and miners demanding a continuance of the 1921 scale for three years appears to be softening. Instead of a strike or lockout April 1, the two parties agreed last Friday at Madisonville, Ky., to extend the existing agreement to April 15 while President John L. Lewis, at International headquarters, tries to determine some way to change the situation. It is prophesied that if he will not agree to an agreement cutting wages 25 per cent for at least one year, no agreement of any kind will be signed. The field would then be largely non-union. This negotiation applies only to that section of western Kentucky centering in Muhlenberg County. The western part of the western Kentucky field is already largely non-union although a union contract with several operators, signed last spring, has another year to run.

Southwest Fields Suspend

CHICAGO, April 1—The entire Southwestern district, comprising Kansas, Oklahoma, Missouri, and Arkansas, shut down April 1 pending the outcome of wage negotiations now going on in Kansas City, Mo. There is no evidence of a break in the deadlock between miners and operators. The operators say they will demand a wage reduction and will submit a revised scale after "more important matters now in subcommittee" are disposed of. It is generally understood that unless the miners grant important changes in working conditions the operators will demand a 40-per cent wage reduction. It is predicted that negotiations will run well into the summer.

Lehigh & Wilkes-Barre Co. Pays 200 per Cent Stock Dividend

Having formally approved the plans of the board of directors to increase the capital stock of the company from \$10,000,000 to \$30,000,000, stockholders of the Lehigh & Wilkes-Barre Coal Co. on March 27 voted themselves a 200 per cent stock dividend, payable 100 per cent in common and 100 per cent in preferred stock. The new stock will be distributed April 1 to stock of record March 26.

C. F. Huber, president of the company, in a letter to stockholders, said that the par value of the stock heretofore has not reflected the actual investment in the business or the amount of the investment of the holders of a large majority of the stock.

"From the organization of the company in 1874 to 1909," he said, "no dividends were paid to the stockholders, the company retaining the entire current earnings in the development and growth of its business. On Dec. 31, 1923, the company's surplus exceeded \$17,000,000, the major portion of which was accumulated prior to March 1, 1913, and is invested permanently in the company's business. To bring the company's capital more in line with such permanent investment the board of directors has declared this dividend."

New York City Departments Seek Coal Bids

Bids will be opened on April 8 by the Department of Purchase of New York City for furnishing and delivering to several of the city departments nearly 450,000 net tons of coal and coke. The tonnages required are as follows: No. 1 buckwheat, 206,730 tons; No. 2 buckwheat, 31,630 tons; No. 3 buckwheat, 47,850 tons; run of mine, 89,815 tons; stove coal, 5,630 tons; chestnut, 120 tons; pea coal, 690 tons; Georges Creek coal, 144 tons; coke, 350 tons, and mixed coal (two-thirds No. 3 buckwheat and one-third run of mine), 55,100 tons.

Leon Besson Is Made Kansas Inspector After Furor

Leon Besson is now state coal mine inspector for Kansas, succeeding James Sherwood. His appointment, effective April 1, has created considerable furor in Kansas politics, and marks a victory of the Alexander Howat rebel faction within the United Mine Workers organization in the Kansas district. Besson's appointment by Governor Jonathan I. Davis was challenged by Judge John H. Crawford, of the Industrial Court of Kansas, who voted against the appointment and favored Ernest Shaw, of Weir, Kan., on the ground that Besson had not passed the state mining board's examination. But Judge Crawford was outvoted by the other two members of the Industrial Court, both recent appointees by Governor Davis.

Besson is a socialist and an avowed Howat man in the struggle Howat is making to get back into the miners' union and to win back control of the Kansas district from the union administration at Indianapolis. His appointment was opposed not only by miners of the administration faction but also by many of Governor Davis' own party. Davis was elected Governor on an anti-Industrial Court platform, and his causing his two appointees on that court to appoint Besson inspector without undergoing an examination and a man whose democracy is seriously questioned promises to be an incident of no small proportions in Kansas state politics.

James Sherwood, who has been inspector for five years, will return to employment with the Associated Companies handling mine liability insurance. A year ago the Associated Companies offered Sherwood a position at a tempting salary, but when Judge Crawford told the concern Sherwood was needed on his official job it consented to wait until he had completed his service to the state.

Spent His Long Life Underground

Ten thousand days in a coal mine is the record claimed by "Uncle Steve" Bone, of West Frankfort, Ill., now 71. He was born in England and started working in the mines with his father at the age of seven years. He has worked for forty-nine years in a mine now owned by the Chicago, Wilmington & Franklin Coal Co. Before labor was organized Bone says the contracts were "iron-clad" and a miner could either sign them or get out. He also worked 15 hours a day in some instances in the early days. During his long service in the mining industry Bone has had many narrow escapes, but was never entombed or seriously injured. It is estimated that he has traveled 1,640 miles up and down in the cages and has loaded 139,977 tons of coal. Bone's sons are miners.



Harry N. Taylor

The former president of the National Coal Association now heads the United States Distributing Corporation, which reports net income of \$592,962 for 1923.

More Coal Lands for Henry Ford?

Henry Ford has closed negotiations with the Davison-Connellsville Coal Co. for the purchase of 3,700 acres of coal land in Fayette County, Pennsylvania, and Monongahela County, West Virginia, according to a report from Uniontown, Pa., March 25. The price will reach \$10,000,000, it is said.

Representatives and engineers of the Ford interests have been on the ground some time inspecting the property and the mines, which are in operation. Mr. Ford, it is said, wanted the lands to provide fuel for his glass and subsidiary companies in the Pittsburgh district.

A SPECIAL DISPATCH TO *Coal Age*, March 17, from Salt Lake City, Utah, covering the recent disaster at Castle-gate, stated that R. M. Magraw was superintendent of the Utah Fuel Co. mine. This was an error. Mr. Magraw is general superintendent with the United States Fuel Co., Salt Lake City.

545,400,000 Tons of Bituminous Coal Produced in United States in 1923

Total output of soft coal in the United States in 1923 was 545,400,000 net tons, according to preliminary estimates by the U. S. Geological Survey.

The estimates by states, like that for the country as a whole, are based on weekly reports of cars loaded by the 137 principal coal-carrying roads, furnished through the courtesy of the American Railway Association. These weekly loadings afford a substantial basis on which to estimate the total output because the carriers reporting load about 85 per cent of all the coal produced. Allowance also is made for mine fuel, coal coked at the mines local sales, shipments by water and over certain small roads not reporting.

Many interesting facts are revealed

by the table, the most striking of which are the sharp increase in the output of West Virginia, which for the first time passed the 100,000,000-ton mark, and the maintenance of production in Kentucky close to the high record established in 1922. Probable factors in the high rate of production in those states were the demand for low-volatile coals as substitutes for anthracite for household purposes, and for high-volatile coals for the coke industry. No new high record was established in Pennsylvania, but the 1923 output—approximately 160,000,000 tons—was 41 per cent higher than in the strike year, 1922; 38 per cent higher than in 1921, and about 10 per cent less than the maximum production of 1918.

Estimated Production of Coal in 1923, by States, Compared with 1920, 1921 and 1922.

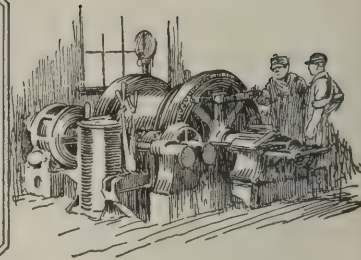
	(In Net Tons)			
	1920 ^a	1921	1922 ^a	1923 Estimated
Alabama	16,294,099	12,568,899	18,324,740	18,200,000
Arkansas	2,103,596	1,227,777	1,110,046	1,400,000
Colorado	12,278,225	9,122,760	10,019,597	10,300,000
Illinois	88,724,893	69,602,763	58,467,736	84,000,000
Indiana	29,350,585	20,319,509	19,132,889	27,000,000
Iowa	7,813,916	4,531,392	4,335,161	6,500,000
Kansas	5,926,408	3,466,641	2,955,170	4,500,000
Kentucky	35,690,762	31,588,270	42,134,175	41,000,000
Maryland	4,065,239	1,827,740	1,222,707	2,700,000
Michigan	1,489,765	1,141,715	929,390	1,200,000
Missouri	5,369,565	3,551,621	2,924,750	3,800,000
Montana	4,413,866	2,733,958	2,572,221	3,300,000
New Mexico	3,683,440	2,453,482	3,147,173	2,700,000
North Dakota	948,625	864,903	1,327,564	950,000
Ohio	45,878,191	31,942,776	26,953,791	40,000,000
Oklahoma	4,849,288	3,362,623	2,802,511	3,550,000
Pennsylvania (bituminous)	170,607,847	116,013,942	113,148,308	160,000,000
Tennessee	6,662,428	4,460,326	4,876,774	6,100,000
Texas	1,615,015	972,839	1,106,007	1,100,000
Utah	6,005,199	4,078,784	4,992,008	4,600,000
Virginia	11,378,606	7,492,378	10,491,174	11,000,000
Washington	3,757,093	2,428,722	2,581,165	2,950,000
West Virginia	89,970,707	72,786,996	80,488,192	100,100,000
Wyoming	9,630,271	7,200,666	5,971,724	8,200,000
Other States (b)	159,054	180,468	253,126	250,000
Total bituminous	568,666,683	415,921,950	422,268,099	545,400,000
Pennsylvania (anthracite)	89,598,249	90,473,451	54,683,022	95,444,000
Grand total	658,264,932	506,395,401	476,951,121	640,844,000

(a) Includes output of "wagon mines," for which data were not available in other years.

(b) Alaska, California, Idaho, Georgia, North Carolina, Oregon and South Dakota.



Practical Pointers For Electrical And Mechanical Men



Old Centrifugal Mine Pump Made Good as New

About three years ago a three-stage centrifugal pump was removed from one of our mines because it would no longer deliver anywhere near its original capacity. The mine water had eaten away some of the inside parts and much water leaked from stage to stage. Consequently, much of the water was merely circulated from one stage to another. Like many other pumps which have given a reasonable amount of service this pump was destined to land in the scrap heap. But before finally discarding it we decided to open it and see just what had happened. We expected at least that we would learn something about its design and possibly might find something which we could pass on to the manufacturers for their information.

Not long ago we found an opportunity to open up this pump to see just what had happened. Upon close inspection we found that the separating rings between the various stages were badly

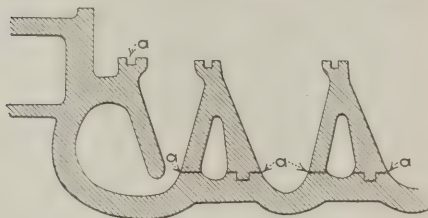


Fig. 1—Original Joint Between Separator and Casing

The shallow tongue in the joint between the space separator and the casing soon corrodes away and leaves considerable space for the mine water to leak from stage to stage.

eaten away at the line where they are fitted to the outer casing. The leakage through these spaces was not unusually large but was sufficient to prevent the pump from generating full capacity pressure and from delivering as much water as its size would indicate. Fig. 1 shows how the separating rings were fitted to the outer casing. It will be noticed that the tongue at the joint extends but a short distance into the groove in the casing; in fact, the dovetailing at the joints was not more than $\frac{1}{8}$ in. When the water started to corrode the metal at the joint it soon formed an easy passageway from one stage to the other. Just as soon as this condition existed the flow of water through the joint increased rapidly and the corrosive action of the water was quickened. The dirt in the water passing through this joint brightened the surface of the metal and thus the

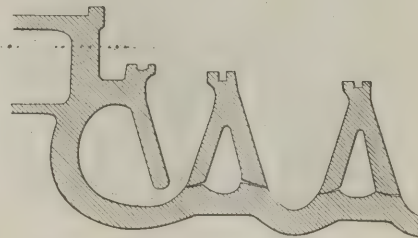


Fig. 2—How Joint Was Opened by Mine Water

Dirt in the mine water polishes the surface of metal thus increasing the corrosive action of the acid in the water. The leakage from stage to stage soon increases when there is a direct flow of water through the joints.

acid in the mine water had little difficulty in eating it away. Fig. 2 shows how the joints between the separating rings and the casing were worn to a considerable width. Further examination showed us that the rest of the casing and pump parts were not unduly worn.

A new casing for this pump would have cost between \$800 and \$1,000, but before buying it we decided we would try to repair the pump. Accordingly the casing was taken to our shop where it was rebored and fitted with rings designed to fill in the space between the stage separators and the casing. These parts are shown in Fig. 3, and it will be noticed that the tongue and lip at the joints were materially increased. The tongue fitting into the casing was made $\frac{1}{2}$ in. deep. To fit the rings securely in position, they were coated with red lead and boiled in linseed oil.

Our repair of this pump was satisfactory as the pump has now been running for about nine months and is still delivering full capacity at a reasonably high efficiency. Just recently this pump has been permanently located in a place where we were about to install another pump of the same capacity. As a consequence we have

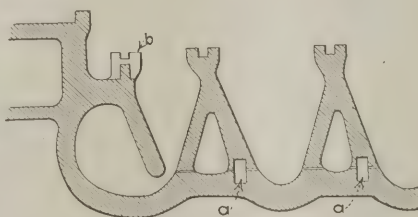


Fig. 3—Filler Rings in Place

These spacing rings were placed in position after the casing had been rebored. The deep tongue in the groove makes it much harder for the mine water to circulate in the joints. The saving resulting from this repair was from \$800 to \$1,000.

saved over \$2,000 by this little repair job. Another pump of this same type is now being repaired, and we feel sure we have found a means to materially increase the life of a pump of this type.

J. F. MACWILLIAMS.

Making Power-Line Work Easy and Safe

Linemen are more frequently injured while working at the ground level than they are while working in the air. The injuries may be received in many ways, but most commonly they are due to slipping, tripping, falling, handling tools, or being struck by flying or falling objects.

A few years ago, practically all pole and post holes were dug by hand, and the poles were raised and placed in position with pike poles. With many companies, hole-digging machines have replaced the digging bar and shovel, and pole-erecting derricks have superseded the pike pole and "deadman." Power winches, chain hoists, and auto trucks are now much used in place of the old strong-arm methods which formerly resulted in so many strained backs and blistered hands; but with the introduction of these powerful devices more responsibility fell upon the shoulders of the foreman. Cables and ropes, blocks and slings all had to be strengthened.

The evolution of the auto truck as a vehicle for transporting men, material and supplies has been a revelation. Not many years back, the "heavy gang's wagon" looked like a homeward-bound junk man after a big day's business. The bottom of the truck was filled with a pile of ropes, blocks, hand lines, coils of guy wire and messenger cable and a tangle of miscellaneous wire, both new and recovered.

On top of this would be piled a collection of digging tools and hand tools of all kinds, a dozen or more pike poles of odd lengths, and a couple of cant-hooks. Above this conglomeration would be piled several partly filled wire reels, and above all, half a dozen or more linemen, hanging on by their eyebrows, trying to keep the load under them, while the horses drawing the wagon were traveling in high to reach the plant before quitting time.

Out of this mess came the highly perfected and systematized "traveling stockroom" of today "with a place for everything and everything in its place." Naturally, with system came increased safety. A well stocked first-aid kit is now always at hand, and the cuts, scratches, and sliver punctures, which formerly were responsible for many

cases of infection, are now treated on the job, and the probability of infection is greatly reduced.

With the introduction of labor-saving devices for line work and construction, there has been a consequent reduction in the number of men employed on any particular job. The reduction in the number of men has usually resulted in a "survival of the fittest," and to say that some men are less fitted for line work than others is stating it mildly. Instead it should be said that some men employed as linemen are a positive hazard, not only to themselves, but unfortunately to their fellow workers also.

There are, possibly many times in the course of a day's work when one lineman is compelled to trust his life to another, and often it is necessary that he place this trust in a wholly irresponsible and careless co-worker. While "juggling hot stuff" 30 or 40 ft. above ground, in the vicinity of other live wires or grounded cables, a lineman should not be compelled to work on the same pole with a man who has had a couple of wild nights and feels either like "telling the world" about it or going to sleep on the job.

CARELESSNESS CAUSES MOST GRIEF

The class of men who are attracted by this adventurous life cannot be expected to be recruited from the ribbon counters in department stores, but there are some engaged in the work who might more properly be employed as stunt flyers at an aviation field, or animal trainers with a circus. Carelessness, inexperience, and thoughtlessness cause more grief for the lineman than all of the other possible causes combined. Take the following cases and see in how many you can blame the accident to one or more of these three factors:

A lineman on a pole with a hand ax, placed it on a crossarm while he was changing his position. The hand ax was jarred off and in falling struck a groundman on the shoulder, sending him to the hospital for several weeks. Hand axes should never be taken up a pole.

Another lineman, reaching out from the pole to catch an insulator tossed up from the ground, lost his balance, came into contact with a live wire, fell to the ground, and was badly injured. Tossing up material or tools is against the rules of most companies. The handline is much more reliable, if not quite as speedy.

Here are two cases where a handline caused trouble, but in neither case should the handline be blamed. In the first, a lineman climbed a pole to do some work on a transformer. Instead of taking the end of a handline with him, he called down to the groundman to throw it up. He stood up on the cover of a transformer with his back to the pole in a favorable position to receive the line, but in attempting to catch it, he straightened up and brought his head into contact with a high potential line. Falling to the ground he was killed.

The other accident in which a handline figured was caused by a thrown line becoming tangled in a high potential circuit. In attempting to shake

the line loose, a short circuit burned off one of the line wires. The falling wire struck a lineman working on the pole. He received a shock which caused him to fall, breaking both arms. Neither of these accidents would have happened if the handline had been carried up the pole.

Rubber gloves are usually provided by the company, systematically tested and kept in good repair. Linemen frequently have to be coaxed or threatened by the foreman before they will put them on, and then sometimes they will take them off and tuck them under their belts, just when they need them most. To use rubber gloves as a measure of precaution in the event that the circuit on which they are working accidentally comes into contact with a high potential line, apparently seems to some of them like displaying a weakness, and they would rather take a chance with a high voltage than to run a chance of being "kidded" by the other boys in the gang.

RUBBER GLOVES BETTER THAN HARP

The lads who are poking fun would make one believe that gloves should be worn with a swagger stick and monocle, but there are different kinds of gloves and different kinds of jobs. Rubber gloves are unwieldy and not exactly pleasant to wear, but at the worst they are much better than a wooden overcoat.

Take this case: After making the claim that he could "eat 220-volt stuff," a lineman climbed up on a steel frame building to cut down a 220-volt service. Standing on the grounded steel work, and without gloves, he cut the line. The moment the jaws of his pliers touched the copper, his grip froze to the handles and he was killed before he could be freed.

There is another reported case where a lineman was badly shocked as he cut into a 110-volt wire while he was standing on a lawn that was wet from sprinkling. In another quite recent fatality, a lineman was killed by 110 volts. He was connecting a three-wire 110/220-volt service on the pole and had the middle or neutral wire under his left arm close up to the shoulder. While tapping the service to the line, he received a 110-volt shock through his pliers, right hand, right arm, and chest, which killed him before he could be released.

PULLING DEAD LINES EVEN DANGEROUS

Many serious accidents have been reported where men were pulling wires or cables while standing on the ground and the lines came into accidental contact with high potential circuits. This class of accidents has become so frequent and serious with certain companies, that they are contemplating requiring groundmen to use rubber gloves while handling wire or cables which are in any way exposed to accidental contact with live circuits at any voltage.

Once in a great while safety belts break and linemen fall, but more frequently they fall because they are not using the belt. The safety belt is frequently changed from one location to another as a man changes his position on the pole, and here lies the greatest danger. In passing the strap around the pole or over an arm there is often

greater liability to come into contact with high potential circuits, and "looking ahead" in this case is important.

I would offer this advice to linemen: Do not do your work automatically or subconsciously. Think as you go and "think safety." This may be illustrated by a story of two men working on an 11 kw. line, painting the cross arms yellow. One was splashing along with his mind miles away, when he unconsciously reached up and hung his paint pail on the 11,000. His partner called his attention to what he had done. He looked at it for a moment and then said: "Well, if I hung it there I guess I can't take it off," and he did.

Do not forget, if you are a lineman, you are a member of a team, just as much as though you were a ball player—with this difference: If you make an error you may not be able to play again tomorrow. In no game is team work required more than in the game of "juggling juice." There is an old saying: "Linemen never grow old," I would qualify that by saying: "Careless linemen never grow old," so "keep your eye on the ball" and don't get too close to the plate.—G. E. Kimball in *Safety News*.

Rules Being Established for Radio Antennas

In the past few years much has been said and written on the subject of the hazards of antennas used in radiophone receiving installations. Many people have sought to convey to the minds of the untechnical the idea that radiophone antennas are invariably a menace, arguing that every wire elevated or suspended in space and connected at one end to the earth is likely sooner or later to be struck by lightning.

To counteract this impression, the radio selling organizations supported a campaign the aim of which was to present to prospective purchasers statistics that would prove the risk to be negligible. Representatives of some of these organizations felt that insurance companies, underwriters committees and inspection bureaus were overestimating the hazard in the interest of bureaucracy and against the interest of the radio equipment companies.

The situation now is clearing as the public learns that the National Electric Code, recognized by fire-insurance companies, specifies methods of wiring, including lightning protection, which should be followed if damage to life and property is to be reduced to a minimum.

Care in Handling Copper

Copper cannot be given the same rough treatment that iron, steel or brass will stand; it requires some important precautions in its handling and application. It fails quickly under localized stresses. Sharp bends, rough or nicked edges in copper straps or wires, limited movement to take care of expansion and contraction, are all points especially to be guarded against. This is particularly true when the copper is subject to quick, sharp blows or vibration, such as are common with locomotive motors.



Problems In Underground Management



Water Cartridge May End Powder Risk And Bring Down Coal in Lumps

Will Not Cause Dust or Gas Explosions, Shatter Roof or Coal Ribs, nor
Develop Poisonous Gases—Small Cartridge Only
Two Inches in Diameter

MORE than one effort has been made to introduce the hydraulic cartridge into the coal mines, and correspondence recently received shows that it still has many advocates who are anxious to get in touch with the concerns which are making it. The cartridge must stand up, of course, under the severe conditions it has to confront.

It is not easy to shatter coal, rock or concrete and do it by main force without the advantage of impact and have the equipment remain uninjured and ready for continuous work. That B. C. Beachamp, of the Demolition and Construction Co., 72-74 Victoria St., London, S. W.-1, the owner of the Tonge hydraulic mining cartridge says his device will do. Its ability to crack concrete as shown in the illustrations seems to satisfy that point, at least in a degree.

The other difficulty is in the making of the hole for the cartridge. Powder and dynamite go into small holes. The hydraulic cartridges have needed more room. One, at least has required or preferred a slotted hole. This device needs a hole 2 in. or 4 in. in diameter depending on the size of the cartridge. This size is by no means insuperable, the smaller hole being quite of usual dimensions.

The hydraulic mining cartridge consists of a strong steel cylinder or cartridge-shaped body containing a number of small hydraulic rams or presses which work at right angles to the axis of the body. These rams were formerly of duplex or telescopic form, thereby having a longer travel. For practical work the solid ram has proved adequate to all requirements, being also somewhat simpler. The cartridge is used in conjunction with a pneumatic, steam, or electric drill.

A hole of a suitable diameter, slightly larger than that of the particular size of cartridge being used, is drilled to the required depth in the material being broken. The cartridge is inserted in position, and liners, or packing pieces of flat iron bar about $\frac{3}{8}$ in. thick, are placed between the heads of the rams and the concrete circumference of the hole. All is then ready for "firing."

A charge of about a quart of water is required. The tank containing this is

connected by a rubber tube to the suction side of the cartridge pump. This pump has two handles, the smaller of which is attached to the pump piston. Operation of this handle in and out alternately draws in water from the suction side and forces it into the cartridge head. An air exhaust valve is left open until the cartridge head, tubing, and pump are full; it is then closed.

With the apparatus full of water it is now impossible to operate the small handle direct, and the second, and larger one, is brought into use. It consists of a screw device, which as it is tightened up forces water into the cartridge head past a non-return valve. As the operator continues to work the pump, therefore, the pressure behind the rams in the cartridge head gradually "builds up," until finally the material to be broken cracks and then gives way.

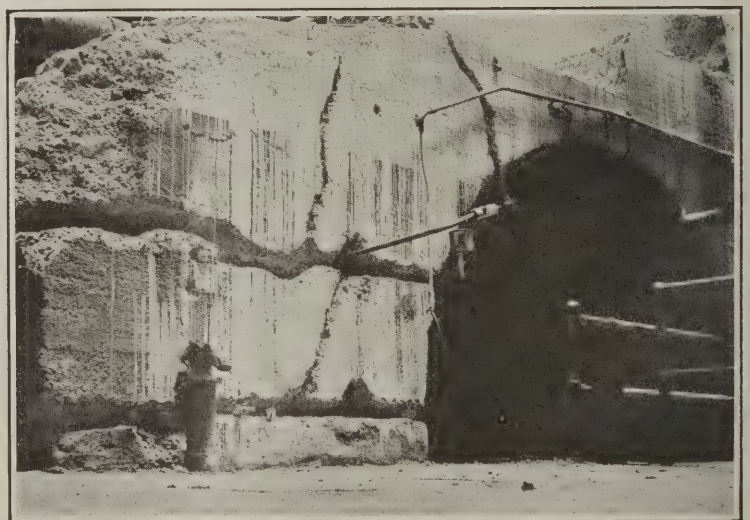
The hydraulic pressures usually employed in working the tool are from three to five tons per square inch, although much higher pressure could be used if required. However, as the

collective area of the rams multiplied by the hydraulic pressure per square inch indicates a total bursting pressure of from 60 to 240 tons, depending on the size of the machine used, it is clear that no higher operating pressures are needed for all practical purposes. One of the early applications of the machine was the lifting of 200-ton masses of concrete to permit of a chain being passed below them for removal.

The cylindrical head of the cartridge is made of various diameters and lengths, and is provided with five, six, or eight press rams, according to the size of the tool, the larger sizes having the smaller number of rams. For concrete work the 4-in. diameter cartridge has proved most useful. Recently, to meet the requirements of lighter work, a baby cartridge of slightly over 2 in. diameter has been developed.

It is interesting to note that the cartridge was used in raising the two British warships that were sunk during the war in the Zeebrugge Canal to blockade it. By means of the cartridge the concrete with which these ships were filled was easily removed and the hulls were floated.

The hydraulic cartridge was invented by a mining man, Mr. Tonge, for use in the coal mines. Its use for demolishing concrete and rock is a new development, but shows the power with which it can be made to operate. It has the advantage that where it is used explo-

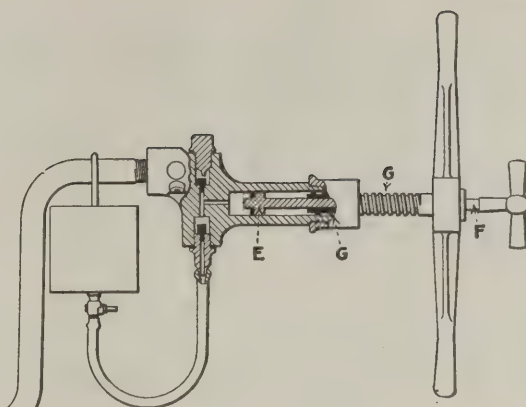
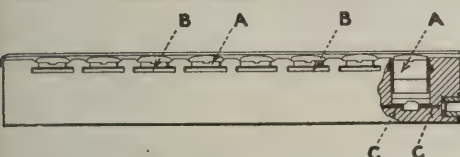


Water Power Applied to the Breaking of Concrete

Hydraulic mining cartridge breaking 50 tons of concrete with a single "shot" at Lots Road Power Station in London, England. The pump by which this was effected is seen near the under side of the arch.

Sketch Showing Construction of Hydraulic Mining Cartridge

A, ram; B, retaining plate; C, passage; D, connection pipe; E, piston; F, piston rod; G, supplementary hollow rod. The small handle is used to fill the pump with water by the usual method of reciprocation. When the cartridge is filled—it only needs a quart of water—the screw pump is used to provide the final compression thus causing the plungers to move out with almost irresistible force. Note the small water reservoir with its rubber pipe. This latter, of course, never receives any pressure, except that of the reservoir.



sives are not needed. This is a distinct gain as it removes the dangerous powder magazine, which has already claimed many lives. It also saves the danger and expense of the powder trip and all the dangers connected with the handling of powder, fuse and detonators at the mine face.

It, further, is safe in a gaseous place. Even permissible explosives are not safe in gas if an overcharge is fired. The possibility of powder being dropped or discharged unburned into the coal is avoided as well as all the dangers of deteriorated explosives. A long train of accidents is thus avoided.

Where the hydraulic cartridge is used

no coal-dust explosion can be charged to the breaking of the coal and the quantity of fine dust formed will be decreased, however that is a minor matter as undercutting makes plenty of dust. The coal is not shattered, nor are the adjacent ribs of the roof, making the roadways more permanent and safe and reducing the need for timber. Neither poisonous gases nor smoke are formed. Where ventilation is defective deaths from the first have occurred and the health of the miner has often been affected adversely. The smoke of explosives is particularly undesirable especially during working hours. With the hydraulic cartridge "shooting" can be done at any hour without fear of

accident, delay or discomfort. The "shot" is made in about five minutes, and as will be seen the equipment is light. No tests of this cartridge have been made in America but it is being extensively tried we understand in the mines of Great Britain, and it is being used quite generally, we are told, in the urban demolition and construction work in that country. Care, of course, would have to be taken to arrange the cartridge so that it would break the coal down in sufficiently small pieces that the miner would not have to reduce the coal to small sizes in order to load it into the car. Only experience will determine the true value of the water cartridge.

Chunk of Waste Stops an Inaccessible Leak

By E. S. WADE

Superintendent, Beech Bottom Mine Power, W. Va.

In the Beech Bottom mine of the Windsor Power House Coal Co., near Power, W. Va., an extensive sump a short distance from the main headings was drained by a plunger pump. A 3-in. discharge line led from the pump through an airway to a borehole 175 ft. away, which carried the water against a head of 65 ft. to the surface.

The roof in this mine is "rotten," and consequently comes down in large falls, unless it is timbered, properly. The airway mentioned, unfortunately, was not so timbered, with the result that many falls occurred in it. One of these broke the discharge line of the pump. An attempt to locate the break would have been both difficult and dangerous.

What was to be done? Water in the basin rose rapidly and the discharge borehole was no longer available. The shortest distance from the pump to the surface by way of the entries is about 1,200 ft. and at least three days would be required after the pipe was obtained and brought into the mine to lay such a line. I was at a loss to know what to do and asked a representative of a pump manufacturer for his advice.

He suggested that the discharge end of the pump be opened and a piece of waste, the size of one's fist, be placed in the line. His theory was that the waste would follow the path of least resistance. Consequently when it reached a break in the pipe, it would rush into the opening, where it would

serve as a plug, held in place by the pressure of the water inside the pipe, which naturally would be many times greater than the atmospheric pressure on the outside.

He was right. I tried his scheme and it worked perfectly. This emergency repair afforded me an opportunity to lay a new permanent discharge line.

Does Oxidation of Pyrite or Of Coal Cause Mine Fires?

Pyrite, says J. Ivon Graham, in a paper read before the South Staffordshire and Warwickshire Institute of Mining Engineers, has been credited for the past three centuries with causing the spontaneous combustion of coal. It is now clear from recent researches that in some cases the oxidation of coal is the cause of spontaneous combustion and that in others the oxidation of pyrite is to be credited as being the cause.

Winmill, says Mr. Graham, has indicated that the pyrite of North Staffordshire which oxidizes rapidly is found in a finely divided state and that the lump pyrite in the Barnsley bed that remains untarnished for years, when crushed to a fine powder oxidizes rapidly at (86 deg. F.), in fact as rapidly as the North Staffordshire material, whereas particles that will be retained on a 30-mesh screen and pass through a 10-mesh show only a slight absorption of oxygen.

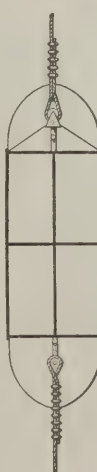
Winmill has shown that twice as much heat is evolved in the oxidation of pyrite as is generated in the oxidation of coal when an equal quantity of oxygen is absorbed. Further Win-

mill's tests show that the rate of oxidation of pyrite is doubled for a rise of 10 deg. C. or 18 deg. F., an acceleration in the rate of heating of pyrite in excess of that resulting with the oxidation of coal.

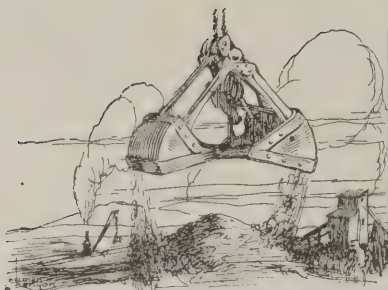
Some pyrite from the Ballachulish state quarries which showed no evidence of tarnishing rapidly oxidized when broken up into small sizes. Massive pyrite from Cornwall and radiated pyrite (marcasite) from the chalk at Folkstone showed a similar action. Hence it seems obvious that pyrite when broken fine is readily susceptible to oxidation.

Reducing Resistance of Air To Cage Movement

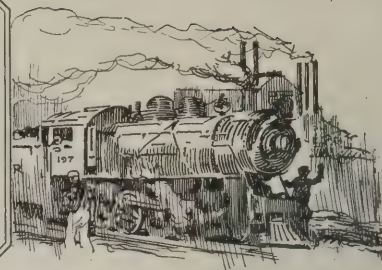
General recognition has been given to the fact that the movement of



cages interferes with the passage of air in the shaft. It also adds to the work of the hoist. Recently experiments have been made showing that mine cages when traveling at the maximum speed increase the static strain on the rope 8 to 21 per cent. This lowers the actual margin of safety from 10 to 7 and a writer in *Braunkohle* advises that air resistance be reduced as shown in the illustration especially for deep shafts and high hoisting speeds.



Production And the Market



Unrelieved Dullness Pervades Coal Markets; Contracting Lags; Lake Opening Lacks Promise

The coal consumer's little game of "wait and see" is being carried to such lengths that stagnation prevails in the coal markets of the country. Everyone continues to hold back to see what will happen, but nothing happens. Even the closing of contracts which ought to be in evidence at this time is conspicuously backward, and that despite the low levels that prices have reached. Running time at commercial mines has dropped to three days a week or less in most fields, southern Ohio working at less than 20 per cent of capacity. In the Standard field and in eastern Kentucky many mines have closed down, and many others are soon to follow suit, as a strike is expected in the latter field April 1. An indefinite suspension is looked for also in the Southwest pending the negotiation of a wage agreement. Central Pennsylvania and northern West Virginia have ironed out their differences, the existing agreement having been reaffirmed in each case, with minor modifications. An open-shop pact has been signed for four years between the union and the Kentucky-Tennessee operators' association.

Preparations for the opening of the navigation season on the Lakes lack the usual hopeful anticipation. With about 3,500,000 tons of coal on the docks at the Head-of-the-Lakes March 15, compared with 900,000 tons at that time a year ago, there is likely to be an oversupply when navigation opens. As a consequence a considerable falling off in early lake traffic as compared with last year is more than probable.

Midwest Markets Stagnant

Coal Age Index declined 3 points to 173, as of March 31, the corresponding average price being \$2.09. This compares with \$2.13 on March 24.

A slight firming up of steam coals is the only feature that has tended to relieve, in a measure, the deadly

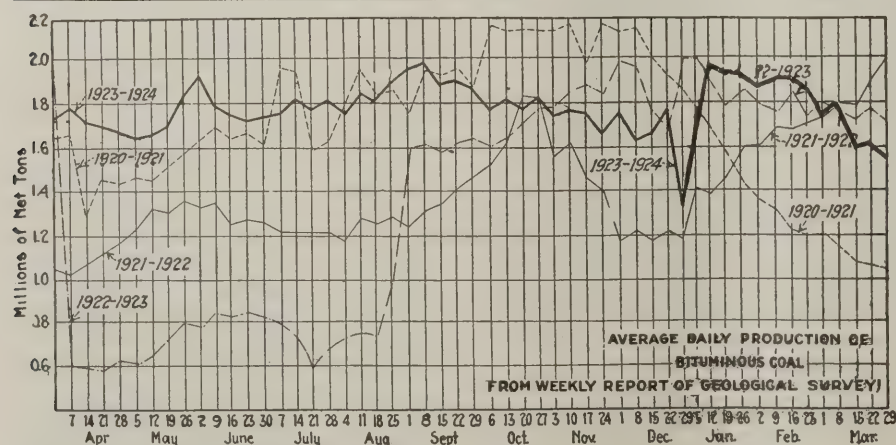
dullness that has settled over Midwestern markets. Though a number of screening contracts expired April 1, very little contracting is going on, consumers still having supplies sufficient to last several weeks longer. Running time at commercial mines averages about 2½ days a week.

Kentucky markets have developed further weakness, due to mild weather and lack of orders from retailers, and more wage cutting is reported in the non-union districts of eastern Kentucky. Eight thousand idle empty coal cars on sidings in the Cincinnati district bear eloquent testimony to the dullness of the market thereabouts. There was a spurt of activity in the Southwestern district, featured by heavy buying on the part of railroads and industries, due to the expected shutdown during the wage parley. The Colorado market was reasonably active, thanks to some cold weather, but the reverse is true of Utah, where the mines are working less than two days a week on an average.

Sluggishness All Too Evident

Sluggishness characterizes the trade in Ohio, and there is no evidence of preparations for rush of early cargoes up the lakes such as was the case last year, when the docks were cleaned up. Pittsburgh is finding it difficult to meet competition from some of the West Virginia and Kentucky fields, which are able to quote lower prices due to wage cuts. Trade in New England and on the Atlantic seaboard remains dormant.

Production of bituminous coal during the week ended March 22 amounted to 9,309,000 tons, according to the report of the Geological Survey, which was 318,000 tons less than was produced during the previous week. Output of anthracite totaled 1,804,000 tons, a decline of 137,000 tons compared with the preceding week, when 1,941,000 tons was mined.



Estimates of Production

(Net Tons)

BITUMINOUS

Week ended	1922-1923	1923-1924
March 8	10,628,000	9,617,000
March 15 (a)	10,428,000	9,627,000
March 22 (b)	10,424,000	9,309,000
Daily average	1,737,000	1,552,000
Coal year to date	417,168,000	532,016,000
Daily average to date	1,389,000	1,780,000

ANTHRACITE

March 8	2,049,000	1,882,000
March 15	2,057,000	1,941,000
March 22	2,126,000	1,804,000
Coal year to date	54,478,000	91,118,000

COKE

March 15 (a)	410,000	308,000
March 22 (b)	384,000	316,000
Calendar year to date	4,270,000	3,367,000

(a) Revised from last report. (b) Subject to revision.

Midwest Dullness Continues

There was little to relieve the chronic dullness in Midwestern markets during the past week even though steam coals firmed up a trifle. An effort to force screenings business was made by jacking the price of southern Illinois 1½-in. stuff to \$2, and 2-in. coal to \$2.15, but even this did not drive much business into the open. A good many screenings contracts ran to April 1 and the holders of some of these agreements have more fine coal on the ground, which evidently is going to carry them several weeks further. By May 1 a real stiffening of fine-coal prices is expected.

The prospective shutdown in the Southwestern region beginning April 1 last week was looked upon by Illinois producers as a source of some business in Missouri, Kansas and Nebraska. This argument was worked to the full on steam purchasers, who insist upon making no contracts now but who say they will be ready to do so in a month or six weeks. Very little contracting is now going on.

Domestic business is slow indeed throughout the Midwest region. Fag-end business is all there is at retail yards, especially after a period of fine balmy weather opened during the latter part of last week. Many mines closed

down in southern Illinois, as well as in the rest of Illinois and Indiana on April 1. Running time at the average commercial mine has not exceeded 2½ days a week.

Mines in the Mt. Olive district are carrying a large number of "no bills" in prepared sizes, which is the result of a small demand for domestic tonnage by reason of the prevailing mild weather. Two and one-half inch and 3-in. lump is being quoted in the St. Louis market at \$3 per ton mine, while prices in the surrounding territory outside of East St. Louis and St. Louis switching districts are 25c. per ton lower, or \$2.75 per ton. Domestic egg and domestic nut are difficult to move at any price.

In the Standard field the only size finding a ready market is screenings, which are quoted at \$1.10@1.30. A number of mines already have suspended operations and others are contemplating doing so on April 1. Those in operation are fortunate in getting two days per week working time.

St. Louis Trade Is Duller

Mild weather has caused a decline in retail interests, resulting in a decidedly inactive market. Dealers are reducing their stocks to a minimum, anticipating lower prices April 1. The country demand is largely for cheaper grade

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
	Market Quoted	Apr. 2 1923	Mar. 17 1924	Mar. 24 1924	Mar. 31 1924†		Market Quoted	Apr. 2 1923	Mar. 17 1924
Smokeless lump.....	Columbus....	\$6.85	\$3.85	\$3.60	\$3.15@3.40	Franklin, Ill. lump.....	Chicago.....	\$3.85	\$2.85
Smokeless mine run.....	Columbus....	4.25	2.10	2.10	2.00@2.25	Franklin, Ill. mine run.....	Chicago.....	3.10	2.35
Smokeless screenings.....	Columbus....	4.25	1.55	1.60	1.50@1.75	Franklin, Ill. screenings....	Chicago.....	2.05	2.00
Smokeless lump.....	Chicago.....	6.10	3.60	3.25	3.00@3.50	Central, Ill. lump.....	Chicago.....	3.10	2.60
Smokeless mine run.....	Chicago.....	3.75	2.20	2.10	2.00@2.25	Central, Ill. mine run.....	Chicago.....	2.60	2.10
Smokeless lump.....	Cincinnati.....	6.25	3.25	3.25	3.00@3.50	Central, Ill. screenings....	Chicago.....	1.60	1.70
Smokeless mine run.....	Cincinnati.....	4.00	2.25	2.20	2.00@2.25	Ind. 4th Vein lump.....	Chicago.....	3.35	2.85
Smokeless screenings.....	Cincinnati.....	3.85	1.75	1.75	1.65@2.00	Ind. 4th Vein mine run.....	Chicago.....	2.85	2.35
*Smokeless mine run.....	Boston.....	6.10	4.65	4.65	4.15@4.25	Ind. 4th Vein screenings....	Chicago.....	1.85	1.85
Clearfield mine run.....	Boston.....	3.05	2.10	2.05	1.65@2.35	Ind. 5th Vein lump.....	Chicago.....	2.85	2.60
Cambria mine run.....	Boston.....	3.85	2.60	2.60	2.10@3.00	Ind. 5th Vein mine run.....	Chicago.....	2.10	2.10
Somerset mine run.....	Boston.....	3.50	2.35	2.30	1.75@2.50	Ind. 5th Vein screenings....	Chicago.....	1.55	1.70
Pool 1 (Navy Standard).....	New York.....	4.10	3.00	3.00	2.75@3.25	Mt. Olive lump.....	St. Louis.....	2.85	2.85
Pool 1 (Navy Standard).....	Philadelphia.....	4.30	3.00	3.00	2.75@3.25	Mt. Olive mine run.....	St. Louis.....	2.50	2.50
Pool 1 (Navy Standard).....	Baltimore.....					Mt. Olive screenings....	St. Louis.....	1.55	1.50
Pool 9 (Super. Low Vol.).....	New York.....	3.50	2.20	2.20	2.00@2.40	Standard lump.....	St. Louis.....	2.60	2.70
Pool 9 (Super. Low Vol.).....	Philadelphia.....	3.50	2.30	2.30	2.00@2.45	Standard mine run.....	St. Louis.....	2.10	1.95
Pool 9 (Super. Low Vol.).....	Baltimore.....	3.50	2.30	2.25	2.00@2.50	Standard screenings....	St. Louis.....	.95	1.30
Pool 10 (H. Gr. Low Vol.).....	New York.....	2.90	1.95	1.95	1.75@2.00	West Ky. lump.....	Louisville.....	2.50	2.85
Pool 10 (H. Gr. Low Vol.).....	Philadelphia.....	3.00	1.85	1.85	1.70@2.00	West Ky. mine run.....	Louisville.....	1.85	1.70
Pool 10 (H. Gr. Low Vol.).....	Baltimore.....	3.25	1.90	1.90	1.85@2.00	West Ky. screenings....	Louisville.....	1.75	1.30
Pool 11 (Low Vol.).....	New York.....	2.50	1.40	1.40	1.25@1.60	West Ky. lump.....	Chicago.....	2.85	2.60
Pool 11 (Low Vol.).....	Philadelphia.....	2.50	1.65	1.65	1.30@1.70	West Ky. mine run.....	Chicago.....	1.80	1.35
Pool 11 (Low Vol.).....	Baltimore.....	2.35	1.75	1.60	1.50@1.70				

High-Volatile, Eastern					South and Southwest				
	Market Quoted	Apr. 2 1923	Mar. 17 1924	Mar. 24 1924	Mar. 31 1924†		Market Quoted	Apr. 2 1923	Mar. 17 1924
Pool 54-64 (Gas and St.)....	New York.....	2.40	1.50	1.50	1.40@1.65	Big Seam lump.....	Birmingham.....	2.50	2.60
Pool 54-64 (Gas and St.)....	Philadelphia.....	2.30	1.60	1.60	1.45@1.70	Big Seam mine run.....	Birmingham.....	2.10	1.80
Pool 54-64 (Gas and St.)....	Baltimore.....	2.40	1.85	1.70	1.55@1.90	Big Seam (washed).....	Birmingham.....	2.35	2.10
Pittsburgh acid gas.....	Pittsburgh.....	3.35	2.55	2.55	2.50@2.65	S. E. Ky. lump.....	Chicago.....	3.85	2.85
Pittsburgh gas mine run.....	Pittsburgh.....		2.30	2.30	2.25@2.35	S. E. Ky. mine run.....	Chicago.....	2.85	1.85
Pittsburgh mine run (St.).....	Pittsburgh.....	2.00	2.10	2.10	2.00@2.25	S. E. Ky. lump.....	Louisville.....	4.25	3.00
Pittsburgh slack (Gas).....	Pittsburgh.....	2.25	1.45	1.35	1.20@1.30	S. E. Ky. mine run.....	Louisville.....	2.85	1.75
Kanawha lump.....	Columbus....	4.25	2.55	2.55	2.40@2.70	S. E. Ky. screenings....	Louisville.....	2.40	.95
Kanawha mine run.....	Columbus....	2.75	1.50	1.55	1.45@1.70	S. E. Ky. lump.....	Cincinnati.....	3.75	2.85
Kanawha screenings.....	Columbus....	2.30	1.05	1.05	1.00@1.10	S. E. Ky. mine run.....	Cincinnati.....	2.60	1.45
W. Va. lump.....	Cincinnati.....	3.50	2.85	2.50	2.00@2.50	S. E. Ky. screenings....	Cincinnati.....	2.10	.85
W. Va. gas mine run.....	Cincinnati.....	2.75	1.40	1.30	1.25@1.35	Kansas lump.....	Kansas City.....	4.50	4.50
W. Va. steam mine run.....	Cincinnati.....	2.50	1.40	1.30	1.25@1.35	Kansas mine run.....	Kansas City.....	3.50	3.25
W. Va. screenings.....	Cincinnati.....	2.10	.85	.85	.75@1.00	Kansas screenings....	Kansas City.....	2.60	2.50
Hocking lump.....	Columbus....	3.50	2.55	2.55	2.40@2.70				
Hocking mine run.....	Columbus....	2.35	1.85	1.70	1.60@1.75				
Hocking screenings.....	Columbus....	1.90	1.05	1.05	1.00@1.10				
Pitts. No. 8 lump.....	Cleveland.....	2.90	2.30	2.35	2.00@2.75				
Pitts. No. 8 mine run.....	Cleveland.....	2.25	1.80	1.80	1.75@1.90				
Pitts. No. 8 screenings....	Cleveland.....	2.00	1.30	1.25	1.10@1.30				

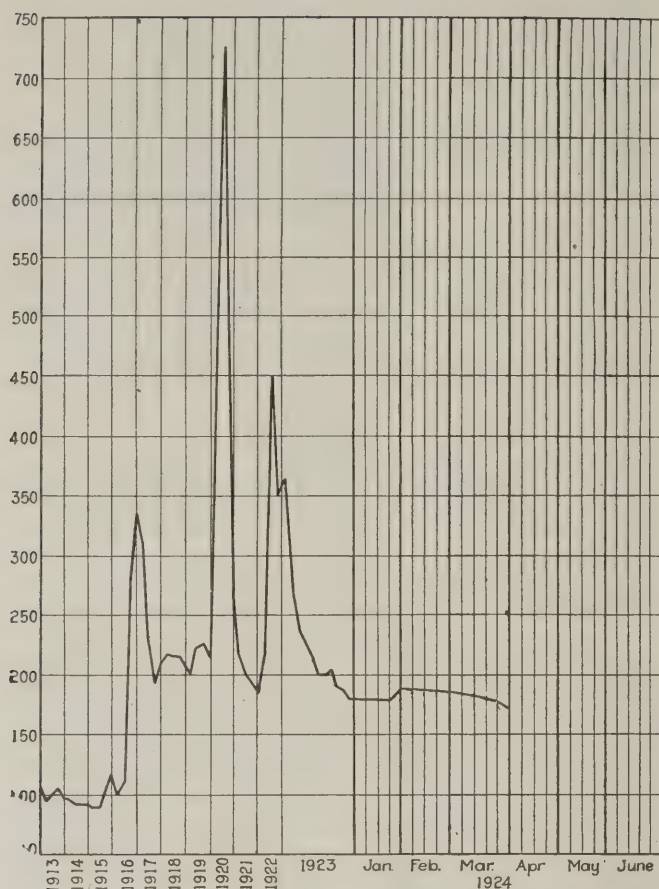
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		April 2, 1923		March 24, 1924		March 31, 1924†	
Market Quoted		Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34	\$7.75@8.35		\$8.00@9.25		\$8.00@9.25
Broken.....	Philadelphia.....	2.39	7.90@8.10				
Egg.....	New York.....	2.34	8.00@8.35	\$7.75@8.25	8.75@9.25	\$7.75@8.25	8.25@9.25
Egg.....	Philadelphia.....	2.39	8.10@8.35	8.50@10.00	8.75@9.25	8.50@10.00	8.75@9.25
Egg.....	Chicago.....	5.06	7.20@8.25	7.50@8.80	8.00@8.35	7.50@8.80	8.00@8.35
Stove.....	New York.....	2.34	8.00@8.35	8.75@9.25	8.75@9.25	8.75@9.25	8.25@9.25
Stove.....	Philadelphia.....	2.39	8.15@8.35	9.85@11.00	8.90@9.25	9.85@11.00	8.90@9.25
Stove.....	Chicago.....	5.06	7.35@8.25	7.95@9.25	8.00@8.35	7.95@9.25	8.00@8.35
Chestnut.....	New York.....	2.34	8.00@8.35	8.75@9.25	8.75@9.25	8.75@9.25	8.25@9.25
Chestnut.....	Philadelphia.....	2.39	8.15@8.35	9.85@11.00	8.90@9.25	9.85@11.00	8.90@9.25
Chestnut.....	Chicago.....	5.06	7.35@8.35	7.95@9.25	8.00@8.35	7.95@9.25	8.00@8.35
Range.....	New York.....	2.34	8.30		9.00		9.00
Pea.....	New York.....	2.22	6.00@6.30	4.50@5.25	6.15@6.65	4.50@5.25	5.75@6.65
Pea.....	Philadelphia.....	2.14	6.15@6.20	4.75@6.50	6.35@6.60	4.75@6.50	6.35@6.60
Pea.....	Chicago.....	4.79	5.49@6.03	4.50@5.60	5.40@6.05	4.50@5.60	5.40@6.05
Buckwheat No. 1.....	New York.....	2.22	3.50@4.15	2.25@3.00	3.50	2.25@2.75	3.00@3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	4.00	2.25@3.00	3.50	2.25@3.00	3.50
Rice.....	New York.....	2.22	2.50	1.75@2.25	2.50	1.75@2.25	2.00@2.50
Rice.....	Philadelphia.....	2.14	2.75@3.00	1.75@2.25	2.50	1.75@2.25	2.50
Barley.....	New York.....	2.22	1.50	1.50@1.75	1.50	1.50@1.75	1.50
Barley.....	Philadelphia.....	2.14	2.00	1.25@1.50	1.50	1.25@1.50	1.50
Birdseye.....	New York.....	2.22	1.60	1.60@1.75	1.60	1.60@1.75	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924			1923
	March 31	March 24	March 17	April 2
Index	173	176	179	252
Weighted average price.....	\$2.09	\$2.13	\$2.16	\$3.07

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

coals, but only a small tonnage is moving, the country dealer taking the same view as the city dealer. There is some interest being taken in anthracite, but orders are withheld awaiting the new circular.

Kentucky Market Soft

Milder weather and lack of retailer orders has further weakened the Kentucky coal market, until \$2.75 is the top price quoted on the best spot coal in the state, while there has been some distress stuff selling at ridiculously low prices. Eastern Kentucky mines in the non-union districts are reported to have done some more wage cutting, which is causing much dissatisfaction among miners, but it is a case of lower production cost or close down.

Revised prices of eastern Kentucky coal show block at \$2.50@\$2.75; lump, \$2.25@\$2.50; egg or nut, \$1.75@\$2; mine run, \$1.25@\$1.75; and screenings, 75c.@\$1.15, while western Kentucky is asking \$2.75 for 6-in. block; \$2.40@\$2.50 for egg or lump; \$1.75@\$2.15 for nut; \$1.40@\$1.85 for mine run, and 90c.@\$1.25 for screenings.

Western Kentucky has no business to speak of and many mines are closing, even though a strike was expected in most of the field April 1. Operators report that a good many mines are down and that others are working a day to a day and a half a week, the few that are working two days being considered as "sitting pretty."

Northwest Trade Is Dead

Dock conditions at the Head-of-the-Lakes are bad. Stocks on docks March 15 are placed at 3,500,000 tons, of which approximately 1,500,000 is free coal. Very little has gone

out in the past six weeks, and at present it looks as if there would be an oversupply when navigation opens. This time last year the docks held only about 900,000 tons. The railroads are taking what coal they can. The docks would be working only two or three days a week if it were not for them.

Prices of bituminous are the same as last week, although the market is weaker and reductions are likely. Dock companies at Duluth have word not to cut, as any one of a dozen possibilities might help the market.

A cut of \$1 in anthracite pea coal has been announced. The remainder of the anthracite market is firm. This cut is because of oversupply and makes the dock price \$10. Little anthracite is in demand. Nut is cleaned up, but a small amount of stove seems to bob up every now and then. Buckwheat and Pocahontas are both at a standstill. Anthracite substitutes are dead. Briquets can be had at \$10, and coke at \$9.50 to \$10.50, depending on size.

The coal market is in a state of stagnation at Milwaukee also. Little or nothing is doing. Demand is only for fuel for immediate use. The weather continues mild. Representatives of dock companies are in the East consulting the powers that be as to future supplies and also as to the extent of the spring cut in prices, which is expected to be promulgated about the beginning of April.

Southwest Shutdown Coming

The last week of March was an active one through the Southwestern district. The prospect of Kansas, Oklahoma, Missouri and Arkansas mines being closed indefinitely pending a wage agreement by the operators' and miners' scale committees, which opened a joint meeting in Kansas City March 28, brought heavy buying by railroads and larger industries of industrial sizes. The slight surplus of lump and nut accumulated as a result of the increased demand for screenings is causing little worry. It is expected to be cleaned up before long. Mines have been working full time. Kansas prices are unchanged.

The market in Colorado continued reasonably active last week, due to the cold weather. Dealers are fairly well loaded up with small orders on the cheaper grades. Higher grades and anthracite are not popular and a number of unbilled loads of all kinds are reported at the mines. Colorado mines worked an average of twenty-four hours last week. There has been no change in prices since March 1.

The market in Utah continues sluggish in spite of a short cold snap which moved a little retail coal. Mines are working less than two days a week on an average. The demand, such as it is, is for slack, which is hard to get on account of the short working time. No bill cars are on the tracks and operators are doing their best to keep the mines open.

Cincinnati Market Panicky

April 1 prices perhaps are the most interesting of the year's quotations in Cincinnati, as they throw a light for several months to come. During the past week the Louisville & Nashville contracts were let, and those of the Big Four, Norfolk & Western and Chesapeake & Ohio are being parceled out, indications showing that as the really large tonnage is concerned a \$2 basis, or close to it tells the tale. Smokeless circular prices name \$3.50 for lump and egg, \$2.50 for nut, \$2.25 for mine run and \$2 for screenings. Unlike other seasons this represents the figures of the producers. Off grades are being sold below the market, however, and some mine run is being sold with a guarantee that it will contain 50 per cent of the lump and egg. The state of trade is panicky and inclined to be twisted this way or that with the slightest influence. Forty per cent of the mines in Hazard, Harlan, Elkhorn, Big Sandy and in some of the C. & O. fields are down. Still the production, according to interchange figures, continues on the high ratio marked up in the past few weeks. Specialized coals are quoted as follows: Lump, \$3@\$3.50; egg, \$2@\$2.75.

All branches of the Columbus coal trade continue to be quiet, producers as well as jobbers playing a waiting game. Large consumers apparently are waiting until railroad fuel contracts are awarded before coming in, as the prices quoted in the railroad contracts probably will control in commercial business. Quite a few roads have asked for bids and something in that line may be expected

soon. Domestic trade is extremely quiet and retailers are buying only an occasional car to piece through. Slack is weak, owing to the falling off in demand from public utilities. Many Ohio mines are being closed down and output is at a very low point.

As the coal year nears its close, the market situation at Cleveland seems to grow correspondingly worse. Operators and jobbers say that inquiries continue noticeably absent and the market exceedingly dull. It is said that the railroads throughout this section have on hand at least 100 days' storage, and consequently some contracts will not be renewed coincident with their expiration March 31. No contracting of any magnitude is taking place, and it will be an open market proposition pretty generally for a time. The eastern Ohio field as a whole is working less than 50 per cent of full time, and is showing a decline each week. A large number of cargoes are afloat at the lower Lake docks ready to go forward at the opening of navigation.

Production in the Pittsburgh district has been dropping rapidly, chiefly on account of the disappearance of domestic coal. Spot market prices are unchanged except for further declines in slack. It looks as if little contracting will be done, except in special grades of gas coal, consumers preferring to buy from month to month.

Sunny weather at Buffalo has prevented any spurt in the coal trade. As the season is now far advanced the possibility of a weather market seems to be past.

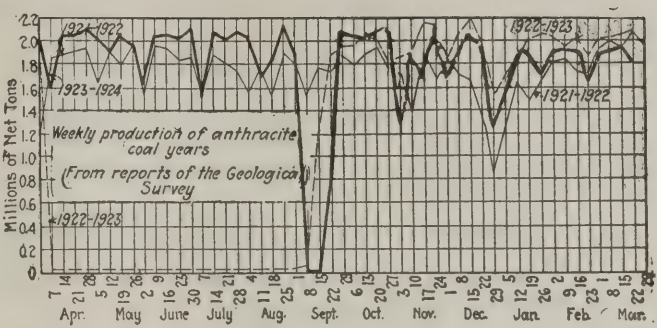
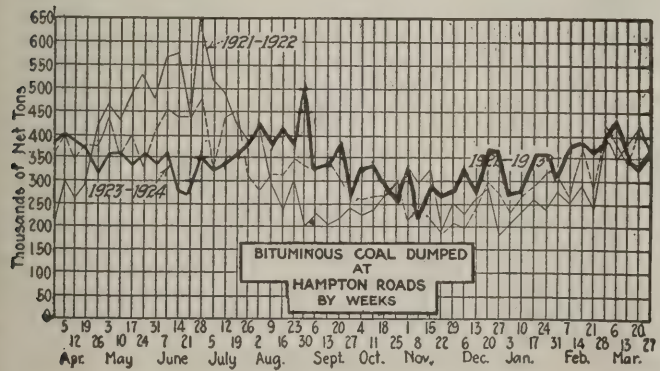
New England Markets Pessimistic

In New England the steam coal market has suffered further reverses. Not only is there an absence of any but scattering spot purchases but prices have declined in pronounced fashion on certain of the high grades. This is the case to a limited extent with quality coals from central Pennsylvania, but most notable are the successive slumps in the figures quoted on Pocahontas and New River both f.o.b. vessel at Hampton Roads and at this end on the dock for inland delivery. Through the trade there is a note of pessimism, and buyers can hardly be relied upon to show much interest in futures under the heavy conditions that now prevail.

For some reason a large share of the smokeless output a fortnight ago was pointed to tidewater, due doubtless to slackening conditions in the West, and large accumulations have been the result. A week ago it was stated that nearly 400,000 tons of Navy Standard coal was either at or en route to the piers, and prices have softened correspondingly. Coal that ten days ago was being held at \$4.50@ \$4.65 has sold down to \$4.25, and in a few instances there have been distress lots disposed of at levels materially lower.

In sympathy with market conditions at Hampton Roads, there has been a similar scaling down of quotations on cars Boston. A few leading factors have run spot coal down to \$5.50 per gross ton, or within easy range of the lowest level last season. Somewhat earlier there were competitive bids from \$6.10 to \$6.30 for Pool 1 grades for delivery through a 12-month period, but already these figures are being discounted and further depression in values can only be conjectured.

All-rail and via the Philadelphia and New York piers there is very little steam coal being dumped, output from central Pennsylvania being hopelessly outclassed by Hampton Roads coals on the current price basis, except within restricted areas.



Seaboard Consumers Out of Market

Buying of soft coal at New York is practically at a standstill. Reserves are such that consumers are not purchasing and there are many mines which it is believed, will be closed soon after the beginning of the new coal year. Contract making is slow and many consumers have not renewed their old contracts nor made new agreements for the coming twelve months. As a rule renewals have been on a lower basis and with the Jacksonville agreement ratified by the miners it is expected that consumers who have no contracts will continue to buy in the open market. Further weakening of the market is indicated in the purchase last week by the U. S. Shipping Board of 1,500 gross tons of soft coal equal to either Pool 71 or Pool 9 at \$4.48 alongside vessel, New York, as compared with \$4.84 for the last previous purchase. This is on a basis of about \$1.80 net ton f.o.b. mine.

The wage scale conference of central Pennsylvania operators and miners has had no effect on the market at Philadelphia, as it was known that the non-union production is more than enough to take care of all current needs. In addition stockpiles are so large that the market would not miss the union tonnage for a long while to come. Producers are after contract tonnage, offering attractive figures on contracts to run from one to three years. Inquiries have dropped to almost nothing.

There is not much of encouragement in the soft-coal trade at Baltimore at present except an increasing export movement. Industrials are buying in small quantities only for the major part, and the usual flood of contract inquiries at this time of the year is largely lacking. Prices remain low.

Anthracite Business Flat

Reductions of 50c. per ton on the various sizes of hard coal with the exception of broken and barley were announced by two of the large producing companies on March 29, making the prices of these companies for egg, stove and chestnut sizes \$8.25, for pea coal \$5.75, and for No. 1 buckwheat and rice \$3 and \$2 respectively. It was expected that the other companies would announce their schedules for April 1 early this week, and that similar reductions would be made. Buying at New York was practically at a standstill except as to current needs. Coal moved so slowly from the terminals that some of the companies loaded boats to await orders for delivery after April 1, while some retailers, anticipating lower prices, had already advertised a cut in their delivery costs. Independent operators are for the most part quoting company circular or lower in order to move their prepared coals, with the average sales being made at below company prices. Pea coal moves slowly, but the steam coals are in fair shape, with barley leading in demand. Philadelphia reports trade as quiet, if not flat. The consumer is waiting for lower prices and is buying very lightly on that account. Retail yards are well filled, with probably more of pea than anything else. It now looks as if the April price for family coal will be \$14.75 for the large sizes and \$11 or \$10.50 for pea.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended March 15, 1924.....	916,953	170,554
Previous week.....	929,505	169,807
Same week in 1923.....	904,116	183,377

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
March 14, 1924.....	175,002*	88,479	604	
Previous week.....	144,426	64,115	2,001	
Same date in 1923.....	12,461	3,897	74,442	30,405

Foreign Market And Export News

Wage Negotiations Upset British Market; Output Continues to Gain

Business and prices in the Welsh coal market are inclined to be erratic on account of the unsettled labor position and the scarcity of tonnage. The south Wales situation is very strong and the majority of the collieries declare that they cannot accept further orders for delivery before Easter.

European business shows no indication of improving at the present and it is reported that much business is being lost to Germany. The violent fluctuations of the franc are further complicating deals between French buyers and British sellers. The entire field is disturbed by the negotiations proceeding between the unions and the operators.

Much the same conditions prevail in the Newcastle market, where tonnage is exceedingly short and many collieries are forced to make concessions to effect immediate clearances. The European business has fallen off considerably. The Swedish State Rys. are in the market for 70,000 tons best steams for April-June shipment, and one of the French railways is asking for 20,000 tons of coking coals for April-June shipment.

Production by the British collieries for the week ended March 15, a cable dispatch to *Coal Age* states, was 5,778,000 tons, according to the official reports. This compares with 5,742,000 in the week ended March 8.

Industrial and Household Coals Active in French Markets

French collieries are booked beyond capacity for industrial fuels and the demand for house coal continues active. A shortage of trucks has impeded coal traffic lately, this being due partly to the intensive use of trucks in the Sarre and Ruhr mines for conveying coal toward the inland area districts.

Imports of British coal have been rather small of late, prices remaining

firm at the shipping docks. With the pound at 115, selling prices are unusually high.

Importers and briquet makers situated along the coast have asked the government for equal treatment in the matter of reparation and Sarre coals in order to make up for the absence of British coals, on which prices are prohibitive. The government having given instructions that Ruhr coal be transported by sea and that Sarre coal be conveyed through France, importers and briquet makers of the littoral want a hand in selling reparation coal rather than leave it to Strassburg merchants, for instance.

In Belgium, the price for Ruhr metallurgical coke has just been fixed at 170 francs per ton (raised by 5 francs) dating March 1 (or about 149 francs in French currency).

United States Domestic Coal Exports During February

	1923	1924
Anthracite.....	330,351	309,510
Value.....	\$3,693,512	\$3,445,150
Bituminous.....	805,973	1,262,838
Value.....	\$5,250,678	\$6,509,723
Coke.....	70,989	55,762
Value.....	\$855,678	\$512,358
Exported to:		
France.....		58,928
Italy.....	9,353	58,407
Other Europe.....		23,985
Canada.....	730,112	944,016
Mexico.....	4,301	5,213
Br. West Indies.....	3,185	21,260
Cuba.....	55,511	38,288
Other W. Indies.....	209	15,301
Argentina.....		23,700
Brazil.....		38,568
Chile.....		9,142
Egypt.....		7,220
French Africa.....		8,071
Other countries.....	3,302	10,739

Hampton Roads Market Dull and Weak; Outlook Bright

Business is dull on the spot at Hampton Roads, with many old orders being filled and old contracts being worked out in advance of the new contract

period, April 1. The price of coal is weak, and little new buying is reported.

Coastwise and overseas movement, which had been hampered by storms that held up shipping, is again gaining ground. South America has been getting a number of substantial shipments, but mostly on old contracts.

The tone of the market is weak, but the outlook for better business is still bright, shippers expecting little activity in the spot market until after April 1.

Export Clearances Week Ended March 29, 1924

FROM BALTIMORE

For Italy	Tons
Czechoslovakian Str. Ligie.....	6,829
For Porto Rico	
Am. Str. Delisle	477

FROM HAMPTON ROADS

For Argentina	
Nor. Str. Bjornstjerne, for Buenos Aires	7,239
For Brazil	
Br. Str. Lindenhall, for Rio De Janeiro	5,414
For Canada	
Br. Str. Jenkri for Seccond.....	1,556
Nor. Str. Dagali for St. Georges....	2,584
For Cuba	
Dan. Str. Arnold Maersk for Cienfuegos	1,632
For France	
Fr. Str. Mechanic Principal Carvin for Rouen	5,812
For Mexico	
Br. Str. Sunpath for Vera Cruz....	3,498
For Newfoundland	
Br. Str. Airdale for Port aux Basques	4,408
For Peru	
Peruv. Str. Perene, for Callao.....	2,065
For West Indies	
Nor. Str. Wascana for St. Thomas..	7,513
Nor. Str. Samnanger for Fort de France	6,378

Hampton Roads Pier Situation

	March 20	March 27
N. & W. piers, Lamberts Pt.:		
Cars on hand.....	2,601	2,618
Tons on hand.....	153,717	164,269
Tons dumped for week.....	152,104	141,821
Tonnage waiting.....	12,000	20,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	2,016	1,807
Tons on hand.....	138,200	122,750
Tons dumped for week.....	63,353	117,707
Tonnage waiting.....	10,791	208
C. & O. Piers, Newport News:		
Cars on hand.....	2,346	2,224
Tons on hand.....	117,685	111,870
Tons dumped for week.....	88,867	74,788
Tonnage waiting.....	1,000	4,150

Pier and Bunker Prices, Gross Tons

	PIERS	March 22	March 29†
Pool 9, New York.....	\$4.75@	\$5.25	\$4.75@ \$5.00
Pool 10, New York.....	4.60@	5.00	4.50@ 4.75
Pool 11, New York.....	4.50@	4.75	4.25@ 4.50
Pool 9, Philadelphia.....	4.90@	5.20	4.80@ 5.20
Pool 10, Philadelphia.....	4.50@	4.90	4.55@ 4.90
Pool 11, Philadelphia.....	4.25@	4.60	4.35@ 4.65
Pool 1, Hamp. Roads....	4.50		4.40
Pool 2, Hamp. Roads....	4.25		4.20
Pools 5-6-7 Hamp. Rds...	4.10@	4.15	4.10

BUNKERS

Pool 9, New York.....	5.05@	5.55	5.05@ 5.30
Pool 10, New York.....	4.90@	5.30	4.80@ 5.05
Pool 11, New York.....	4.80@	5.05	4.55@ 4.80
Pool 9, Philadelphia.....	5.15@	5.55	5.10@ 5.55
Pool 10, Philadelphia.....	4.90@	5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@	5.10	4.65@ 5.00
Pool 1, Hamp. Roads....	4.60		4.40
Pool 2, Hamp. Roads....	4.35		4.20
Pools 5-6-7 Hamp. Rds...	4.10@	4.15	4.10

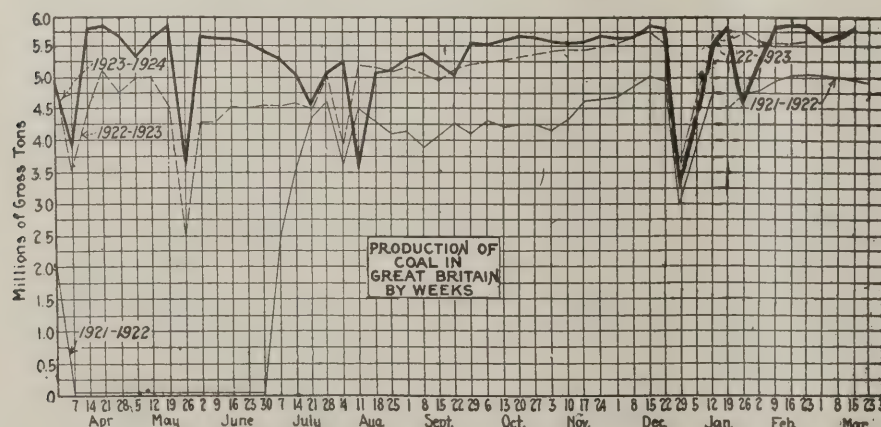
Current Quotations British Coal f.o.b.

Port, Gross Tons

Quotations by Cable to *Coal Age*

	Cardiff:	March 22	March 29†
Admiralty, large....	32s. @	33s.	31s. 6d. @ 32s. 6d.
Steam smalls.....	23s.		22s. 6d. @ 23s. 6d.
Newcastle:			
Best steams.....	26s. @	26s. 3d.	26s. @ 26s. 6d.
Best gas.....	25s. @	25s. 6d.	25s. @ 25s. 6d.
Best bunkers.....	25s.		24s. 6d.

†Advances over previous week shown in heavy type declines in italics.



Traffic News

Three Roads Balk at Conditions For Clinchfield Lease

The Carolina, Clinchfield & Ohio Ry. has added its protest to those of the Atlantic Coast Line and the Louisville & Nashville against the conditions raised by Commerce Commissioner Hall as a basis for the lease of the Clinchfield by these two lines. Attorneys for the three roads assert that if these conditions are enforced the consummation of the lease will be impossible.

"The case," says the brief filed by the Clinchfield, "is distinctly different from the case of the Central-Southern Pacific, from which these proposed conditions have been copied. . . . In the Clinchfield case the resulting investment and market value for the Clinchfield stock is one of the vital considerations involved in the making of the proposed lease. The stockholders of the Clinchfield have held their investment for many years with practically no returns and consequently, have had little, if any, available market for the same. The making of the lease will result in an assured dividend on the stock, with the usual effect upon the investment value of and market for the same."

Approves Lehigh Valley Control of D. S. & S.

The Lehigh Valley R.R. has been granted permission by the Interstate Commerce Commission to acquire control by lease and stock ownership of the Delaware, Susquehanna & Schuylkill R.R. The decision was of significance only in that it marked the carrying out of one of the provisions of the segregation decree. The Lehigh already owns the stock of the D. S. & S., a ten-mile line in the coal region of Pennsylvania penetrated by the parent road.

C. & O. to Build 3,000 Cars

Construction of 3,000 hopper cars in its own shops, it is reported, is being considered by the Chesapeake & Ohio R.R., and the company is said to be in the market for 30,000 tons of steel to be used in the work.

Railroads Order More Cars

Railroads of the United States on March 1 had 45,074 freight cars on order, of which 15,632 were coal cars, according to report by the Car Service Division of the American Railway Association. This was an increase of 19,684 cars compared with the number on order on Feb. 1. During February, 11,537 freight cars were placed in service, making a total of 27,729 installed during the first two months this year. Of the cars installed during February 4,841 were coal cars. The railroads also had on order on March 1 457 loco-

motives compared with 439 on Feb. 1. Locomotives installed in service during February totaled 214, making a total of 485 installed during January and February.

Virginia Ry. Income Climbs

Net income of the Virginian Ry. for 1923 was \$3,671,444, as compared with \$3,408,032 in 1922, according to a preliminary report made public yesterday. Operating revenues were \$20,328,347, compared with \$19,009,443 in the previous year. Expenses increased from \$12,439,391 in 1922 to \$13,611,420 in the year just closed. The total assets of the company are listed as \$134,672,098, in comparison with \$122,235,544 last year.

Association Activities

Coal producers in the Broad Top District have formed the **Broad Top Coal Operators' Association**, the main purpose of which is to conserve coal properties by approved methods of production and distribution. H. H. Lineaweaver, of the Economy Domestic Coal Co., of Philadelphia, and Schipper Brothers' Coal Mining Co., Six Mile Run, was elected president; W. W. E. Shannon, of the Shannon Co., Dudley, vice-president, and W. L. Scott, of J. M. McIntyre & Co., Six Mile Run, secretary-treasurer. The organization, which is composed of a score of the largest operators in the region, plans to co-operate and coordinate its efforts with those of other trade associations, and with governmental agencies in the furtherance of all projects affecting the industry. The formation of the body is looked upon as an effort to increase the domestic use of Broad Top

The annual election of officers of the **Indiana Bituminous Coal Operators' Association** of Indiana was held in the offices of the Terre Haute Chamber of Commerce recently. All officers who have served for the past year were re-elected, as were the members of the executive board as follows: President, E. D. Logsdon, of the Knox Consolidated Coal Co., Indianapolis; Vice-President, W. P. Zimmerman, of the Zimmerman Coal Co., Terre Haute; Secretary-Treasurer, P. H. Penna, Terre Haute. Members of the executive board are as follows: Hugh Shirkie, Shirkie Coal Co., Terre Haute; M. L. Gould, Linton Coal Co., Indianapolis; George H. Richards, Lower Vein Coal Co., Terre Haute; Homer D. Talley, Fort Harrison Mining Co., Terre Haute; Mr. Logsdon; Mr. Zimmerman; David Ingle, Ayrshire Coal Co., Evansville; A. M. Ogle, Vandalia Coal Co., Terre Haute; W. J. Freeman, Green Valley Coal Co., Terre Haute; Simon Zellers, Knox Consolidated Coal Co., Indianapolis; John A. Templeton, Templeton Coal Co., Terre Haute; J. C. Kolsen, Jackson Hill Coal Co., Terre Haute; James Moore, Crescent Coal Co., Evansville; H. M. Ferguson, Ferguson Coal Co., Clinton; John T. Connerly, Miami Coal Co., Chicago, and James B. Pauley, J. K. Deering Coal Co., Chicago.

At the annual meeting of the **Norfolk Retail Coal Dealers' Association**, March 18, Oscar B. Perebee, vice-president and treasurer of the Nottingham & Wren Co., was elected president of the association to succeed W. L. Petty, president of George W. Taylor & Co. Other officers of the association are: B. T. Griffin, of Griffin Brothers, vice-president; G. C. White, of C. B. White & Brother, secretary and treasurer. Walter D. Rodgers, executive secretary of the National Retail Coal Merchants' Association, was the principal guest at the meeting. Arrangements were made for a large delegation of Norfolk coal men to attend the annual meeting of the National Coal Association at Bluefield, W. Va., June 4, 5 and 6.

Industrial Notes

The **Rome Wire Co.**, which purchased all of the capital stock of the Atlantic Insulated Wire & Cable Co. in 1922 and which has since operated the plant, is to transfer the machinery of the plant from Stamford, Conn., to Rome, N. Y. Additions will be made to the plant at Rome and the entire business will be managed from that city.

Gellatly & Co., Oliver Building, Pittsburgh, Pa., have been appointed distributors for Post-Glover products, which include Homanite steel resistance grids and W. & W. starters, for the middle and western Pennsylvania districts. **Coffin & Smith**, Board of Trade Building, Scranton, have been appointed Post-Glover representatives in the anthracite district.

George E. Evans, one of the directors of the **Joy Machine Co.**, manufacturers of the Joy coal-loading machine, has announced the purchase by his company of the plant of the Colburn Machine Tool Co., at Franklin, Pa., for the purpose of manufacturing the Joy coal loader. The price paid for the Colburn plant was \$300,000. The monthly output from the plant is expected to be 25 loaders per month. The Joy company has already taken possession of the plant, which had been idle for several years, and expect to begin production this month.

Brady-Warner Coal Corporation is equipping its Abrams Creek Mine at Oakmont, W. Va., with a rotary dump and rope and button retarding conveyor furnished by the Fairmont Mining Machinery Co., Fairmont, W. Va.

Coming Meetings

Canadian Retail Coal Association. Annual meeting, April 3 and 4, King Edward Hotel, Toronto, Ont., Can. Secretary, B. A. Caspell, Brantford, Can.

American Institute of Electrical Engineers. Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress. May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

News Items From Field and Trade

ALABAMA

The Black Creek Coal & Coke Co., recently organized, has begun development on its 7,000 acres of Black Creek coal, the new mining camp being known as Thermal, located on the Louisville & Nashville R.R. in the northern end of Jefferson County. A slope already has been sunk for several hundred feet and work is progressing on a tippie and washery capable of handling 800 to 1,000 tons daily. Both inside and outside equipment will be of the most modern design, electrically driven. Houses for employees will be erected at once. A spur from the Louisville & Nashville R.R. to the mining site is about completed. It is stated that a byproduct coke plant is to be built later on. All of the officials of the company are experienced mining men, E. M. Tutwiler, Sr., being president; Priestly Toulmin and T. W. Morgan, vice presidents; Priestly Toulmin, Jr., secretary; E. C. Morgan, treasurer and general manager, and Herbert Tutwiler, assistant to the president and sales manager. Head offices are located in Birmingham.

The Alabama Power Co. is adding a third unit of 20,000 kw. to its Gorgas steam plant, which will bring the plant up to 70,000 kw., or 95,000 hp. Hundreds of mining operations and industries in this district obtain power from the Alabama Power Co. and this standby steam plant affords uninterrupted service during low water periods.

The Blount County Mining Co. has been incorporated at Oneonta by J. G. Rowell and E. H. Rowell with a paid-in capital of \$10,000 to engage in the coal-mining business.

COLORADO

During the month of February Colorado mines produced 884,881 tons of coal, this being a decrease of 31,121 tons as compared with the production for the same month last year. The total number of men employed in and about the mines for the month was 13,338.

ILLINOIS

The Consolidated Coal Co., of St. Louis will likely shut down Mine No. 9 at Murphysboro in the near future according to reports although there is a considerable tonnage of good coal still unmined. Driving of entries has been stopped. Water from the Big Muddy River broke into this mine two years ago, costing the company a considerable sum of money. The company has land yet unworked near Murphysboro and will probably sink a new mine north or east of the town in the future.

George F. Getz, president of the Globe Coal Co., Chicago, announces the election of C. R. Campbell as vice-president of the company, in charge of the bituminous coal department, effective, April 1, 1924. Mr. Campbell was with the John A. Logan Coal Co. and formerly was vice-president of the Consumers company.

The Prosperity Coal Co., 343 S. Dearborn St., Chicago, has been incorporated with a capital stock of \$20,000, to produce coal and other minerals. Incorporators are J. W. McElvain, J. I. McTaggart and T. H. McElvain.

The Crerar-Clinch Coal Co., of Chicago, has closed the Dale mine at Herrin. The same company operates mines at Johnston City and Du Quoin and is opening a new strip mine which may become one of the largest in the Du Quoin field.

The mine at Valley View owned and operated by Sackville & Wynn has been closed, probably until next fall. The mine is the largest near that place.

INDIANA

The Hickory Grove strip miners, of Terre Haute, who have been on strike since Jan. 2, recently returned to work, the officials of the mining company having signed the Terre Haute agreement with the officials of the United Mine Workers. The Hickory Grove mine employs about 45 miners and has a capacity of about 250 tons per day. The mine is located about one and one-half miles east of Riley. Following the

attempt of the miners to organize the company continued to operate with other men until about three weeks ago, when the mine was closed down.

M. S. Weills, N. G. Wallace and Joseph Mullikin have bought at receiver's sale the property and assets of the Sugar Valley Coal Co., of Terre Haute, for \$98,801.22. The buyers filed with the receiver, Clem J. Richards, a written request that the property be conveyed to the Macksville Coal Co. The sale was made subject to liens on the coal company's property and assets, which, with receiver's compensation and expenses, total the purchase price.

The Comet Coal Co., Evansville, capitalized at \$50,000, has filed articles of incorporation with the Secretary of State. The company will develop and mine coal and other minerals. The directors of the company are Fred J. Stock, Boonville, and Charles W. and Frederick B. Cook, both of Evansville.

KENTUCKY

Late reports on the actions of the adjourned Kentucky Legislature indicate that with the exception of passage of the bill making script transferable and negotiable at face value, and certain slight changes in the Workmen's Compensation law, there wasn't much legislation that will have any effect on the coal trade.

The Kentucky Utilities Co., of Louisville, one of the Insull interests, which is supplying most of the mine power in both the eastern and western Kentucky coal fields, is planning a new hydro-electric operation on the Cumberland River, near Burnside. The same interests are putting in a mammoth hydro development on the Dix River, in central Kentucky, which will supplement the present power facilities, and another large steam plant at Pineville.

The Chickasaw Coal Co., of Madisonville, capital \$25,000, has been chartered by James D. Overall, Blayne C. Mitchell and J. Basil Ramsey. Overall is an experienced large operator.

The Pond Creek Pocahontas Coal Co. for 1923 reports net profits of \$19,353, or 15c. a share on the capital stock. The company's net current assets are \$909,953 and net current liabilities of \$280,123, leaving working capital of \$629,830.

MARYLAND

The new \$200,000 plant of the Anthracite Fuel Corporation, at Fait Avenue and Eight Street, Highlandtown, is about completed. The plant, the first unit of which will consist of four buildings, will be used for the manufacture of coal briquets and will be the only establishment of its kind in Maryland. The completed structures consist of manufacturing, administration and storage buildings and a power house.

MASSACHUSETTS

The Island Creek Coal Co. reports net profits of \$2,722,545 for 1923 after all charges, taxes and preferred dividends, equal to \$20.39 a share earned on the common stock outstanding. In 1922 net profits were \$3,440,350, equal to \$26.44 a share on the common stock. The general balance sheet showed net current assets of \$6,013,271 against net current liabilities of \$1,528,687, leaving the company working capital of \$4,484,584.

MINNESOTA

The Duluth, Missabe & Northern Ry. will add another coal-handling bridge to its Duluth dock, making four in all. The new bridge will serve as an auxiliary for one which is called upon for almost continuous service now. It will serve the west side of the dock. The bridge and equipment will be installed by the Mead-Morrison Co., Chicago, and the electrical equipment by the General Electric Co., of Schenectady. It will cost about \$200,000. The dock has a storage capacity of 650,000 tons and the bridge will increase the handling capacity 25 per cent.

Charles Beuglet, Duluth sales manager for the Northwestern Fuel Co., has undergone an operation at Rochester, Minn.

MISSOURI

Harry Scullin, president of the Scullin Steel Co., St. Louis, Mo., and associates are reported to have an option on 41,000 acres of land in the Raccoon mountains, containing approximately 20,000 tons of iron ore and 9,000 tons of metallurgical coal to the acre. Plans include building barges and tow boats to handle the raw material.

Roy Williams, of New Orleans, has succeeded John McDermott as manager at the Clay Coal & Mining Co.'s mine on the Williams farm, east of Excelsior Springs. Mr. McDermott's interests in the mine were bought one year ago by the other stockholders, but he remained with the company March 1, 1924.

NEW YORK

F. G. Wilcox was appointed president and general manager of the Price-Pancoast Coal Co., the Melville Coal Co. and the West End Coal Co., at a meeting of the boards of directors of those companies, March 24, at their offices, 17 Battery Place, New York City. Mr. Wilcox succeeds William L. Allen, who died recently.

The Elk Horn Coal Corporation for the year ended Dec. 31, 1923, reports net profits of \$168,301 after taxes, depreciation, depletion and interest, equivalent to \$1.27 a share earned on \$6,600,000 preferred stock, par 50. This compared with a net loss in 1922 of \$99,906. Directors decided that earnings do not warrant a dividend at this time.

Twining Tousley, formerly associated with Marshall Field, Glore, Ward & Co., has accepted a position with the Coal and Iron National Bank in its new business department. Mr. Tousley has had considerable experience along financial lines, having spent most of his business life in the employ of financial institutions.

Announcement is made that the last of the ten coal- and grain-carrying steamships building in Europe for the Eastern Steamship Co., a Buffalo syndicate, has just been launched at Birkenhead, England, and will be delivered in April. The vessel has been named the Eugene C. Roberts, after the manager of the coal firm of E. L. Hedstrom. The steamers are of about 3,000 tons capacity, and so are fitted to navigate the Welland Canal and the St. Lawrence River. They ought to effect a resumption of anthracite shipments from Lake Ontario to the upper lakes.

Charles Longenecker, formerly sales engineer with the Bonnot Company at Canton, Ohio, has become associated with the Combustion Engineering Corporation, 43 Broad Street, New York City. He will be identified with the recently created industrial department of the Combustion Engineering Corporation. This Department, in charge of H. D. Savage, will specialize in the application of pulverized fuel to industrial work of all kinds.

OHIO

Signs of the times have rarely been more acutely shown than in the past week, when several offices and branch offices bowed to the general condition of affairs in Cincinnati. The International Fuel & Iron Co., which for the past three years maintained an office in the Union Trust Building, announced that it would be closed, and Charles Reese, who has been in charge would be identified with the main office in Pittsburgh. The Kelly's Creek Collieries Co. has closed the office maintained at Cincinnati for over a year and will conduct its Western business from the Charleston office. The Swain Fuel Co. will liquidate. The Western Coal Co. will close within the week. The Co-Operative Fuel Co., a smokeless concern with head offices in Bluefield, W. Va., has closed its offices in the Fourth National Bank Building.

Papers have been filed with the Secretary of State chartering the Branch Creek Coal Co., Cleveland, with an authorized capital of \$50,000 to mine and deal in coal. Incorporators are Frank J. Kelly, E. E. Rodway, Paul F. Colebrook and A. F. Gaughan.

Al Knidler, in charge of sales for the Liggett Brothers Coal Co. for some time, has been appointed Western sales manager for the Three States Coal Co. with headquarters in Cincinnati.

Harry Neilson, who had charge of the Co-Operative Fuel Co.'s office in Cincinnati, is now in charge of the Western sales agency of the Universal Coal Co. in the same city.

N. K. Howard, who was identified with the office of the Old Dominion Coal Co. in the Union Central Building, until it went in the hands of the receiver, is now associated with the Mid West Coal Co.'s Cincinnati office.

M. L. Yuster, head of the Packard Coal Co., of Columbus, who was the individual owner of a small mine near Athens, with 200 acres of coal land, has traded the mine to **D. W. Wallace** for a foundry and machine shop, which has been known as the Athens Foundry & Machine Co. The mine was leased to the New Lexington Coal Co.

OKLAHOMA

The recently formed City Planning Commission of McAlester has set to work on an extensive program of development, which, first of all, contemplates more thorough exploitation and development of the vast coal-mining operations about the city. The coal deposits in Pittsburg County are declared to have a potential wealth of \$30,000,000,000 by engineers who have conducted careful surveys of the extent and depth of the coal veins. The Commission held its first meeting, which took form of a dinner at the Busby Hotel last week, when the commission had as guests ten members of the official party of the Missouri-Kansas-Texas Ry. touring the Katy lines as a public relations committee. The meeting followed an all-day visit of the railway officials to McAlester and the coal fields, during which they held a number of conferences with business interests looking to the creation of more cordial relations between the shippers and the railway company. The railway officials pledged the City Planning Commission every possible assistance in the development of the coal deposits of Pittsburg County. The question of freight rates as they affect the marketing and transportation of coal from this section was gone into thoroughly, and plans for working out more equitable tariff schedules were made. Joint committees from the railway company and the coal-mining interests will frame recommendations for changes in freight rates which will be placed before the Interstate Commerce Commission in an effort to bring about more equitable freight rates for the McAlester district.

The McAlester-Craig Coal Mining Co. has been organized at McAlester, to do a general coal-mining business in development of some leases on coal lands in Pittsburg County. The company is capitalized at \$35,000, and the incorporators are H. C. Clark, L. Clark, and R. B. Cannon, all of McAlester. The company will operate steam shovels and drag lines in surface mining operations.

The Midway Coal Co. of Chelsea, is developing an extensive bed of coal found at shallow depth near Catale, six miles from Chelsea. The company is now operating two large steam shovels in surface mining operations, and is employing more than one hundred men. The steam shovels are running night and day. A prosperous town is being built at Catale, financed largely by the Midway Coal Co. Additional steam shovels are to be put to work at once, it is reported.

The Montezuma Creek Coal Co. has been incorporated in Okmulgee, with a capital stock of \$50,000, by Harlan Read, H. D. Lloyd and others.

PENNSYLVANIA

Employees of the Bethlehem Mines Corporation, a subsidiary of the Bethlehem Steel Corporation, exceeded all expectations in subscribing to the 7 per cent cumulative preferred stock of the parent company, under the savings and partnership plan recently instituted by the Bethlehem Steel Corporation, which includes a bonus to stockholders in continuous service of the company. Out of a total of 6,932 men employed, 5,580 have taken advantage of the opportunity, by subscribing for 11,297 shares. Slickville Mines, under supervision of L. O. Mellinger, led the subscriptions with 98.5 per cent; Johnstown, under a supervision of Frank Horton and Duncan May, came a close second with a percentage of 98.1. Other divisions subscribed as follows: Wehrum, Pa., with 93.5 per cent; Heilwood, Pa., 92.6 per cent; Preston division, W. Va., 86 per cent; Ellsworth, Pa., 64 per cent; and Marion division, W. Va., 44 per cent.

TEXAS

The Marshall plant of the Darco Company, owned by the Atlas Powder Co., of Wilmington, Del., will resume operations at once, it is announced by A. N. Chase, superintendent and J. M. Williams, assistant superintendent and engineer. This is one of the largest plants of its kind in the United States and mines lignite from the extensive deposits owned by the company, the lignite being manufactured into charcoal for the manufacture of powder, and other chemicals taken from the lignite as by-products.

The Sandow Lignite Co., of Rockdale, has begun operating its extensive holdings six miles south of Rockdale. This company formerly was known as the Western Securities Co. and the mine it is now working as the Federal Fuel Co. The new company takes out the lignite by stripping process. One large steam shovel is now at work, removing the earth overlay and it is planned to place one and possibly two additional shovels in the mine at once. The vein of lignite is overlaid by about 30 ft. of earth. Shovels are now operating day and night, and load one carload of lignite on an average of every thirty minutes. A. P. Rudowsky is president of the company and M. R. Reddell is treasurer. John Weed is general superintendent and has charge of all operations at the mine.

UTAH

Castlegate Mine No. 1 of the Utah Fuel Co., which was closed down a few weeks ago and the men transferred to No. 2 mine, where the recent explosion occurred, will be opened right away. Mine No. 2, it is expected, will be in a position to resume operations, if necessary, about the first week in May.

The Blazon Coal Co. is offering \$50,000 worth of common stock. The company is operating property in Wyoming, where it owns 480 acres of leased lands in the Kemmerer district. The company is headed by L. F. Rains, of Salt Lake City, president of the Carbon Fuel Co., and has a capital of \$300,000.

It is expected that a railroad will be built in the near future to the coal beds in Salina Canyon, Sevier County, by either the Union Pacific or the Denver & Rio Grande R.R. The latter company has had concessions for some years, but has failed to act. It is said the Union Pacific is seeking concessions now.

It has finally been decided to conduct a drive for a relief fund for the dependants of the miners who lost their lives in the Castlegate explosion early in March. The drive is approved by the Governor and \$100,000 will be asked.

WEST VIRGINIA

In all there were nine new domestic coal corporations formed in West Virginia during February, with a total capitalization of \$905,000. These companies include the Carver Coal Co., of Charleston, capitalized at \$50,000; Judicial Coal Co., of Clarksburg, capitalized at \$25,000; W. M. Tyree Coal Co. of Huntington, capitalized at \$100,000; Malone Collieries Co., of Grafton, capitalized at \$5,000; Sitnek Coal Mining Co., of Fairmont, capitalized at \$50,000; Trent-Pocahontas Coal Co., of Iaeger, capitalized at \$50,000; Kenova-Lincoln Coal Corporation, capitalized at \$100,000; Sutherland Coal Co., of Morgantown, capitalized at \$50,000, and Howesville Coal Co., of Morgantown, capitalized at \$25,000.

One of the largest deals consummated in some time was that under the terms of which the Wilbur Fuel Co., acquired the plants, properties and assets of the Vulcan Coal Co. and the Eastern Utilities Coal Co., with large holdings in Grant District of Harrison County, for a consideration said to be in the neighborhood of \$1,000,000. The purchase covers 1,198 acres in fee and 368 acres of surface land upon which there is a town of 115 houses. Officers of the newly organized concern are D. J. Carter, of Clarksburg, president; E. J. Lewis, vice-president and treasurer; R. D. Lloyd, general manager; Harry Sheets, secretary. On the board of directors are the above officers and Frank B. Sinclair, of Steubenville, Ohio; H. W. Sheets, R. D. Lloyd, E. J. Lewis, J. M. Carter and D. J. Carter, of Clarksburg.

The Mohawk Coal & Coke Co. has changed the location of its principal office from Welch to Bluefield, and the Tierney Mining Company has changed the location of its principal office from Powhatan to Bluefield.

The Nagolas Coal Co. has been awarded a verdict of \$26,000 in the United States District Court for the southern district of West Virginia in its suit against the Pine Ridge Coal Co., of Detroit, Mich. This suit was the outgrowth of a dispute as to the division of profits arising from business deals in which both companies were interested.

T. J. Collins, chief mine inspector of the Collins interests in southern West Virginia for the last ten years, has severed his connection with them to become identified with the Harman interests in McDowell County as general superintendent of all mines, his appointment having become effective on April 1.

Three tracts of coal land in Ohio and Brooke counties have been conveyed to the Carnegie Coal Co., of Carnegie and Pittsburgh, Pa., by Mr. and Mrs. John A. Bell, of Carnegie, Pa., the consideration involved being approximately \$85,000. A mortgage has been filed by the Carnegie company in favor of the Colonial Trust Co., of Pittsburgh, covering the purchase of the coal tracts and other property of subsidiary companies to the Carnegie Coal Co., showing that \$750,000 has been secured in first mortgage on the properties.

Philip Konrad, of Killarney, has been appointed general superintendent of the mines of the Killarney Smokeless Coal Co., of the Ingram Branch Coal Co. and of the Smith Pocahontas Coal Co. Green H. Nowlan, of Lynchburg, was recently elected president of these companies.

The Simpson Creek Collieries Co., of 1230 Hanna Building, Cleveland, Ohio, of which W. M. Osborne is secretary, has been granted a certificate of authority to transact business in West Virginia.

The Illinois Coal Co. has increased its capital stock from \$300,000 to \$400,000 and the Elm Grove Mining Co. from \$2,400,000 to \$3,000,000.

The name of the Blake-Towson Coal Corporation has been changed to the Blake Coal Co.

CANADA

The Blue Diamond Coal Mines, of Brule, Alta., which are owned jointly by the McIntyre-Porcupine and Timiskaming mining companies, of Northern Ontario, have been closed down owing to lack of orders from the Canadian National Rys. Gordon F. Dickson, the manager, is visiting in the East.

Figures presented to the Canadian House of Commons showed that Canada imported 20,989,953 tons of coal during 1923, of which 20,417,239 came from the United States. Of the latter, 15,511,206 tons was bituminous, 4,905,707 tons anthracite and 2,331 tons lignite. The balance came from Britain with the exception of a few tons from the Philippines and Alaska.

The Consolidated Mining & Smelting Co., the principal user of Crows Nest coke, is said to be making arrangements for the importation of coke from Europe. The company has made arrangements for the shipping of large quantities of concentrate, matte, and base bullion to Europe, and it is said that the boats carrying this material will return laden with coke. The high cost of coke at the Trail smelter has retarded operations for some years, and the company long has considered other sources of supply.

The Princeton Coal & Land Co. has obtained a verdict for a refund of taxation that had been imposed wrongfully during the years 1909 to 1921, inclusive. Though the amount at stake was comparatively small—\$4,102.40—the decision is important in that it is the first case that has been tried under the amendment to the taxation act, which was passed in December, 1922, whereby the Court of Revision may decide upon the petition of any taxpayer who declares himself, by reason of any manifest error in the assessment roll for any preceding year, to have been charged more than 25 per cent over the sum that he ought to have been charged.

Of \$25,000 sent to the mining communities during the recent strike by the administrators of the Charles Garland Fund, (the Harvard Communist who turned his fortune over to the Communists) the bulk was spent in the dissemination of Red propaganda, it is reported. The money was to have been expended in alleviation of suffering and privation among the strikers.

The Ontario Government has instructed counsel to apply to the Dominion Board of Railway Commissioners for an investigation into the whole question of coal rates from Alberta and Nova Scotia, it was announced in the Ontario Legislature.

New Equipment

Electrically Operated Drill And Hammer

A portable tool known as the Syntro electric hammer has been designed to run on 60-cycle current and strike 3,600 blows per minute. It is suitable for drilling through masonry walls, drilling holes for expansion bolts, chipping castings, light riveting and assembly work, chipping and cracking stone, calking pipe, tank plates and so forth. A similar tool designed for 25 cycles which will strike 1,500 blows per minute can be used for heavier riveting. The hammer proper consists of two windings which are energized alternately to impart a reciprocating movement to a movable core or piston, which is the only moving part. In its forward stroke, the piston strikes a tool, which may be a drill, chisel, rivet set or the like. In its backward stroke the piston strikes an elastic bumper in which it stores its kinetic energy until it is moved forward again. The energy stored in the bumper is then returned to the piston on the forward stroke.

To operate the hammer, alternating current is supplied to the two windings to energize them alternately so as to impart a reciprocating movement to the piston, which moves in synchronism with the frequency of the alternating current supplied to the windings. The current alone produces the operating forces to move the piston. No mechanical devices are used.



Electric Hammer Operates on Alternating Current

Wherever electric current is available this little hammer can be used, direct current must be changed to alternating current because the number of blows per minute depends on the frequency. It fills a great need for a hammer where only electric current can be used as a source of power.

The hammer is rugged in construction and aside from an occasional oiling of the piston, needs no attention. The piston is made of special hardened steel and will last indefinitely. A trigger switch on the handle of the hammer starts and stops its operation.

The hammer meets the need of a portable device that can be carried from job to job. It can be connected to any lamp socket and is then ready for work.

The hammer is at present available in three sizes, one weighing 10 lb., another weighing 17 lb., and a third weighing 24 lb. All sizes are available for 110 or 220 volts alternating current of any frequency. The power consumption of the 17-lb. hammer is 300 watts. Two carrying kits are supplied to hold the hammer and a control box, together with a 50-foot extension cord and a complete assortment of drills, chisels and stone points.

High-Pressure Air Blower

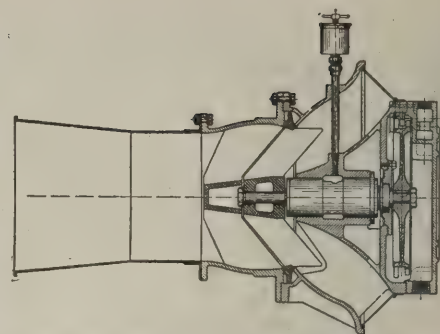
The field of usefulness for propeller blowers has been greatly increased by the introduction of the Coppus Vano blower, manufactured by the Coppus Engineering Corp., Worcester, Mass. With the exception of low-duty ventilating fans, propeller blowers have been used almost exclusively for undergrate draft on hand-fired boilers, or with chain-grate and overfeed stokers. The Coppus blower has a screw-blade propeller which delivers the air parallel

to the axis of rotation. With this design the air leaves in the same direction as it enters.

It is claimed that this blower will produce pressures up to 8-in. water gage, and, therefore, can be employed where, until now, only centrifugal blowers could be used.

The efficiency of the blower is about 80 per cent, and the power consumption at constant speed is practically unaffected by variations in the volume of the air delivered or the pressure.

The principal feature of the blower is the stationary guide vane which causes the air current leaving the propeller to be radially subdivided by the individual guide-vane blades and thus be taken up by them without shock. These blades have a curvature increasing in the direction of the rotation of the propeller which concentrates the air current and gives it further acceleration inside of stationary guide vanes so that a



Propeller Blower for Forced Draft and Auxiliary Ventilation

This little blower is specially designed to develop high pressure. It fills a great need for auxiliary mine ventilation and stoker draft systems.

considerable part of the pressure is produced in the latter. Most of the end thrust is thus taken up by the stationary guide-vane casing. The air currents into which the flow of air has been subdivided by the guide-vane casing, leave it slightly rotating and with a motion convergent toward the axis so that the smallest section of the air flow is reached beyond the casing.

This blower finds wide application wherever a blower is desired. For forced-draft installations on automatic stokers, several units can be grouped together discharging into an air duct to the wind box of the different stokers or stoker compartments.

Auxiliary mine ventilation can be easily obtained from the single-unit machine having fan and driver on one shaft. However, to deliver air through long pipe lines, high initial pressure is necessary. As it is impossible in mine practice to keep air ducts tight, especially at the joints, the air lost by leakage, which increases with the high pressure, is often of greater volume than the actual air delivered at the discharge end of the pipe. Under these conditions, several Coppus blowers delivering the same quantity of air at 4-in. pressure may be installed in a series of units set at equal distances along the air duct. The losses through leakage are thus reduced to a fraction of what they would be at higher pressures.

Grounding Clamp for Conduit Systems

A solderless aluminum grounding device has been developed by the Neco Manufacturing Co., South Norwalk, Conn. The device has a projecting clamp to which the ground wire may be fastened. It can be readily threaded to a piece of conduit so as to provide an effective ground connection. The manufacturers are now in position to supply the clamps in sizes ranging from $\frac{1}{2}$ in. to 6 in.

Unit Type Air Heater

A new heater has been placed on the market by the American Blower Company, of Detroit, Mich., for use in ventilation systems. The unit heater has an automobile-type radiator through which the air is circulated by means of a motor-operated fan. This device is especially suitable for ventilating systems of offices or warehouses.

COAL AGE

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Passing the Buck

EVERY new piece of equipment gives a chance to pass the buck, and many a superintendent is a past master in the art. As a result, many a device is condemned for faults which cannot rightly, but can speciously, be charged to it. If the new method or the new machine is imposed from above or from some other department than that of the production head—mine superintendent or foreman—it is liable to be opposed. Every effort is made to charge it with all the stray costs which that operating head desires to dispose of satisfactorily to himself and his reputation.

Most cunningly does he contrive to pass the blame to this interloping introduction, and only patient watchfulness and discrimination will assure a fair trial to the new system or device. That is why a discussion of this matter *in camera*, in a full meeting of all concerned, is advisable, before, after and during the experiment. The facts openly and exhaustively discussed will bring all the merits and demerits to light, place all the details of the experiment where they can be clearly viewed, and promote friendly effort to get the best out of the opportunity.

As a rule, however, executives hear but one side and pass judgment. Did the mine superintendent propose it, it is a success. Did he oppose it, it is a rank failure and the cause of many ills with which it may have only a remote or perhaps no connection? With men of many varying qualities and backgrounds—administrational, mining, mechanical, electrical—no subject has been settled till the judgment of all has been sedulously sought. We can no more determine the value of a piece of equipment by hearing the opinion of one man than we can comprehend the value of a building by showing alone a plan of one floor, a front, a rear or a side elevation. We need plans and elevations from several points of view. Then we shall know at least something about our building, and not until then.

Coal Dust "As Is"

TESTS of coal dust in experimental mines and galleries seem to be of the substance as it might be rather than as it is. No one has taken, we believe, the floor material as it is and subjected it to tests. They have not taken it in its natural depth and coarseness and tried it out. Perhaps it might give a false feeling of confidence, for at any time a different condition might arise.

It might be ground finer, it might be less damp, it might have the finer material on top, it might have less roof scale in it or it might be rendered more noxious by the presence of less locomotive sand. Of course, it would be difficult to reproduce the exact condition in an experimental mine. The floor dust loaded into cars would not reproduce the various vertical and hori-

zontal zones, the lines where scurrying feet had worn a path of comminuted dust and lines where mules had kicked up enough broken bottom to render the dust relatively innocuous.

Still the mines as they are might be simulated better. Dust from the most unfavorable place and travel zone in the mine might be taken and tested. It would be more suggestive of what might be expected than dust which was ground to such a fine, mealy consistency that nothing like it was ever seen underground. It is like taking FFFF and drawing conclusions as to the F variety of black powder.

Finally we might add: Never overprove anything. People always suspect an overstatement. The skepticism of those who see the velvety dust in the experimental mine is a case in point. They do not recognize it as coal, not their coal at any rate. But if you put the material they have daily trodden carelessly underfoot in a sure-enough mine like that at Bruceton and put a buster shot in the face like some of those they know unconscionable miners are using and get a severe explosion, you put real fear in their hearts. This is the stuff they have handled, these are the conditions they face—and in that homely thought lies conviction.

In this connection it may be said that when members of the South Staffordshire and Warwickshire Institute of Mining Engineers visited the Eskmeals Experimental Station in England and viewed an explosion of coal from the Kilburn seam of the Butterley Colliery, Nottinghamshire; L. Holland and H. H. Ridsdale criticized the experiment saying: "We consider it most important that the experiments should be carried out on actual samples of road-dust, large and small, taken from representative roads in the pits of that area."

Wonder What Farrington Thinks About?

THE famous cartoonist who draws an almost daily series of picture "strips" wondering what the cigar Indian, and the Statue of Liberty, the handsome collar ad man and other such notables think about, ought to turn his attention for a moment to Frank Farrington, president of the Illinois district of the United Mine Workers. What *does* he think about these days, anyway? And why has he postponed his state convention for two months to May 13? Farrington's problems typify those of many union miner leaders of the country.

His puzzles are enough to make any man lie awake nights and think. There he is with 90,000 union miners in a solidly unionized state. Not a pound of coal can be dug except under the union agreement continued for three years. Unless the usual sixty or seventy million tons of it are produced in Illinois each year of the three, a vast deal of suffering must be borne by his miners. Thousands of them must be squeezed

out of the industry by shutdowns that have already closed three quarters of the state, and the rebel element in Illinois, long dangerous to Farrington's regime, will have new and effective ammunition to use against him, especially in the union election next December. Although he does not particularly hanker to remain president of the district, he does not want to be kicked out.

But in spite of this danger in the reduction of Illinois coal, what can he do to prevent it? Illinois must have a market or it can't produce. Kentucky, a competitor on the south, is headed for non-unionism in those portions which are not already beyond union control. If it doesn't go all the way, it will at least make union contracts in the western end of the state that far undercut the wages of Illinois. That means a certain loss of market by Illinois. The Southwest district operators are determined to have a contract that will materially reduce costs and they probably will have their way. That will mean more loss of Illinois business in Kansas, Missouri and Nebraska. The Northwest docks are heavily loaded with cheap coal and are in position to stock up again this summer with more good coal at prices that Illinois cannot meet in Minnesota unless freight rates are altered. All this adds menace to Farrington.

What is the logical thing for him to do? He cannot violate the new three-years contract so far as wages are concerned. Therefore, that method of remedying the Illinois situation is out of the question. But, as everybody knows, there are clauses in the working agreement in Illinois which add materially to the cost of producing coal in that state. He could change some of them, thereby enabling Illinois mines to hold certain escaping markets. Thereby, also, many miners would hold escaping jobs. Are most unemployed Illinois miners convinced yet that such a course is necessary? Perhaps they will be by May 13. Perhaps, also, by that time certain outlying districts such as the Southwest will have signed agreements that will establish a precedent for Illinois. Is this what Farrington is thinking about?

Slow Progress in Standardization

IN COAL mines we have not the compelling force for standardization that the railroads have. Each mine stands by itself. There is no interchange of equipment. The cars at the Katastonka mine do not have to be coupled with those at the Katie No. 5, and the cars on the roads of one operation do not have to run on the other. Nor do the Katastonka cars have to be repaired at the shops of Katie No. 5. Consequently, the local need for standardization is not supplemented with the need for intercompany interchange.

It is interesting to note the conditions that favored the adoption by the railroads of the Master Car Builders' coupler. When they standardized couplers many of the railroads were already faced with the necessity of changing their coupling equipment. When the change was made they could just as well go to the standard as to some other kind of coupling. One kind of change was no more burdensome than another. Some standards were helped by the fact that they related to equipment that most of the cars did not have at all and might not have had today if the laws had not compelled its introduction.

Standardization will profit by constant advocacy because mines have often, when bought, only the meagerest of equipment. They need almost entire renovation, and when that is the case the scrapping of the old equipment is more economical than the supplementing of some of it and the saving of the rest. Many a plant thus renovated maintains a foolish standard when it would do better to adopt one that is more general. It is often an alibi and not a real excuse to say that the reason why the gages are diverse is because old mines were bought and they had a narrow gage when the purchase was made.

In many cases it would have been well to take the whole string of cars to the scrap heap. They were not fit to run. In fact they had to be almost entirely rebuilt any way. The tracks could probably have been widened on the old ties. Perhaps the ties were too rotten or too short for that but if that were the case the track should have been condemned. Most of these old gages have been kept because the subject of scrapping the old equipment was not even considered and no standard had been suggested.

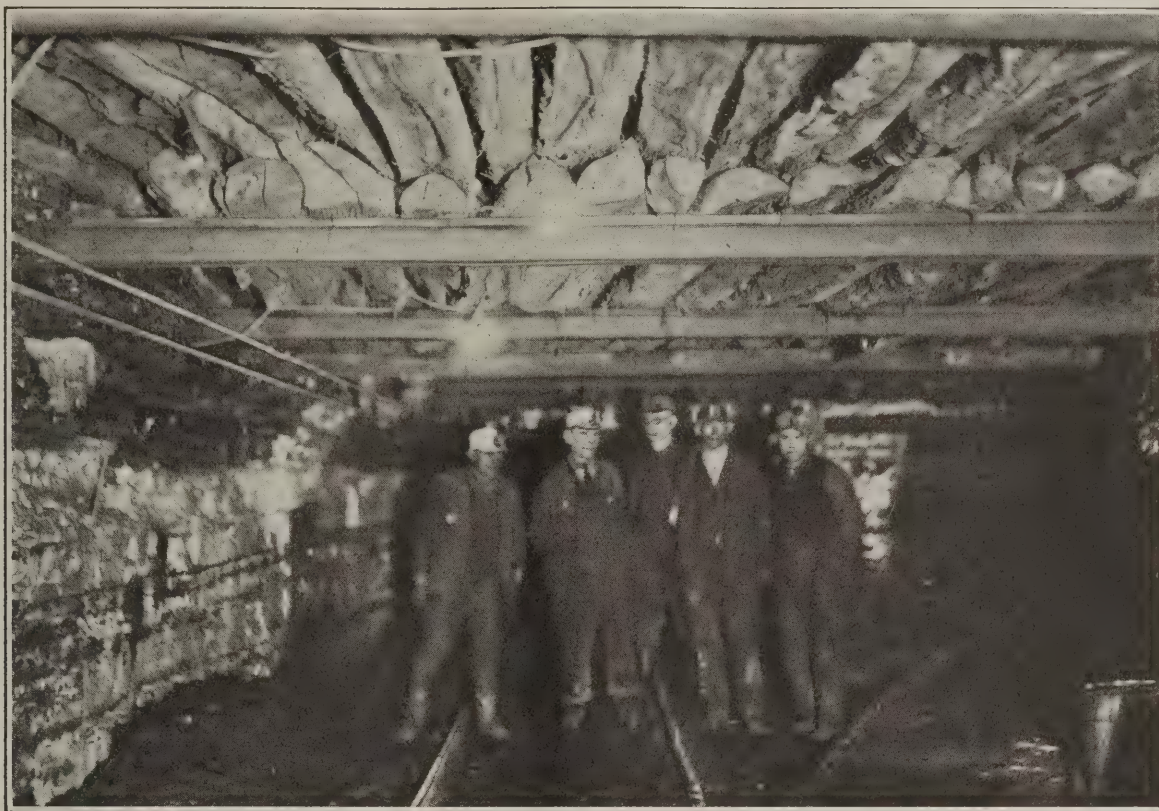
However, there are some cases where an attempt to conform to standard would scarcely pay until there is a revolution in the industry. Such a change is likely to come soon. When coal is brought by scrapers or conveyors to the main roadways and the cars do not have to enter the rooms, they will be made larger and when larger cars are purchased the gage can be made standard. Only the track in the main roadways will have to be changed. Today a revision in track gage would mean relaying all the room tracks. That in some mines would be profitable, for the roads in the rooms where laid by miners are so crooked that the safety and economy in haulage that would result from their relaying would pay for the operation. Still it takes more courage to undertake the work if the change would involve all the present trackage and not solely the tracks in the main roadways.

Then again concentration of workings will reduce trackage considerably and make it less costly to change the gage. Every considerable change in method of operation makes standardization more possible and it certainly would be helped if the manufacturers could offer a lower price wherever certain standards were adopted.

It is paradoxical but true that standardization is promoted by a general break in standards. A new development causes a discarding of much of the old equipment, and the tendency is, or at least should be, to adopt at that time standards which till then were little other than an impossible ideal.

Off the Track

WRECKS were a daily occurrence on the railroads of past years. Now they are relatively unusual, and traffic moves steadily. The railroads certainly have profited by the change. But the mines, they still have wrecks. They wouldn't be the same old mines without them. These derailments don't pay dividends, but you would imagine they did by the way the average manager makes provision for them. Many a mine would be making a profit if it did not have to write off so much for the destroyed equipment, wasted time, accidental injuries and repairs consequent on cars and locomotives leaving the track.



Careful timbering in Beech Bottom Mine, Power, W. Va.

Better Methods and Improved Equipment Increase Production at Beech Bottom Mine

By Locating Power Plant at Mine, Cost of Power Is Greatly Reduced—Means Adopted to Reduce Loss of Coal in Mining and to Save Unnecessary Handling of Slate

BY ALPHONSE F. BROSKY

Assistant Editor, *Coal Age*
Pittsburgh, Pa.

CENTRAL stations for supplying power in the coal regions are now being built exclusively so near coal mines that the freight costs on the coal can be entirely eliminated. The disposition to locate power houses at some point on the railroad more or less remote from the mines is now recognized generally to be uneconomical. It is cheaper to transmit power at usual voltages over a transmission line 200 miles in length than to carry the coal to a central station by railroad an equal distance even though thereby it is possible to generate the power more conveniently to the center of load. The advantage of locating a central station at a coal mine situated somewhere near the center of distribution is even more clearly apparent. A comparatively recent development in the Panhandle region of West Virginia furnishes an excellent illustration of this tendency.

Headpiece portrays timbering at the junction between two roads and shows how the Windsor Power House Coal Co. supports bad roof by 60-lb. rails placed at 4-ft. centers.

On the Ohio River, at Power, W. Va., a village located about ten miles north of Wheeling, the West Penn Power Co. and the American Gas & Electric Co. operate the Windsor power station, which has a capacity of 180,000 kw. The station is located in proximity to the hillside tippie of the Beech Bottom Mine, owned and operated by the Windsor Power House Coal Co., a subsidiary of the companies just mentioned. The situation is clearly illustrated in the panoramic view, Fig. 3.

The operation of this central power station calls for a supply of 70,000 tons of coal per month, or say 850,000 tons a year. The Beech Bottom Mine has been equipped to produce coal from a tract of 10,500 acres at the rate of 1,000,000 tons per year. The mine is operating in the Pittsburgh No. 8 coal seam, which in this region is 4½ ft. thick. After making due allowance for probable loss in mining, it is estimated that this tract provides a reserve of 54,000,000 tons of coal, or more than a half-century's supply of fuel for the plant.

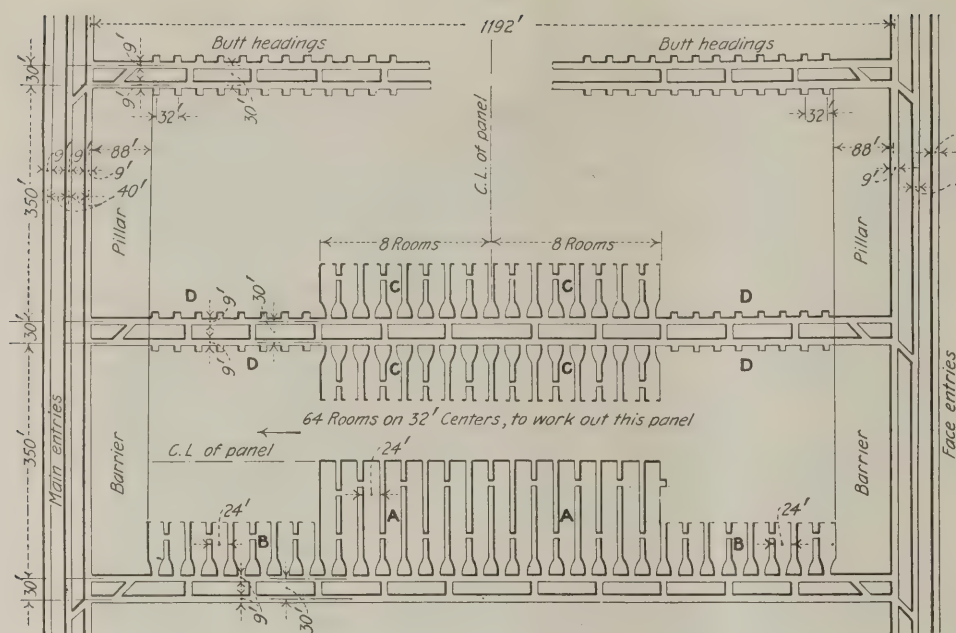


Fig. 1—Method of Working Panels

Two sets of eight rooms *AA* are driven up concurrently. When these sets are driven half way up two sets *BB* and two sets *CC* are started. Thus sets *AA* are finished when sets *BB* and *CC* are at mid distance. The pillars are not drawn. The center of the panel is worked out first, which is advisable, for the coal is hauled to both sets of face entries making it unnecessary to save the center of the panel when sets *AA* are completed.

Owing to bad roof, the mines in this region are small producers as compared with operations in other areas of the Pittsburgh seam. The plan of mining at this plant is to drive up rapidly short wide rooms separated by narrow pillars which are abandoned without any attempt at recovery. The present owners of the Beech Bottom Mine profiting by early experience in the operation of this seam and by the use of more modern equipment have increased greatly the percentage of coal recovered. Even though the pillars are still lost, a big saving is made because the rooms are all completed before a squeeze comes and prevents further mining.

A brief reference to the character of the overburden will serve to explain the peculiar roof conditions encountered in the operation of the mine. In the Pan-

handle region of West Virginia at least and particularly in the Beech Bottom Mine, the coal is overlaid with about 15 ft. of dangerous roof, consisting of a drawslate and laminations of coal and shale with 12 ft. of fireclay having a conchoidal structure. Above this is a great thickness of massive limestone that will not break except over a long span.

Because of this condition operators in the region believed that it was necessary to leave in the mine all room pillars, chain pillars and a large portion of the barrier pillars, for they could not be recovered with safety. Experience has shown that in this section the roof over a 24-ft. room will stay up for about four months when adequately timbered. After that the 15-ft. bed of drawslate, roof coal, shale and fireclay, between the coal and the limestone, weakens and begins to fall.

Any attempt to remove the pillars in the rooms would start a squeeze that would extend over the entire mine, closing the roads and aircourses completely.

When, four years ago, this property was first taken over by its present owners, it was the pronounced intention to equip the mine for putting out the production of from 3,000 to 4,000 tons of coal per day. Old-timers shook their heads knowingly saying, "It can't be done." But they were wrong, as a careful study of the conditions and the adoption of improved methods and equipment have since shown. On Feb. 13, 1924, the output of coal was 3,486 tons, which probably exceeds all records in West Virginia for a single opening on the Pittsburgh No. 8 seam.

At the time the Windsor Power House Coal Co. came

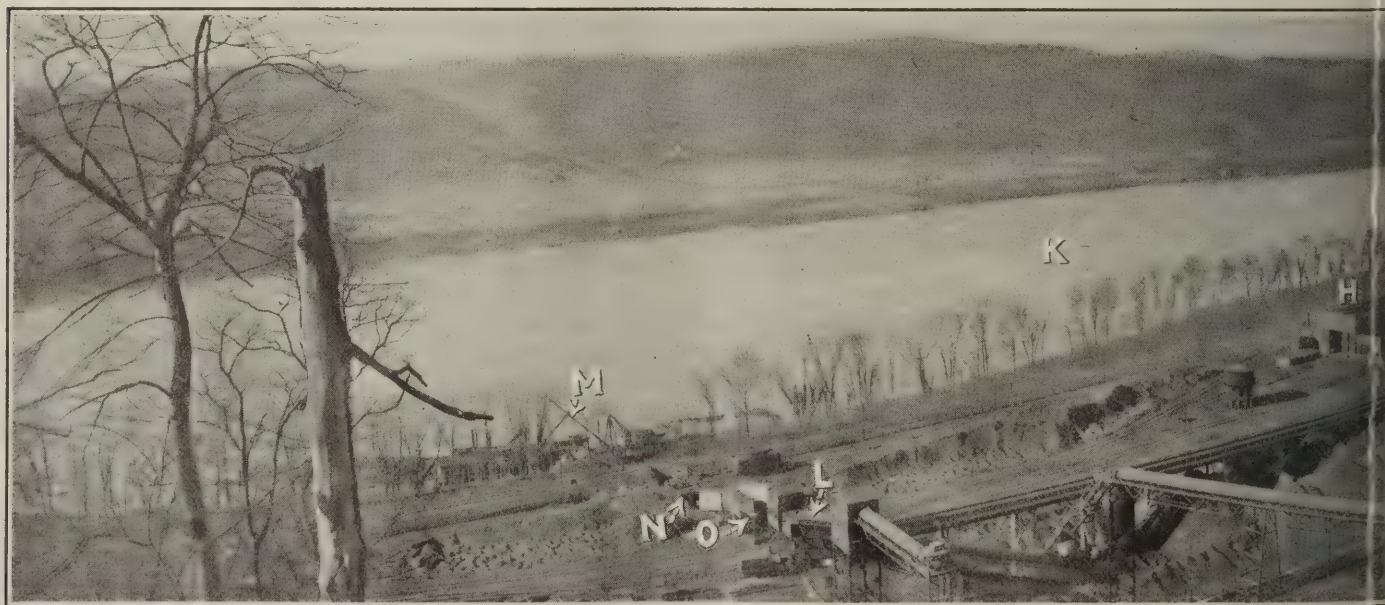


Fig. 3—Panoramic View Showing the Way in Which the Coal Brought Down from the Beech Bottom Mine. A, is the mine tippie; B, mine portal for loaded track; C, mine portal for empty track; D, rock bin; I, traveling crane; J, coal storage yard; K, Ohio River; L, conveyor system.

into possession of the Beech Bottom Mine, the daily tonnage did not exceed 1,000 tons, although the development in the mine was sufficient to have produced a larger output. The new company at once took steps to overcome the obstacles that hindered production. Its officials soon found that, in order to meet the requirements of the power station, the entire mine plant had to be rebuilt, the plan of the mine had to be altered materially, the system of haulage had to be changed and new shop buildings and a modern tippie had to be erected.

In the mine, the plan had been to drive face entries at intervals of 1,400 ft. and butt entries at intervals of 440 ft. On each side of the butt entries, in each of the panels thus formed, thirty-eight rooms were turned and driven 220 ft. long and 24 ft. wide, on 32-ft. centers. It was observed that many of these panels had to be abandoned before all the rooms were driven up and much coal was lost.

The new management decided that there must be shorter and fewer rooms in each panel. The plan adopted was to drive all entries 9 ft. wide. The main entries were to be driven on 40-ft. centers and face and butt entries on 30-ft. centers. The main and face entries were to be driven three or four abreast as conditions might require, the butt headings remaining on the double-entry system.

SPEED UP EXTRACTION TO OUTPACE FALLING ROOF

As shown on the accompanying map (Fig. 1), the face and butt entries were driven at intervals of 1,192 ft. and 350 ft. respectively. This provided for the driving of thirty-two rooms on 32-ft. centers, in each panel, and leaving a barrier pillar $83\frac{1}{2}$ ft. wide to protect each face entry. The rooms were driven 24 ft. wide and 175 ft. long, measuring from the center line of the entry to the center of the panel where they would meet the rooms driven from the adjoining butt entry.

It should be observed, here, that where the room pillars are not to be extracted, there is not the same need of preserving a uniform line across the faces of the rooms. However, as shown on the map (Fig. 1), it is well to work out each panel by driving eight sets of

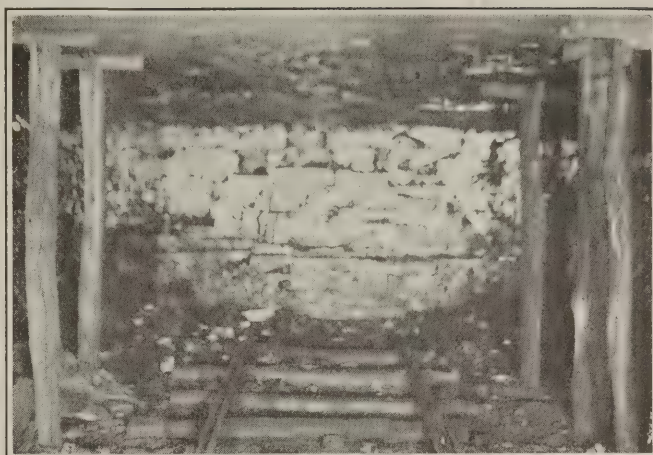


Fig. 2—Timbering Roof in Beech Bottom Mine

Rooms are driven 24 ft. wide with 8-ft. pillars, the latter not being recovered, because, if the roof is once broken, a widespread squeeze will do immense damage to the mine. The roof directly above the coal is weak; consequently a row of timbers is placed on each side of the track which is laid in the center of the room. The crevicing of the coal is not natural. The coal has been shot and partly loaded out. The shots failed in the middle to bring down the coal but fractured it as shown.

eight rooms each, in both directions, to the right and left of a pair of butt headings. As appears in the first panel at the bottom of the map, the two inner sets of eight rooms each, marked *AA*, are first started. When these have been driven half their distance, the two outer sets marked *BB* are commenced. At the same time, the four inner sets, *CCCC*, driven east and west from the second pair of butt headings are started. By following this system, when the sets *AA* have reached their limit and have been stopped at the center of the panel, the *B* and *C* sets have all been driven half their distance. At that time, the four outer sets *DDDD* are started from the second pair of butts.

It is claimed that this system provides a much desired concentration of the working places along the several butt entries where thirty-two or sixty-four rooms are being driven simultaneously. As indicated on the map, there is no through haulage on the butt entries, the coal from the rooms in each half of a panel being hauled to



Beech Bottom Mine Is Carried to the Power House and How the Rock Is Handled by an Aerial Tram

A, aerial tramway for disposal of rock; *F*, crushers; *G*, power plant; *H*, machine shop and storehouse; *I*, river and rail delivery; *N*, discharge from railroad cars; *M*, delivery from river boats.

the nearest face entry. Though this increases the haul, in some cases, the plan has the advantage that track and wire may be torn up in rooms and on entries as fast as any section is finished.

In the rooms, 20-lb. rails are laid on steel mine ties. The track is carried up the center of each room to facilitate the loading of coal at the face. This is an advantage when the room pillars are not to be drawn. As shown on the map, all room-necks are bottle shaped and only enough coal is left in the entry stumps to hold the room safely open until it is finished.

CARRY LINE OF POSTS EITHER SIDE OF ROOM ROAD

In Fig. 2 is shown a view of the face of a room being driven up. It will be observed that a row of posts lines the track on either side. The posts are set on 4-ft. centers, with an 18-in. cap-piece at the roof. It is common practice also to set a row of posts, on 4-ft. centers, across the face of the room. Though it is safe to set these posts 8 ft. from the face, that distance is often reduced where shortwall cutting machines are used, as this type of coal cutter requires less than 8 ft. of clearance. No room timbers are removed when a room is abandoned.

The roof on butt entries needs but little support, as the roads are driven only 9 ft. wide and are abandoned in less than a year. At some points where the roof may develop weakness, 20- or 40-lb. rails are placed across the entry to give it the needed support. In this manner rails are often used at the junction of two entries and at room-necks to avoid possible trouble from roof falls at such points. In every case, these rails are recovered when the places are abandoned. A rope from the drum of a crab locomotive is first made fast to the rail to be drawn. If necessary, a small stick of dynamite is used to dislodge a supporting timber. The locomotive, which is kept at a distance where it will be out of danger, is then used to pull out the rail.

As shown in the headpiece, it may happen that an exceptionally heavy fall of roof will make it necessary to place much lagging above the supporting rails. Need for

work of this kind has often occurred at entry junctions. In the figure mentioned, the roof fell and 30 mine-car loads had to be removed and the roof above it supported not only by steel but by lagging. To avoid this difficulty, these large open spans must be heavily supported by steel rails. This is but one of many practices adopted to reduce to a minimum the avoidable gobbing of roof material.

Other practices are supporting the necks of breakthroughs and crosscuts by three wooden posts and timbering all airways by setting posts staggered on 8-ft. centers. The extensive use of steel and wood for supporting the roof has greatly reduced the labor expense of clearing up and gobbing roof falls. Today, though the production of this mine is three times what it was four years ago, the expense for deadwork has been greatly decreased and less slate from falls is hauled out of the mine.

PROVIDING FOR GOOD HAULAGE AND VENTILATION

Referring again to the general plan of mining shown in Fig. 2, the practice has been followed of maintaining every third set of face entries for permanent haulage and ventilation. This set is maintained for an indefinite period depending on the life of the territory to be reached. The intermediate face entries are abandoned as the adjacent panels are finished. Likewise, every fifth set of butt entries is kept open sufficiently to facilitate haulage and ventilation as may be required. Though 60-lb. rails are laid on the main entries and 40-lb. rails on all face and butt entries, as previously stated, 20-lb. rails are used for the most part in rooms.

One of the measures taken to produce an output of 3,500 tons of coal per day is the double-tracking of primary haulage entries and of the more important of the secondary haulage roads. This practice includes the main entries and those face entries that are most commonly used. At present, the main entries have a length of $2\frac{1}{2}$ miles, which will be increased to 6 miles at some later time. The double-tracking of these entries now extends a distance of 6,600 ft. To expedite the work of gathering cars, sidetracks are provided on all face entries at the junction of butt entries. The expense of laying and maintaining these numerous sidetracks is

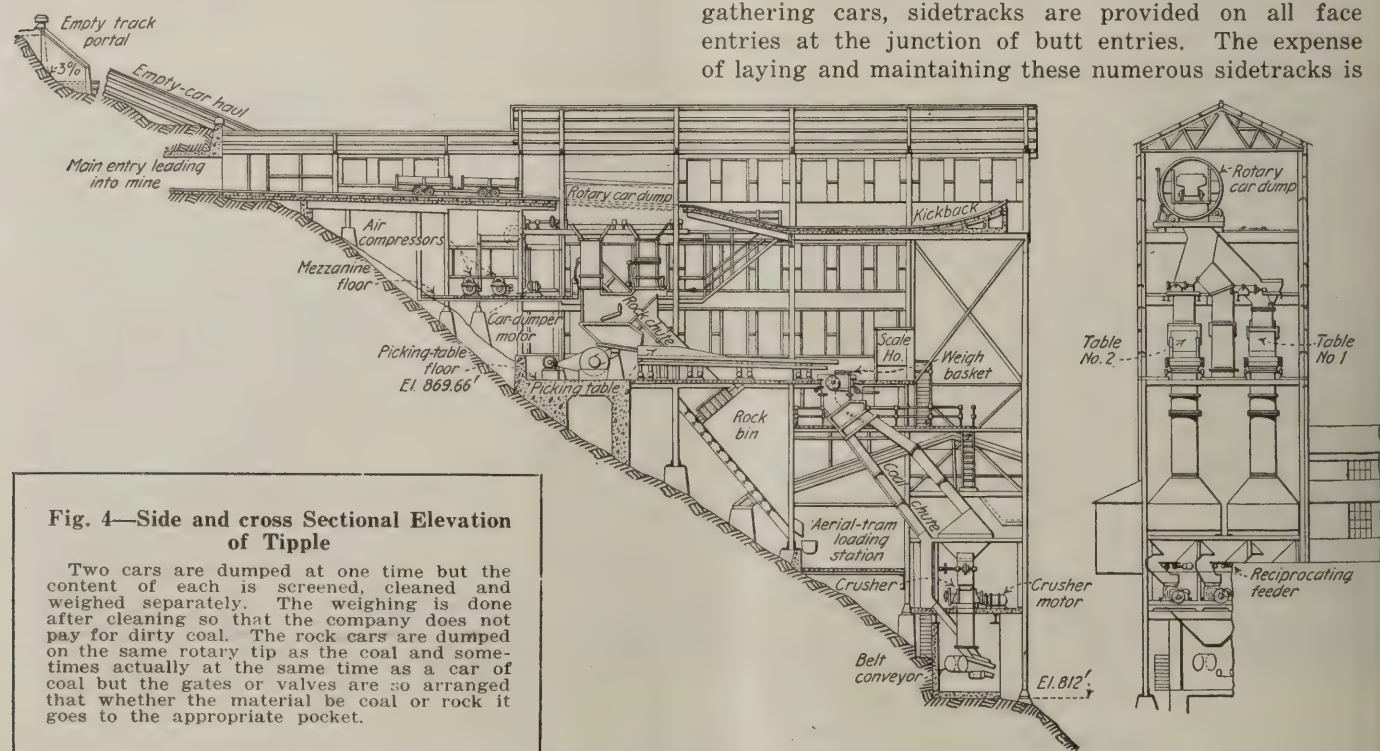


Fig. 4—Side and cross Sectional Elevation of Tipple

Two cars are dumped at one time but the content of each is screened, cleaned and weighed separately. The weighing is done after cleaning so that the company does not pay for dirty coal. The rock cars are dumped on the same rotary tip as the coal and sometimes actually at the same time as a car of coal but the gates or valves are so arranged that whether the material be coal or rock it goes to the appropriate pocket.



Fig. 5—Cars in Revolving Cradle Ready to Dump

The loaded cars come into the dump from what to the observer in this illustration appears as the rear. After dumping they run forward to the kickback and out to the inclined empty-car hoist on the right. The inclined track leading from the rotary dump must impart sufficient momentum to the two cars in tandem to enable them to negotiate the kickback and then clear the shunting switch on their way to one of the two car hauls.

offset by a reduction in the standing time of the gathering locomotives.

On the main haulage roads five 15-ton locomotives are in daily operation. The average one-way haul is 9,250 ft., and each locomotive makes eight round trips between the inby partings and the tippie each day. The estimated capacity of a 15-ton locomotive, running on a practically level track, is forty 2.4-ton cars, making a net load of 96 tons of coal per trip.

Based on an output of 3,500 tons of coal per day, each locomotive would be required to haul $3,500 \div (5 \times 8) = 87\frac{1}{2}$ tons of coal per trip, leaving a good margin for any rock that must be hauled out of the mine. Rated at its full capacity, each locomotive in operation is performing an average of $(96 \times 9,250) \div 5,280 = \text{say } 168$ net ton-miles per hour in the hauling of coal and rock.

Each of the 850 cars with which this mine is equipped

makes an average of two trips a day, between the working face in the mine and the tippie. Estimating the output at 3,500 tons of coal per day and the cars as having a capacity of 2.4 tons, and making two trips a day, or hauling 4.8 tons of coal daily from the face to the tippie, the number of cars required to haul the coal would be $3,500 \div 4.8 = \text{say } 730$ cars, which leaves a fair margin of facilities for the hauling of rock and for bad-order cars lying in the shop undergoing repairs and for others standing in idle places, or otherwise employed in the hauling of timber and track material.

CRAB LOCOMOTIVES USED ON GATHERING HAUL

For gathering haul, sixteen 6-ton and two 5-ton locomotives of the crab or reel type are used. This type of locomotive has been installed, because it is particularly adapted to gathering cars from rooms with the narrow necks that must be adopted at this mine if roof trouble is to be avoided and, again, because it avoids the necessity of a locomotive entering a room where the track is poor and derailment likely.

When a car is derailed by reason of defective track, it can be rerailed with far less difficulty than a locomotive. Each of the eighteen gathering locomotives hauls about 200 tons of coal per day from the working face to the sidetracks where trips are made up to be hauled out of the mine by the larger locomotives operating on the main road.

Mention has already been made of the efforts made to reduce the danger and minimize the expense caused by falls of roof on the roads. During the past year, 7,000 ft. of haulage road have been strengthened by building cribs and supporting the roof with heavy steel rails set in hitches cut in the ribs. Wherever a section of the roof on a main road gives increasing evidence of weakness, these rails are spaced 4 ft. apart.

The importance of this work is reflected largely by the increase during the year of the daily tonnage. In January, 1923, the average daily output was 1,300 tons. This was increased, in January of the present year to

FIG. 6

Shaking Screen Picking Tables

The coal dumped from each mine car passes over one of these two tables, and, in so passing the slack falls through the screen and the dirt is picked out by hand. The clean lump and the slack drop into a two-compartment weigh basket where they are weighed together. The aggregate weight of the two sizes is credited to the miner. Between the picking tables can be seen the chute which conveys the rock from the rotary dump to the rock bin.



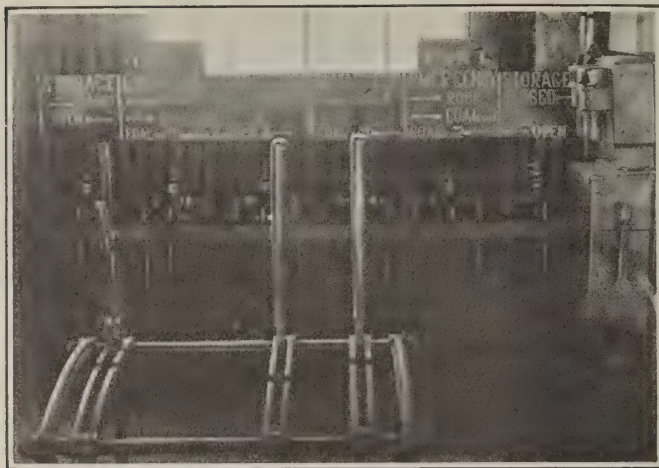


Fig. 7—Levers and Valves Controlling Dump

By regulating the valves shown behind the lever control, two mine cars both of coal or one each of rock and coal, are dumped simultaneously and the contents of each kept separate in its passage through the tippel.

2,636 tons daily, or more than 100 per cent. Naturally, there were other factors besides the protection of the roof on the road that contributed to these results, but timbering played an important part.

Of equal importance with the underground improvements that have been described was the construction and equipment of the new tippel building shown in Fig. 4. As appears in this figure, the mine has two openings, one for the loaded cars and another at a somewhat higher elevation for the empties. These are located on a steep hillside several hundred feet above the ground on which the power plant, previously mentioned, is erected. In order to overcome the disadvantage of handling the mine cars in freezing weather, ample storage trackroom, both for the empty and loaded cars was provided under the hill.

CARS ARE DUMPED IN PAIRS BY ELECTRICITY

The loaded cars coming out of the mine are run, in pairs, into an electrically driven two-car rotary dump shown in Fig. 5 which gives a view of a portion of the tippel floor and the arrangement of the tracks leading from the dump to the kickback and returning through the switch to the empty-car hauls. In the background beyond the rotary dump are shown the loaded cars coming from the mine, and on the right is shown the lower portion of the empty-car hauls. Leaving the dump the empty cars run down a short, steep incline to a two-car kickback, returning from which they are shunted to either one of the two empty-car hauls, by which they are taken to a higher elevation so that they will run by gravity into the mine.

The two-car kickback is a feature found at few mines. Its design requires special care to obtain the right vertical curves that will handle two mine cars in tandem and impart to them sufficient momentum to enable both cars to clear the switch leading to the empty-car haul. In order to avoid delay caused by a breakdown of the machinery, this car-haul was installed in duplicate, one unit always being held in reserve to be used in case of accident to the other.

On loaded tracks the inclination of a plane is usually limited to 14 deg., so as to prevent coal from falling off the cars on the incline. This haul, however, was for empty cars only, so it was given an inclination of 23 deg. In consequence it is possible to gain the required elevation in the short distance available between the

switch at the kickback and the head of the graded track leading into the mine.

The tippel is of steel and covered with corrugated iron siding. A novel feature of the two-car rotary dump is the provision made to enable each car when loaded with coal to deliver its load to individual shaker screens and picking tables, each of which has a capacity of 250 tons per hour. By an ingenious arrangement of pockets, chutes and air-control fly gates, a car loaded with rock whether occupying the forward or the rear position on the dump, can be made to empty its load into a 70-ton reinforced concrete hopper, from which the rock is conveyed away by buckets on an aerial tram, as shown in the panorama.

SHAKING SCREENS AND PICKING TABLES

When coal is dumped from the cars, it is carried by chutes to two double-deck shaker screens, which effect the separation of sizes under 1½ in., the larger sizes remaining on the upper deck of the screen, the smaller sizes and slack falling through to the lower deck. From the screen, the lump coal passes onto picking tables where the refuse is picked from the coal and thrown into openings leading to rock chutes on each side of the picking tables.

In Fig. 6, is shown a photographic view of the shaker screens and picking tables with their side pockets, as taken from a point near the scale house. A comparison of this view with the arrangement shown in Fig. 4 will afford a clear understanding of the equipment. Between the two shaking tables appear the rock chutes conveying slate and other refuse to the rock bin below. In the upper right portion of the illustration appears the stairway leading down from the tippel floor. This enables the tippel force to inspect and operate the air-compressor system controlling the wings and gates in the chutes. The head of this stairway is shown on the right of the view of the tippel floor (Fig. 5).

Both the lump coal from the upper deck and the screenings from the lower deck of the shaker screen are conveyed to a double compartment weigh basket, the lump coal having first passed over the picking tables, for the removal of any refuse or rock it may contain. This arrangement is designed to facilitate the weighing at one and the same time of all the coal from individual

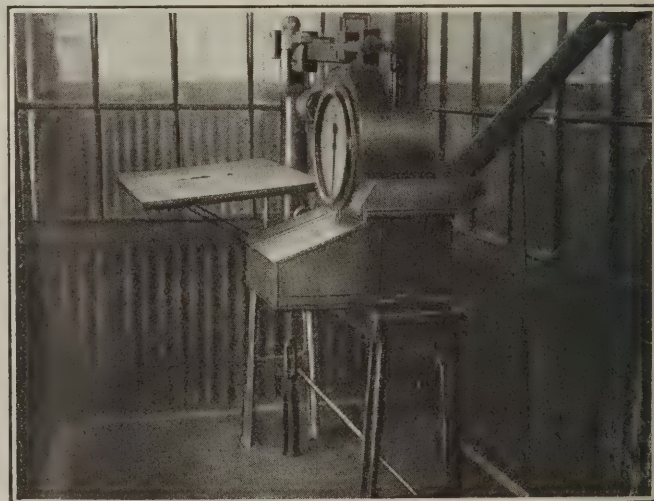


Fig. 8—Automatic Recording Scale

Not only is the miner satisfied that the dirt for which he is docked actually was in his coal but he is made certain that the record of weight is correct as vouched for by the recording scale which makes a permanent statement of the weights taken against which can be affixed the numbers on the miners' checks as deposited in the slot provided for that purpose.

mine cars after the refuse has been picked from the lump coal as described.

As will appear from a study of the elevation of the tipple in Fig. 4, a duplicate cycle of operations is provided. The load in each mine car is weighed and dumped before the load of the next car is deposited in the basket for weighing. The two separate sizes are weighed jointly through the agency of automatic recording scales.

AIR CONTROL DUMPS ROCK AND COAL TOGETHER

The dumping of coal and rock at the same time and from the same two-car rotary dump is made possible by a system of control levers and air valves located in an operating room, as shown in Fig. 7. Behind the car-dump levers appear the 3-way air-control valves just below the boards on which are indicated the various directions in which the valves should be turned so as to dump rock and coal from cars Nos. 1 and 2 standing on the rotary dump.

In Fig. 8 is shown a view of the scale house containing the automatic recording device for the weighing of the coal contained in the double compartment weigh basket previously mentioned. After weighing, the coal is dumped from the basket into a bin or hopper from which it is fed by reciprocating feeders to any two of three crushers (see Fig. 4), each having a capacity of

125 tons per hour. Here also, in order to avoid possible delays from breakdowns, a spare crusher unit is provided and held in reserve in case any one of the two crushers may be out of commission.

From the crushers the lump coal is fed to a 30-in. belt conveyor where it is joined with the fine coal and slack which has bypassed the crushers. The entire product is now carried by a series of conveyors that link the tipple with the storage yard at the bottom of the hill and with the power plant adjoining the yard. Provision is also made for delivering coal to the river, if desired, as indicated in the panoramic view previously shown.

A point not to be overlooked in the operation of the mine is the equity afforded all parties by the elimination of tare weight, which has always been the cause of much friction between operators and miners. By screening and picking the coal in mine-car lots before it is weighed, the miner is assured that he will be credited for the exact quantity of clean coal contained in his car. The system offers excellent opportunity for the inspection of the contents of every car of coal coming from the mine. At many operations the inspector has no adequate means of making a satisfactory determination of the quantity of dirty coal in the mine car and this is a cause of a great deal of dissatisfaction.

The Miner's Torch

A Library for Sale

THERE has been much discussion of late in the engineering press and in society proceedings covering the changed status of the engineer in the mining industry. Year by year the mechanical requirements of our mines have increased, and during the last half dozen years this increase has been almost staggering, especially at our coal mines. With the increased use of machinery, mine management and mine planning become more complex and engineering ability becomes more and more a necessity. But it does not follow that because the percentage of engineers at our mining camps is increasing that engineers as a rule are being offered the encouragement that their present importance would seem to justify.

Bearing on the above I want to record an adventure that befel me in a second-hand book store not very long ago.

I had often visited the particular shop and occasionally made purchases, not technical books, however; in fact I had never seen a technical book of any description on any of the shelves or racks. Generally I was drawn to the place when I felt a desire to get away from things technical. On the day in question, as I entered the shop the first thing that attracted my attention was a dozen or so books bound in the sort of bindings that one instinctively associates with books dealing with things technical. My first impulse was to make a hurried exit but this was followed by a desire to find out whether there was a story connected with the offer to sell; why did the man who owned them decide to dispose of them?

You are expecting an engineer's hard luck story just as I did but it is not the kind of a hard luck story that you nor I anticipated. These books were the property of an ex-professor of mining engineering who had given up his profession in disgust and accepted employment as a mechanical engineer with a large manufacturing company; having fully decided that he would never again have any interest in the mining industry, he decided to dispose of his mining library for what it would bring.

I guessed most of the story when I opened the first book and saw his name on the fly leaf, because some three or four years previously I had met the man at a gathering of mining men and he was complaining bitterly at that time about the treatment accorded his graduates by the men who employed them. He intimated then that he felt called upon at times to advise the undergraduates in his department to make a change before it was too late. The owner of the book shop was able to give me the balance of the story, as he had talked to the ex-professor when he came in to dispose of the books.

Many will assume that the professor was not fitted for his task, but I have known several of his students and their estimate of him would not bear out that assumption.

If, in spite of the growing demand for mining engineers, a professor of mining engineering can't conscientiously advise young men to enter the profession, and feels called upon himself to give up teaching, it would seem that a fuller discussion of the subject should be welcomed.

COAL AGE INDEX—A few indexes of *Coal Age* for the last half of 1923 remain. Should you have use for such an index kindly write to *Coal Age* for a copy, which until the present supply is exhausted will be sent free to those desiring it.

Safety Earns Men Four Times As Much as Company

U. S. Coal & Coke Co. Prevents Its Employees from Losing by Accident \$100,000 a Year—Maintains Interest by Bonuses to Bosses

THAT ample room remained at coal mines for improvement in accident prevention was indicated conclusively by Howard N. Eavenson, in an address on "Mine Accident Prevention from the Standpoint of the Mine Operator," before the Mine Safety Conference in Pittsburgh. In reviewing the experiences of the U. S. Coal & Coke Co. in its mines at Gary, W. Va., he stated that during a period of ten years following the adoption in 1909 of the slogan, "Safety the First Consideration," the prevention of accidents saved the company 39 per cent of the compensation it would have had to have paid had the accident rate not been reduced.

Still more striking was the saving to employees during this time, it being equal to the wages earned which otherwise would have been lost had the accident rate existing prior to 1909 been maintained. This saving now amounts to more than \$1,000,000, or an average of slightly over \$100,000 per year. In other words, for every dollar the company saves for itself through accident prevention, it saves \$4.55 for its employees through the elimination of idle periods due to accidents. As time goes on the saving to employees will increase as the number of prevented accidents grows.

These savings were made in a group of eleven mines. They normally produce from 3,000,000 to 5,000,000 tons of coal per year. The roof over one of the beds is a drawslate with many pot holes. Above the other seam, the roof consists of laminated slate and coal.

The first step taken toward the prevention of accidents was the division of each mine into small sections, each of which was placed under the supervision of an assistant mine foreman. The section is of such size

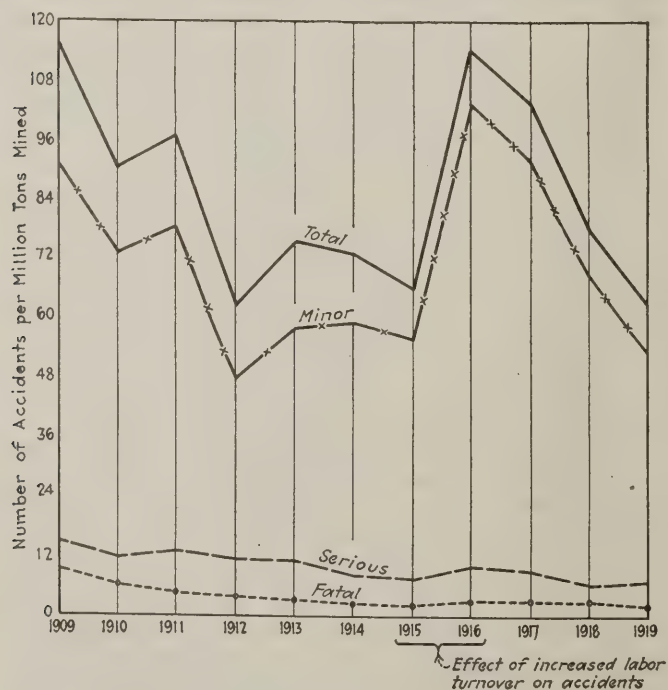


Fig. 1—Training and Education in Accident Prevention

This clearly shows the effect of high labor turnover during the years 1915 and 1916. Its effect is most evident in the minor accidents. It is less pronounced in the serious and fatal mishaps although its influence is visible even there.

CAUSE	INSIDE NO.	OUTSIDE NO.	TOTAL NO.
Defective Machinery Lack of Guards Poor Equipment etc.	□ 4% 8	□ 10% 6	□ 6% 14
Carelessness of injured	61% 113	62% 37	62% 150
Carelessness of others	□ 9% 16	□ 15% 9	□ 10% 25
Violation of Rules by Bosses	□ 8% 15		□ 6% 15
Disobedience of instructions by injured	□ 14% 26	□ 7% 4	□ 12% 30
Disobedience of Company Rules	□ 1% 2	□ 1% 1	□ 1% 3
Unavoidable by injured	□ 3% 5	□ 5% 3	□ 3% 8

Total 245

Fig. 2—Classification of Lost Time Accidents in 1919

Only 3 per cent of total accidents are here classified as unavoidable or pure accidents. Six per cent of the accidents occurring arose from defective machinery. This leaves a total of 91 per cent of accidents caused by carelessness or disobedience of rules or instructions. This represents by far the major field for possible improvement.

that the assistant foreman in charge can visit every working place in it at least once every two hours; no more than 40 men are under his care. He must examine all working places before the men enter them; he does the shooting himself and sees to the safety of his men by prohibiting unsafe practices. He is also instructed to stay on the spot until any dangerous conditions discovered are remedied.

A bonus system based on a sliding scale rewards those assistant foremen who have clean records for specified periods of time. For one month without accident a foreman receives \$5. If he sustains such a record for six or more consecutive months he receives \$15 extra for each month during the period free of accidents. He is given demerits for accidents occurring in his section, but these can be erased from his account, that is, neutralized or counterbalanced by an exceptionally good subsequent record.

This system of intensive supervision has made these mines so safe that the number of fatalities occurring in them is one-fifth the number that occurred prior to 1909. On a tonnage basis, the rate or liability to accident is one-half that for West Virginia as a whole. In Fig. 1 is shown a chart which sets forth the character and extent of accidents from 1909 to 1919.

Labor turnover in these mines is large, and was notably so in 1915 and 1916. This militates against the efforts of the company in the prevention of accidents. Of the miners employed 50 per cent are foreigners, 25 per cent are natives of the region and 25 per cent are native Americans but not of the region.

Lost-time accidents during 1919 are classified in Fig. 2. The purpose of the study which preceded the making of this classification was to ascertain how accidents occurred, particularly as to whether they were due to the carelessness of the men injured or that of others. Fig. 2 shows that unavoidable accidents make up only 3 per cent, and defective machinery is responsible for only 6 per cent of the total number of accidents. The remaining 91 per cent represents a wide margin for possible improvement, all of these being caused by carelessness on the part of either the injured persons or others.

Can Signals Be Transmitted from Mine to Surface And Vice Versa by Ground Conduction System?

Transmitting and Receiving Apparatus Should Be Designed to Resist Adverse Mine Conditions—Importance of Foolproof Equipment—Signals are Most Effectually Transmitted Through Ground That is Neither Dry Nor Too Moist

BY J. J. JAKOSKY*

FOR some time the U. S. Bureau of Mines has been studying underground communication, particularly through rock, ore, and coal, preliminary radio tests being made during the summer of 1922.

The experiments, though they did not indicate any practical method of using wireless waves for underground communications, nevertheless proved clearly that electromagnetic waves may be made to travel through solid strata. The absorption, or loss of intensity with distance, is great for short wave lengths. Long wave lengths are known to suffer less absorption and under certain conditions possibly may be found effective.

The experiments with the geophone were completed two years ago. It is one of the simplest and most portable of signal apparatus. For mine-rescue work, however, it has two major limitations—namely, (1) communication or exchange of information is impossible, except where a predetermined set of signals has been arranged; and (2) extraneous noises such as made by rescue operations, wind, surface, mine vibrations, and such like, limit the use of the apparatus for picking up weak signals. Only a comparatively few prearranged signals may be used for the geophone, because their transmission must necessarily be slow, due to the method by which they are sent, one common method being pounding on the mine walls with heavy rocks or sledges. Variable time lengths such as have proved so effective in telegraphy cannot be used in the transmittal of signals by the geophone.

SIGNAL APPARATUS SET AT STRATEGIC POINTS

The purpose of the work on underground communication is mainly to devise a reliable means of communication for underground use. Should a practical system be devised, it may be advisable as a safety and mine-rescue aid to place such signal apparatus, together with other emergency equipment, at convenient strategic points, such as the faces of entries, on different levels, etc., within the mine where men might be trapped by mine explosions, fires, falls of rock, or other disasters. A study would have to be made of each individual mine, taking into consideration the ventilation, entries and drifts, position of mine, barricading facilities, adjacent workings, present and future mining operations and so forth.

The Bureau of Mines has advocated that refuge chambers be built in the main sections of mines. After an explosion or during a mine fire men might retreat to these chambers and close themselves in until help arrived. Such chambers should be provided with drinking water, canned food and compressed air. In some coal mines in the United States where many explosions

have occurred during shotfiring time small refuge chambers have been provided, and these chambers have saved lives. A practical form of communicating apparatus also placed in the chamber would probably be of great help to rescue parties.

Although somewhat costly in initial installation and maintenance, the present mine telephone is giving satisfaction in most mines. In cases of disaster, such as explosions, fires, falls of rock, flooding, etc., the telephone is often put out of commission or cannot be reached by the underground workers, and that at the time when it is most urgently needed. For this reason the mining industry as a whole is interested in any system of communication—"phone" in preference to code—that can be relied upon in an emergency and many requests have been received to devise such a system.

The solution of the entire mine communication problem is dependent mainly upon the working out of a practical portable mine apparatus of sufficient sensitivity to receive and of an adequate power to transmit over an effective range. It is well known that signals can be transmitted considerable distances through the earth if enough power and a receiving set of sufficient sensitivity be used.

Requirements of mine-rescue radio—The ideal system for mine rescue work and general underground communication would be one where voice transmission and reception is possible. The transmission of code cannot be considered as a general solution to the problem of underground communication. Code however, as regards

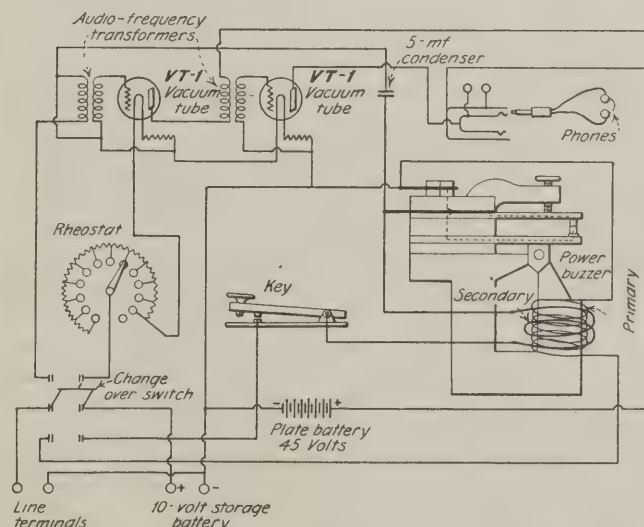


Fig. 1—Transmitting and Receiving Circuits of Tested Signal Outfit

This set consists of the complete equipment necessary for sending or receiving signals. Dots and dashes are propagated through the earth by means of current impulses set up by a power buzzer. Reception is similar to radio detection except that the signals are "picked up" from ground currents set up by the transmitting station.

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transmission of information, has advantages over the geophone.

To be of practical value any type of apparatus for underground communication must be simple in operation. If high frequencies are employed, requiring tuning to produce resonance, some few fixed frequencies should be used. Two or more different frequencies will allow simultaneous communication by either radio or wired radio during general mining operations. For

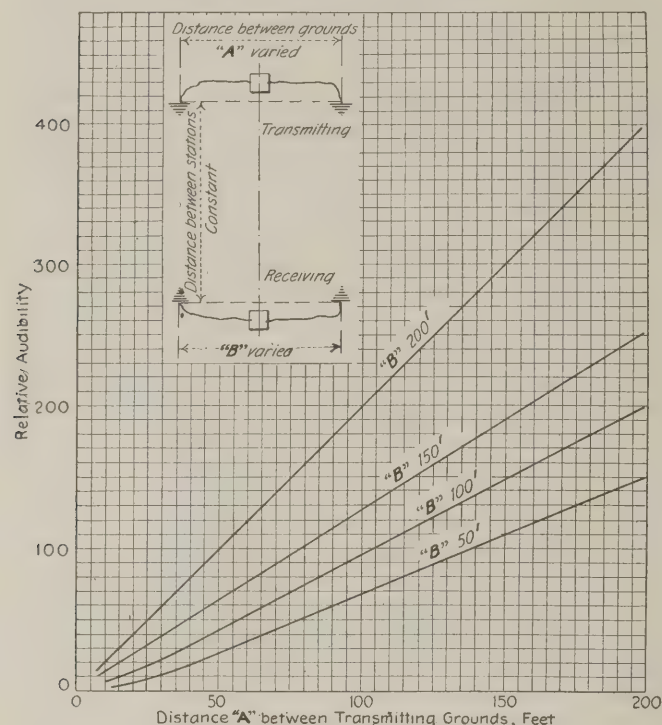


Fig. 2—Signals Become More Audible as Distance Between Ground Connections Is Increased

The ground currents set up through the earth spread out in the shape of a sphere when sent from the mine. Hence the greater the distance, within reasonable limits, between the ground connections of either the sending or receiving circuits the louder the signals become.

mine-rescue work during disasters it now seems probable that only one definite frequency should be used.

Vacuum tubes are the only practical method for the successful modulation and transmission of voice signals, but for the transmission of code signals many different instruments can be used.

The apparatus will have to be such as it will be safe to use in an atmosphere containing an explosive mixture of gases. During mine disasters, and especially when barricades are erected, a gas explosion is to be apprehended should unsafe electrical apparatus be used. All mine-signal apparatus should be of an approved and permissible type.

For satisfactory and practicable use in mining and rescue operations, an underground signal apparatus probably would have to be designed to incorporate the following points.

1. The apparatus must be moisture and waterproof, that is, it should be unaffected by dampness and continuous standing in wet mines. Practically none of the radio or high-frequency apparatus being sold today for general amateur and broadcast use would be suitable for such work.

The condensation of moisture on the surface of dielectric and non-waterproofed insulating materials, unprotected windings, condenser end-plates, etc., causes

large current leakages. In numerous tests radio, as well as other high-frequency signal, apparatus left underground 2 to 10 hr. became very inefficient.

2. The apparatus must be durable, rugged, and fool-proof. The entire equipment should be inclosed in a strong case and all delicate apparatus such as vacuum tubes, controller knobs, etc., should be protected.

3. If the mine apparatus is to be of practical use it must be easy to maintain in good working order. The apparatus itself must not depreciate and the efficiency of the A and B battery power supply must be maintained. If batteries are used as a source of power they should be inspected regularly. If storage cells are to be used, a suitable number of the 8-amp.-hr. miners' cap-lamp batteries would give satisfactory service. In special cases dry cells may be used. Present tests indicate that a properly designed hand-cranked generator, designed to supply a 6-volt filament current and a 250-volt plate current and provided with a suitable filtering system, will prove satisfactory for underground transmission and reception.

4. The receiving apparatus should be simple to operate and probably should be very sensitive, for in practically all types of underground communication, whether by direct ground, induction currents, radio, and to a much less extent line-radio, much of the energy is absorbed.

WEIGHT AND SHAPE ARE MOST IMPORTANT FACTORS

5. The last and probably the most important point to be considered is the weight and shape of the signal apparatus. The equipment should be light or it will not be sufficiently portable for underground use. It is possible that a satisfactory arrangement may be designed so that the transmitting and receiving apparatus can be placed in one cabinet, and the power supply, whether batteries or hand-cranked generator, can be carried in another. A suitable non-reversible plug, safe in atmospheres containing explosive mixtures of methane and air could be used for connecting the power supply to the apparatus when in use. The general shape of case and carrying straps or handles must be such as to allow the apparatus to be readily moved while underground should it be necessary to crawl or keep one hand free.

Methods being Investigated—The present investigation being conducted includes the (1) T.P.S. or ground-conduction methods; (2) induction signaling with both high and low frequencies; (3) line-radio over underground mine power and telephone lines, trolley wires, rails, and through piping for water and compressed air; (4) radio; and (5) electrical geophones and auxiliary equipment. These investigations include studies of the effects of earth falls, mine floods, and similar conditions encountered during disaster, as well as general underground conditions existing in the ordinary operations of metal and coal mines.

UNDERGROUND CONDITIONS MAY DETERMINE TYPE

A practical type of apparatus to be of use to the mining industry should be capable of operating over distances of from 500 to 3,000 ft. or more underground through different strata—coal, orebodies, etc. It is probable that apparatus suitable for one geologic condition may not be so satisfactory for another.

The ground conduction system—Because of its simplicity, and also to facilitate obtaining certain fundamental data regarding underground transmission, the T.P.S. set used and developed by the Signal Corps of the

U. S. Army was first subjected to experimental test. This report is the first of a series dealing with electrical methods of underground communication and signaling, and is confined solely to the results obtained with the T.P.S. set.

The T.P.S. method, or ground telegraphy, is a means of communication which requires no wire connection between the sending and receiving stations. It differs from radio telegraphy in that the transfer of electrical energy from the transmitting to the receiving apparatus is through the ground and more by conduction than by induction, whereas with radio the transmission is through the air. The current generated by the transmitting apparatus is a variable alternating current of comparatively low frequency, such as 0.5 to 1.8 kilocycles per second, instead of the high-frequency oscillations of 100 to 3,000 kilocycles per second, which are commonly employed for radio communication.

Description of apparatus used—The apparatus used in these investigations consisted of the standard U. S. Army Signal Corps T.P.S. set, box type BC 21, weighing 40 lb. The transmitting set consists of a power buzzer or buzzer transformer which generates a high-voltage audio-frequency alternating or variable electromotive force of unsymmetrical form; a storage battery for supplying power to the primary circuit of the power transformer and the filament of the receiving tubes; a telegraphic key for interrupting the power supply in order to transmit code signals; and the necessary ground equipment consisting of ground stakes, field wire, etc.

The power buzzer or transformer, shown in the diagram of connections in Fig. 1, is practically the same as the old French T.P.S. buzzer set. The transformer consists of a laminated rectangular iron core of special shape with two windings—primary and secondary. Connected in series with the primary winding of the transformer is the power supply, a telegraphic sending key and an interrupter vibrator of special design. When the sending key is depressed, the primary circuit is closed, and the current flow in the primary coil magnetizes the core and draws the vibrator downward.

The circuit is then broken at the vibrator contacts, and the magnetic field decays, the vibrator again returning to its first position, the action being analogous to the familiar induction coil used for ignition in many automobiles and gas engines. A pulsating current is thus made to flow in the primary circuit. The secondary high-voltage winding of the transformer is wound directly over the primary. The pulsating direct current flowing in the primary winding induces a high-voltage variable electromotive force in the secondary winding which, when the secondary circuit is closed, causes a variable alternating current of the same frequency to flow in the secondary or ground circuit.

T.P.S. SYSTEM FOR TELEGRAPHIC SIGNALS

By properly opening and closing the key telegraphic signals may be transmitted. The T.P.S. method of signaling is for telegraphy only and cannot be used for voice or speech transmission. The frequency of the pulsating current depends upon the adjustment of the vibrator and may be varied between frequencies of approximately 500 to 1,500 cycles per second by means of a set of small weights fastened, singly or in pairs, to the vibrator armature.

The magnetic circuit of the power transformer is a closed iron core, except for a V-shaped air-gap between

the iron core and the iron armature attached to the vibrator. This is shown schematically in Fig. 1. A 6-microfarad condenser is shunted across the vibrator contacts to reduce sparking and to give a greater time rate of change of primary current at the instant the circuit is broken by the vibrator.

A switch is provided for changing over from transmitting to receiving. On the receiving position the switch disconnects the transmitting power supply and

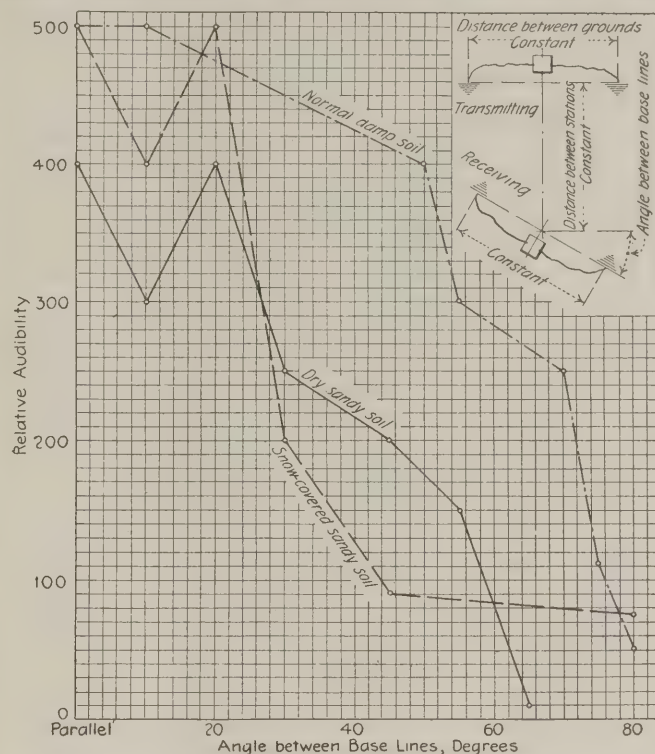


Fig. 3—Signal Strength Decreases When Ground Connections of Outfits Are Not Parallel

Regardless of the conductivity of the soil the relative audibility of the signals decreases as the angle between the base lines of the sending and receiving sets is increased. Normal damp soil permits an easy flow of current into the earth; loose, dry, sandy soil offers high resistance; whereas snow-covered soil short-circuits the two ground connections of the sending outfit and the earth currents fail to penetrate to any practical degree.

the secondary of the transformer from the ground wires, and connects the primary of the first audio-frequency amplifying transformer directly across the ground terminals. On the transmitting position the receiving apparatus is disconnected from the ground terminals and the filament circuit of the tubes opened.

The receiving equipment is practically the same as the ordinary two-step transformer-coupled cascade amplifier used for audio-frequency amplification in radio telephone and telegraphic work. The cascaded method consists of a series of amplifying tubes arranged electrically so that the amplified output of each tube is received by the next tube, where still further amplification takes place. Each tube with its auxiliary coupling apparatus is called a stage or step of amplification.

The secondary of the first transformer is connected between the filament and grid of the first vacuum tube. The plate circuit of this tube is connected in series with the primary of the second transformer, which couples the grid circuit of the second tube. The phones are placed in the plate circuit of the second tube. A 45-volt B battery furnishes the plate voltage for the tubes. The filaments of the two vacuum tubes are connected in series with a rheostat for regulating filament current.

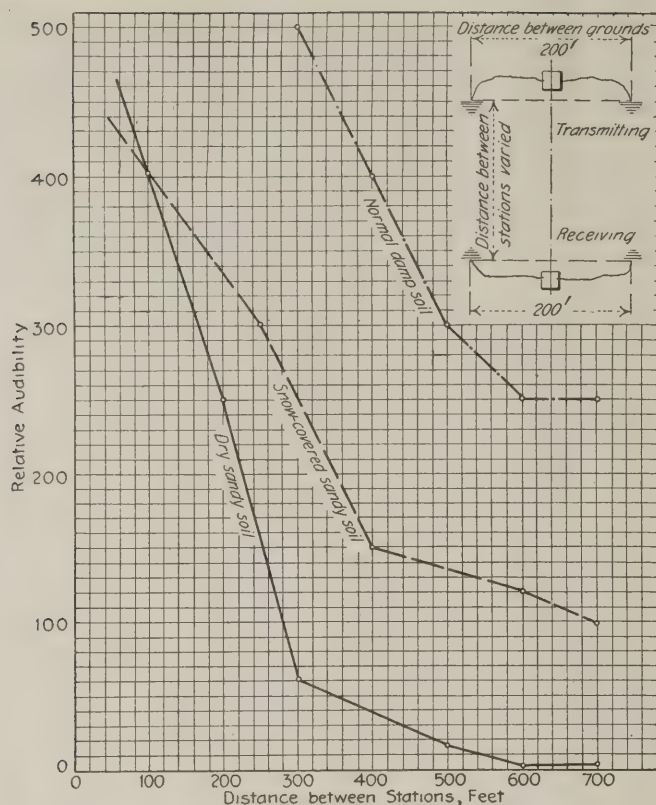


Fig. 4—Regardless of the Kind of Earth, Signals Become Fainter with Increased Distance

At short distances from the transmitting station the audibility was high but rapidly became lower as the distance was increased. It will be noticed from the curves that the rapid decrease in audibility was not uniform; there was a point on each curve where the signals faded out slowly.

The principle of operation of the T.P.S. method of signaling is very simple. The secondary terminals of the power buzzer are each connected to an insulated ground wire connected to the ground. The two ground terminals are placed from 50 to 1,000 ft. apart, the distance depending upon the communicating distance and the local topographic and geologic conditions. The high-voltage secondary current from the transformer flows through the ground wire to its grounded end, through the earth to the grounded end of the other ground wire and back to the transformer.

The current flowing between the two ground terminals does not confine itself to the straight line connecting the two terminals, but spreads out somewhat in the form of a sphere when the terminals are at a sufficient distance underground; and somewhat in the form of a hemisphere when the terminals are placed on the surface of the earth. The distribution of current about the line joining the two ground terminals depends largely upon the relative conductivity of the different strata and earths between the terminals.

The lower the resistance the greater the current flow through that particular strata or conducting strip. Advantage is taken of this fact in order to pick up the currents. For receiving T.P.S. signals, two ground terminals, similar to those used in transmitting, are connected by means of low resistance insulated wires to the input of the receiving apparatus. The current flow through the ground in the vicinity of the receiving station, flows through the circuit composed of the ground leads and the receiving set.

If it is desired to both send and receive at a station, the same ground terminals are used and a change over switch used for connecting either the transmitting or

receiving apparatus to the ground terminals. For ordinary use, where communicating distances from 500 to 1,000 ft. are to be covered, the ground connections should be not less than 100 to 200 ft. apart, and a sensitive two-step audio-frequency amplifier used for receiving.

For reliable underground communication it has been found that this method of signaling is effective only for a distance equal to from two to four times that at which the ground terminals are placed. If, for instance, the terminals at each station are placed 200 ft. apart and the lines joining them are approximately parallel, signals can be reliably transmitted a distance of from 400 to 800 ft. In many cases this range is greatly exceeded, depending on local topographic conditions and on the degree with which leakage and induction currents from power and trolley wires in the mine and on the surface interfere with transmission of the signaling current.

NON-CONDUCTING EARTH PREVENTS PENETRATION

Factors affecting transmission of signals—In the horizontal transmission of signals along the surface of the earth natural surface conditions affect the range considerably. A stratum of non-conducting earth immediately below the transmitting set will prevent the current from passing to any great depth and usually will force it to spread out horizontally to fairly considerable distances. A very dry earth surface, being of high resistance, or a high-resistant connection at the ground terminals will permit only a weak current to flow between the terminals, and usually reduces considerably the distance over which communication is possible.

On the other hand, a very wet surface usually provides too good a conductor, and permits practically all the current to flow directly between the ground connections without spreading out. If a transmitting set is placed close to a river or other place where the subsoil is very wet, the range of the apparatus will usually be less. Conductors buried in the earth or in contact with and lying on the surface, such as metallic piping for water, compressed air, drainage, and sewage, railroad tracks, etc., also greatly reduce the transmitting range of the set, and care must be taken that the ground terminals are placed as far as possible from such metallic conductors, which short-circuit the ground return currents and prevent their spreading or penetration. Under suitable geologic conditions the lines by which current flows between the grounds may spread out as far as two or possibly even three miles from the sending station.

As a preliminary study in the use of T.P.S. sets, the characteristics of the sets for horizontal transmission along the surface of the ground were first determined, and the curves indicate some of these characteristics. Tests were made in different localities, and although the general curves cannot be locally applied quantitatively, they are of value in indicating the general characteristics of the set.

SNOW AND RAINS REDUCE RANGE OF SIGNALS

For any given installation, the signal range varies with local rains, surface and drainage, etc. As a rule, small showers, after a short interval to allow surface drainage, do not appreciably affect the range; but during heavy rains or when the snow is melting there is usually a marked decrease in the range of transmission. The latter factor has, however, not always been

found to hold true when the two ground connections are placed on the opposite sides of a water shed, such as when the T.P.S. set is placed on the ridge of a hill and the two ground leads extended outward a sufficient distance on opposite slopes of the ridge.

The curves in Fig. 2 were obtained by varying the distance between both the transmitting and the receiving ground terminals and keeping parallel the two base lines of the transmitting and receiving sets with the distance between stations constant. For these tests two-step audio-frequency amplifiers were used, with an audibility meter shunted across the phones. The curves indicate that the transmission and receiving ranges of the set vary almost directly with the distance between their respective ground terminals. The greater the distance between terminals the greater the range.

When the sets are used underground, an effort should be made to make the distance between terminals as great as possible. Should it be necessary to place the grounds in an entry or drift containing car tracks, compressed-air piping, or other conductors, maximum range will usually be obtained only if special care be taken to keep the ground terminals as far as possible from such conductors.

In Fig. 3 is given the relationship between the audibility of the received signals and the angles between the base lines of the two sets. It will be noted that for the most audible signals the two base lines should be parallel. As the angle between base lines approaches a right angle, the signal strength or audibility decreases abruptly, although the audibility varies considerably with surface conditions. Even at right angles, however, the signal strength did not drop to zero.

In Fig. 4 is shown the relationship of the distance between stations and the audibility of the receiving signals. The stations were placed with their base lines parallel, and both receiving and transmitting ground terminals were kept 200 ft. apart. It will be noted that the audibility drops off rapidly with the first few hundred feet, but after that it decreases slowly with the increased distance between stations. At distances around 1,000 ft. good readable signals were obtained.

Transmission along mine tracks—Compressed-air piping, car rails, or other conductors may be used as a carrier for T.P.S. signals. Little difficulty was experienced in transmitting signals over such conductors in any part of the Bureau's experimental mine. The decrease in relative audibility of signals with the distance between stations is similar to that for transmission on the surface, shown in Fig. 4. In this series of tests the tracks were, in a number of places, covered with mud and water, and were laid directly upon the mine floor. In two places 8-in. wooden rails had been inserted as a protection against lightning, but the T.P.S. current penetrated the wooden rails—which were wet—without any great decrease in audibility.

In order to determine the effects of mine cars upon the track, a mule was hitched to two pit-cars and a truck. The transmitting set was at the rear of the mine, about 1,200 ft. from the entry where the receiving set was placed. The curve in Fig. 5 indicates the relative audibility of the received signals as the mine cars were moved from the entry toward the interior of the mine. It is interesting to note that the audibility is low when the mine cars are near either the transmitting or receiving sets, but as the distance between the transmitting or receiving set and the cars is increased, the audibility rises considerably. The effects

of short-circuits upon tracks are particularly noticeable in rail radio.

Similar tests were made at the Pittsburgh Terminal Coal Co. Mine No. 3 and the mine of the Inland Collieries, Inc. In the first mine an unused portion of track with 20-lb. rails which was covered with heavy roof falls, mud and water nearly its entire length was used during one test. The rail joints were broken in many places and heavy rust covered all metal joints; fishplates, switches, etc. This series of tests indicated clearly the carrying power of T.P.S. signals over poor conductors running through water, coal and mud covering.

Additional tests at the Inland Collieries, Inc., mine are of particular interest, and illustrate a rather peculiar phenomenon. These tests were conducted on one of the main haulageways. Thirty-pound rails are used, all joints securely copper bonded and the rails cross-bonded every 150 ft. with heavy copper leads. The transmitting set was connected to the rails at the point where one of the cross-bonds connected or short-circuited the two rails.

The receiving set was mounted upon a storage-battery locomotive and two short leads with spring clips used for making contact with the rails. Signals could be read at distances from the transmitting set 1,900 ft.

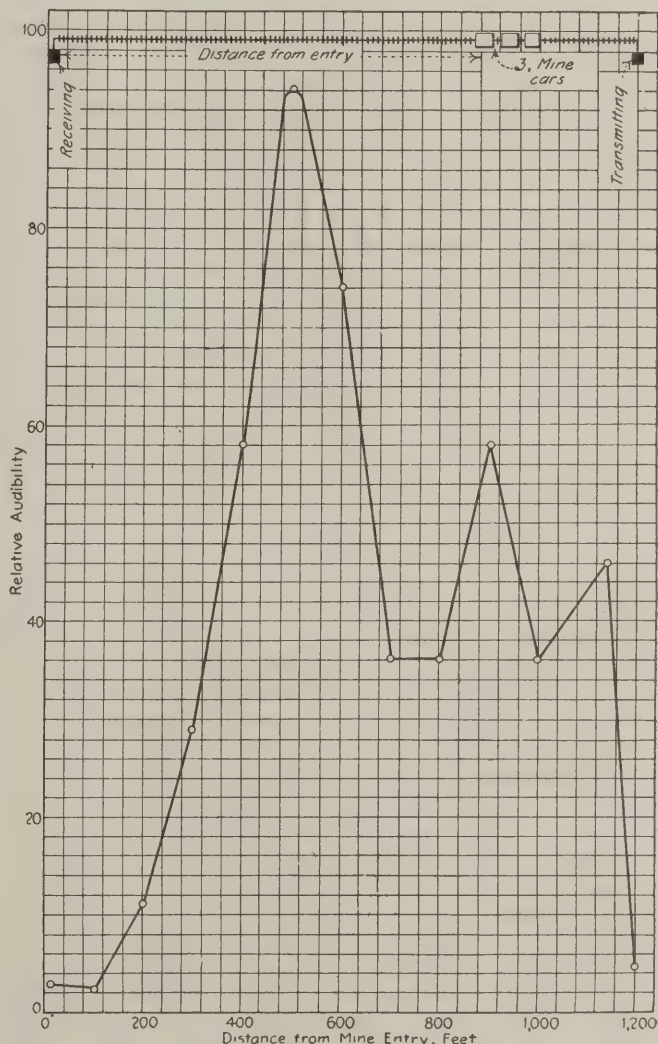


Fig. 5—How Signal Device Operated When Transmission Was Through Rails

The trip of cars seemed to act as a shield or absorbent whenever it was near either the sending or receiving station. It will be noticed that the signals were strongest when the trip of cars was about equidistant from the transmitter and receiver.

away. The low-frequency and commutator hum from leakage and induction currents from power and trolley wires drowned out the signals at distances greater than 1,900 ft. No explanation is being advanced at this time as to how or why the signals traveled along the short-circuited and cross-bonded rails. The curves of Fig. 6 show graphically the relation between signal audibility and rail transmission distance.

VERTICAL COMMUNICATION PROVED SUCCESSFUL

Vertical Transmission—In the tests conducted at the Bureau's Experimental Mine, the T.P.S. set was placed in the mine 600 ft. from the entry. Ground leads extending 100 ft. from the set were used, one lead going to ground 500 ft. from the entry and the other lead placed 700 ft. from the entry. Because of the narrowness of the entry the ground plates were laid upon the mine floor within 3 ft. of the car rails. The grounds consisted of 22-gage galvanized iron plates 6x36 in. connected to each ground lead. The connection was made to the plates by means of two battery clips.

The plates were placed on the moist mine floor, and, after sliding and pressing to give good contact, lumps of coal were placed on the plates. For mine use, iron stakes or pins, as used during the surface investigations, would in some instances be impractical. It is usually difficult to drive a peg into coal or shale strata, and such grounds are often poor electrically because of the small surface contact in friable material such as coal. A coal wedge can, however, be driven into coal.

The receiving set was placed on the surface as nearly over the T.P.S. set as could be estimated. The first reading was taken with the receiving set above the mine set. The receiving set was then moved 100 ft.

west and readings taken. Repeated readings taken every 100 ft. showed the gradual decrease in audibility of the signals. Little difficulty was encountered in transmitting signals obliquely through a distance of about 800 ft. of rock.

Similar vertical transmission tests were carried out at the Pittsburgh Terminal Coal Co.'s mine No. 3. This mine is opened by a shaft about 250 ft. deep. Signals were transmitted without much difficulty from the mine to the surface. A heavy rain fell during the first part of these tests and the receiving apparatus was not removed from the automobile. Two 100-ft. ground leads were run in opposite directions to the side of the road, and code messages easily were received from the mine. The heavy rain, and water covering the road, did not prevent the set from working.

SURFACE AND UNDERGROUND TERMINALS PARALLEL

During the second day of the tests, the ground was covered with about 3 in. of snow, and as before, code messages readily could be received. These tests were made with the surface ground terminals approximately parallel to those underground. Later tests, where the terminals were placed approximately at right angles, showed a marked decrease in signal strength-interference ratio indicating as had been found in the tests at the Experimental Mine, that the two ground terminals should be approximately parallel for maximum signal strength and a minimum of interference from low-frequency leakage currents. If the general direction of the underground terminals is not known when setting up the surface station, two ground lines at right angles to each other are run; thereby giving a maximum angle of 45 deg. between sending and receiving terminals. The signal strength is not greatly reduced by a 45-deg. angle.

Underground Tests in Illinois Mines—Additional T.P.S. data are being obtained from tests now in progress in Illinois coal mines by A. B. McCall, assisted by members of the Springfield Radio Club. The data obtained will deal largely with the results in the deep coal mines near Springfield, Ill.

The tests conducted on the T.P.S. method of signaling indicate the following: (1) The apparatus is extremely simple, reliable and foolproof. (2) The method should not be considered as a general solution of the problem of underground communication because with it only the telegraphic code can be used. (3) Reliable communication can be established through the earth a distance of only two to four times the distance between ground terminals. To transmit the energy 800 ft. through the earth requires, as a rule, ground terminals on both transmitting and receiving sets separated from 200 to 400 ft. (4) The signalling tests made with the T.P.S. set using untuned audio-frequency ground-conduction currents indicate that stray and leakage currents flowing through the ground may greatly interfere with the transmission of signals. Weak signals may be entirely lost as a result of the interference. On the surface such interference may sometimes be minimized by placing the ground leads at right angles to power lines, etc., but underground the ground terminals cannot be thus placed. (5) Present data indicate that the most feasible way of eliminating low-frequency interference is to employ loosely-coupled tuned high-frequency circuits, these being more successful than low-frequency filter circuits.

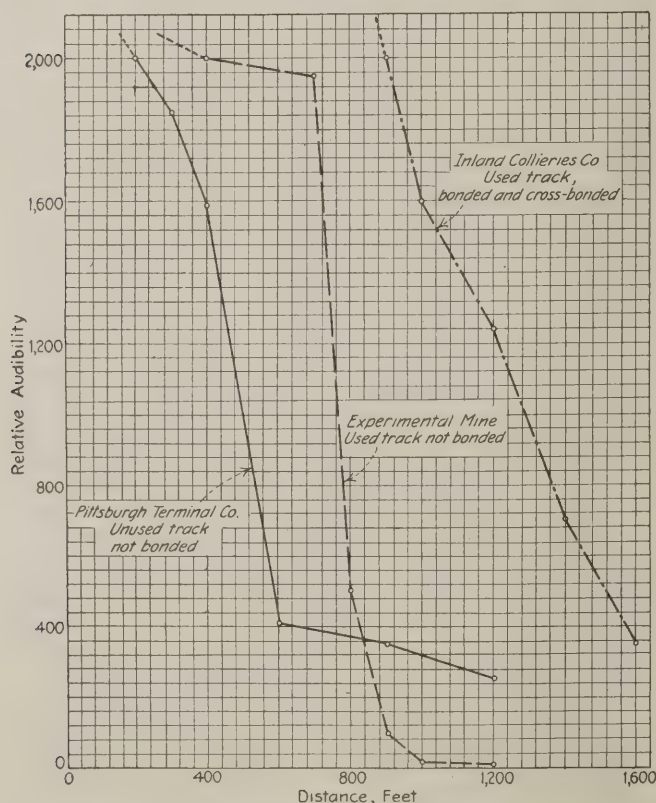


Fig. 6—Records Show Advantage of Using Bonded Mine Rails

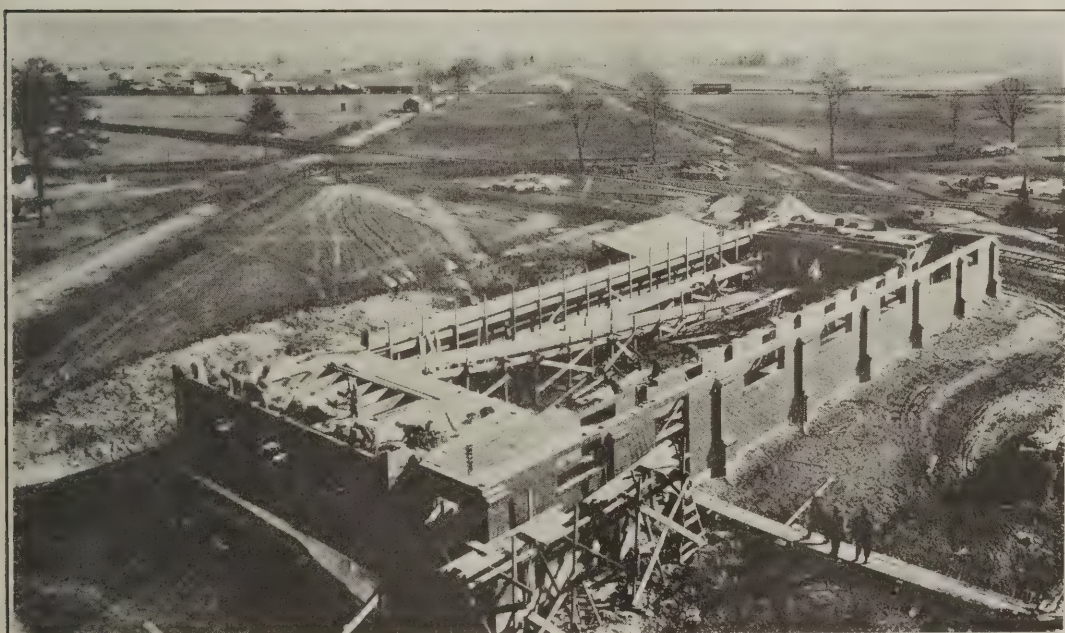
Conduction through materials of low resistance was much greater than through high resistant material. Intervening bodies of water, pipe lines, etc., take the earth currents in other directions than those upon which the operation of the equipment depends.

Illinois Coal Corporation Is Building Huge Mine Despite Adverse Economic Conditions

ONE of the baby giants among the huge coal producers of the country is the Nason mine of the Illinois Coal Corporation. This operation is now in the development stage at the new town of Nason, Jefferson County, Illinois. It is eventually expected to attain a capacity of at least 10,000 tons a day and will be equipped to hoist coal from either or both of its two shafts. The bottom, which is now in process of construction, will be so designed that hoisting can be shifted quickly from the main shaft to the airshaft in case of necessity. The mine is surrounded by the lines of the Burlington, the Chicago & Eastern Illinois and the Wabash, Chester and Western Railways, but it nevertheless lies several miles away from a railroad.

Consequently the coal corporation has built an 11-mile line of its own. This is known as the Jefferson Southwestern and extends from Mt. Vernon southwest to the town near the mine site. The owners have not yet secured permission for full operation of the line. A passenger car, driven by gasoline, however, is in service between Mt. Vernon and Nason. It forms at present the only railroad service for this latter community which already has a population of about 800. The town may be incorporated as a city as soon as it has 1,000 residents.

The Illinois Coal Corporation holds coal rights to about 30,000 acres of land in the region of Nason. This is underlaid with the No. 6 bed of Illinois coal

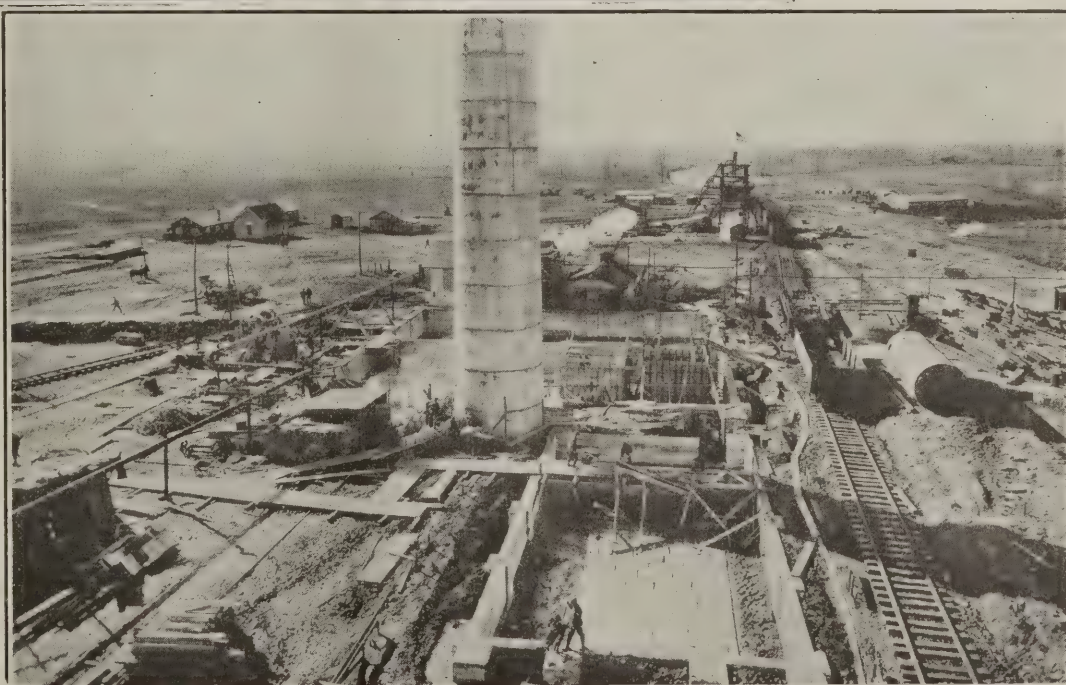


Building the Wash House

Wash houses are legal requirements at Illinois mines. As may be seen this one will be large, modern and commodious. The town of Nason, which can hardly be termed a mushroom community, may be seen spreading over the townsite in the left background of this picture.

Foundation Building

The concrete stack, 10 ft. in inside diameter and 200 ft. high has been completed, and the boiler- and engine-house foundations as well as those for the equipment they are to house are shown in the final stages of completion. Power for operation of the mine as well as for town lighting will be generated at this station. The temporary headframe above the air shaft may be seen in the rear ground. About 300 tons of coal already are being hoisted from this shaft daily.





Gasoline Passenger Car

Full rights to operate the Jefferson Southwestern Railway have not yet been obtained. This car, driven by a gasoline engine, at present forms the only means of railway communication so far as passengers are concerned between the town of Nason and the outside world.

which at this point is about 8 ft. 6 in. thick and 720 ft. below the surface. The new mine is only a few miles north of the well-known Franklin County field, famous the world over for its group of huge operations including the Orient and Zeigler properties—the largest in the world. The plan is to make this operation as independent as possible. The mine and town will be served with power and lighting current from a power plant to contain three generating units, one of 500 kw. and two of 1,000 kw. capacity each. The three turbine

Flame Caps Have Been Used for Testing Gas for Over a Hundred Years

UP TO DATE the earliest account of a method for detecting the presence of firedamp in coal mines appears in a letter dated Oct. 18, 1813, from John Buddle to the "Society in Sunderland for Preventing Accidents in Coal Mines," wherein the utilization of the "cap" or aureole which forms around a flame burning in an atmosphere containing inflammable gas is described. The following is an extract from this letter:

"The common pit candles vary in size, but those generally used are forty-five to the pound; the wick is of cotton, and the candle made of ox or sheep tallow; but clean ox tallow is the best.

"The mode of trying the candle, as it is called, to ascertain the mixture of inflammable gas, is as follows:

"In the first place, the candle, called by the colliers the "low," is trimmed, that is, the liquid fat is wiped off, the wick snuffed short, and carefully cleaned of red embers, so that the flame may burn as purely as possible.

"The candle being thus prepared, is holden between the fingers and thumb of the one hand, and the palm of the other hand is placed between the eye of the observer and the flame, so that nothing but the spire of the flame can be seen, as it gradually towers above the upper margin of the hand. The observation is generally commenced near the floor of the mine, and the light and hand are gently raised upwards, till the true state of the circulating current be ascertained.

"The first indication of the presence of inflammable air is a slight tinge of blue or bluish grey color shooting up from the top of the spire of the candle, and terminating in a fine extended point. This spire increases in size, and receives a deeper tinge of blue as it rises through an increased proportion of inflammable gas, till it reaches the firing point; but the experienced collier knows accurately enough all the gradations of 'shew' (as it is called) upon the candle, and is very rarely fired upon, excepting in cases of sudden discharges of inflammable gas."

The earliest reference to this method of testing

sets will be driven by steam from four 481-hp. water-tube boilers installed in a brick and steel power house.


The job of sinking the two Nason shafts, which lie 525 ft. apart, was a record breaker in point of speed. Actual construction was started April 23, 1923, and the shafts were completed in November and December of the same year. The "A" shaft, which is the main opening, is 12 ft. 5 in. x 21 ft. 5 in. in cross section and was sunk at an average speed of 8 ft. per day. The "B" shaft, 12 ft. 5 in. x 31 ft. 5 in. was sunk at an average of 5 ft. per day. At each shaft three crews kept the work moving every hour of the day. Six weeks was lost when the sinkers encountered between 12 and 15 ft. of quicksand 70 ft. below the surface. This had to be closed off with sheet piling. The shafts are timbered and gunnited to render them fireproof. Each is divided into three compartments. The "A" shaft has two hoisting compartments each 8 x 12 ft. 5 in. and one stairway compartment 4 ft. x 12 ft. 5 in. The larger shaft has an air compartment 14 ft. x 12 ft. 5 in. Development of the mine is proceeding rapidly from the bottom of these shafts, about 300 tons of coal being hoisted daily from the air shaft alone.

appears to be that contained in "The Life of the Right Hon. Francis North," by Roger North, published in 1742, where an account is given of a visit paid in 1676 to coal mines in the Newcastle district. In a description of "damps or foul air," the author states that "an infallible test is by a dog; and the candles show it. . . . The flame of a candle will not kindle them so soon as the snuff."

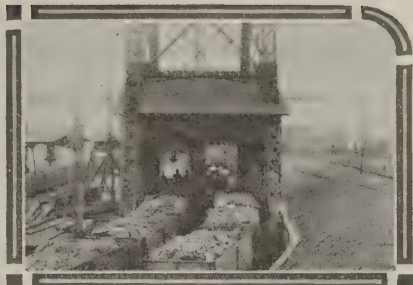
Gases Caused by Detonation of Powder

A study of the products of the detonation of explosives has been undertaken at the Pittsburgh Experiment Station of the Bureau of Mines. Sampling equipment has been installed for obtaining nine simultaneous samples of the product arising from the combustion of explosives when shot under actual coal-mining conditions. The sampling device is to be used: (1) to determine whether the powder fumes concentrate at the top, bottom, or sides of the working place when liberated by different kinds of shots; (2) to take crevice samples of the concentrated fumes whenever possible, fine capillary tubes being inserted for this purpose into the crevices of the coal from which samples will be taken into evacuated gas-sample tubes, so that the carbon dioxide and carbon monoxide ratios in these samples may be compared with the ratios obtained in testing by the Bichel gage; (3) to take samples of the fumes at a point 4 ft. from the face and in the middle of the place, one, three and five minutes after shooting to determine what concentration of carbon monoxide is in the atmosphere at that point. These data should determine how soon a workman should be allowed to return to the face after he has fired a shot.

Samples of gases from the Bichel gage and of the atmosphere in the mine after a shot has been fired have been taken and analyzed to determine the percentages of oxides of nitrogen. So far these analyses have showed that the quantity of these deleterious gases in the resulting atmosphere do not exceed 0.002 per cent. These tests will be continued until the gases from many different explosives have been examined.



News Of the Industry



Senator Oddie Prepares to Introduce His Coal Measure

Embodies Portion of Proposal for Department of Mines—All Branches of Coal Industry Consulted in Formulation—Statistical Data Sought on Voluntary Basis, Reports to Be Confidential

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

AFTER having given careful consideration to the oral argument made before him by Messrs. Brydon, Cunningham and Gandy, officials of the National Coal Association, Senator Oddie, chairman of the Senate Committee on Mines and Mining, has decided that it is not in the public interest to withhold his coal bill, as they request.

While it was Senator Oddie's idea early in this session of Congress to introduce his coal bill promptly, developments were such that the need for haste passed. On learning that the Pinchot bill was not to be pressed and on the signing of the Jacksonville agreement, he felt that all the time necessary to the perfection of the measure might well be taken. Certain sections of the bill, which is a portion of his Department of Mines proposal, still are under consideration. In fact, the entire measure is subject to revision. All branches of the industry have been consulted during the formulation of the legislation.

Follows Garfield Proposal

Senator Oddie has attempted to carry into effect one of the recommendations made by Dr. Harry A. Garfield at the close of his service as Fuel Administrator. That section of the bill in its present form reads as follows:

"That the Secretary of Mines is hereby authorized and directed to provide for the organization of two advisory committees, each composed of three representatives of the producers of coal, three representatives of the consumers of coal, three representatives of the coal miners and three representatives of the transportation agencies. Said representatives of transportation agencies shall be invited to sit on said advisory committees only when the subject of the transportation of coal is under discussion, and shall not participate therein when the subject of labor relations in the coal industry is under consideration.

"The said representatives shall be selected by said Secretary from names of persons furnished by the several interests represented, and shall be appointed by the President, upon the recommendation of said Secretary. The

first of said committees shall be known as the Bituminous Coal Advisory Committee and shall advise said Secretary with respect to all matters related to and affecting the bituminous-coal mining industry and the second of said committees shall be known as the Anthracite Coal Advisory Committee, and shall advise said Secretary with respect to all matters related and affecting the anthracite-coal mining industry. Meetings of said committees shall be held, in the District of Columbia and elsewhere in the United States, as frequently as may be necessary for a thorough consideration and discussion of all matters and problems affecting all branches of the coal industry and its relations to the consuming public.

"Said Secretary shall be chairman ex-officio of said committees. He may, in his discretion, invite or request the attendance of persons not members of the advisory committees herein provided for and he may organize advisory committees of the wholesale and retail coal trade and invite or request their attendance at meetings.

"All plans for the collection of information shall be submitted to the advisory committees for their criticisms and recommendations, both as to the nature and scope of the information to be collected and as to the method of collection, analysis and presentation, but in case of disagreement the decision of the Secretary of Mines upon these points shall be final."

Seeks Voluntary Statistics

It is Senator Oddie's idea that statistical information as to coal is to be submitted on a voluntary basis, with provision, however, for the government to check any returns which may be regarded as of questionable accuracy. "Such reports," reads the draft of the bill, "shall be held confidential to the extent that no part thereof shall be divulged or published in such manner as to specifically identify such report or information with the name of the owner, operator, dealer or person providing the same; to that end for the purpose of obtaining accurate and complete information from all owners,

"Sheriff Alex Howat"! How Does That Sound?

The hundreds of coal miners loyal to Alex Howat in Kansas are trying their best to make it possible for Alex to collect a living wage from somewhere. Balked by International President Lewis in their recent attempt at the Kansas convention to get considerable back union pay for Alex for the period between the time Lewis fired him for calling an unauthorized strike and the time his normal term of district president ran out, they are now booming him for Sheriff of Crawford County, Kansas. They are not particular about the ticket he runs on. Alex's previous relation with the sheriffship of Crawford County was that of prisoner behind the bars.

operators, dealers or persons reporting and to insure the inviolability of such business facts as, if known to a competitor or others, would injure, or tend to injure, the business of the owner, operator, dealer or person so reporting, an officer shall be designated to receive and act as custodian of said reports.

Report to Be Confidential

"Said custodian shall be responsible for providing and carrying out an effective plan to prevent the accidental or unauthorized identification with its source of the information furnished in said report. For this purpose and in connection therewith the following, or some equally effective procedure shall be observed: Said custodian shall provide a report blank, so perforated as to permit its division into two parts. The upper portion shall be designed to permit the entering of the name and address of any owner, operator, dealer or person. The lower portion shall contain suitable space for the entering of the material of the report.

"Said custodian shall also provide envelopes, or other suitable mailing device, bearing the frank of the Department of Mines, the use of which is hereby authorized by owners, operators, dealers and persons in sending their reports to said custodian. The word 'confidential' in boldface type shall be printed on said envelope or suitable mailing device. All such envelopes containing the reports above mentioned shall be opened only by said custodian or by a responsible person or persons designated by him to perform such duty."

Machine Mining Gaining In West Virginia

During the fiscal year ended June 30, 1923, there were 3,954 mining machines in use at 1,208 mines in West Virginia employing 49,425 men and producing 65,304,874 gross tons of coal, which is 75.04 per cent of the total production of the state and 10,845,347 gross tons more than was mined by machine during the fiscal year ended June 30, 1922. Since 1897 the volume of machine coal has grown from 5.12 per cent of the total to 74.86 per cent of the total and the number of machines in use from 55 to 3,954.

Railroads Refuse to Join Coal Export Committee

F. R. Wadleigh, formerly Federal Fuel Distributor and head of the Commerce Department's coal division, is trying to organize a committee of coal exporters and representatives of the railroads. The coal exporters approved the plan. The carriers, however, have declined definitely to co-operate in the formation of the committee. Mr. Wadleigh has received the following letter from Robert M. Collyer, chairman of the Trunk Line Association Traffic Executive Committee:

"Subsequent to my letter of March 8, the necessity developed on short notice for a meeting of traffic executives of Eastern roads without opportunity for arranging a conference with you. The question of appointing a committee to meet with you to discuss the suggested formation of an Export Coal Committee was considered, however, and it was thought that no helpful result would come from the representation of railroad traffic officers on such a committee.

"The railroad officers specializing in coal traffic make a constant study of this great movement in all its phases—local, coastwise, and export—and as applied to railroad transportation it is believed that its problems are thoroughly understood.

"You will appreciate that if the railroads in their public-service capacity should associate themselves in an export association for one commodity they could scarcely withhold joining with all comers—an added liability that they would not wish to have attached to their already great burden in co-operating with the shippers in rate matters.

"We believe that our coal shippers understand that the Eastern railroads will be glad to receive any questions that the coal exporters may desire to have considered."

8,000 Alberta Miners Strike

Eight thousand miners in the coal fields of Alberta and eastern British Columbia (District No. 18) went on strike April 1.

The men demanded a three-year agreement in line with one adopted at Jacksonville and recently ratified by the union. Refusing this, the operators offered renewal for one year of the present contract, but without the war bonus of \$1.17 a day.



Henry Walker

The genial deputy chief of the Mines Department of Great Britain who, with Dr. R. V. Wheeler, director of the Experimental Mine of the Mines Department, has been visiting the U. S. Bureau of Mines and the mines of this country and incidentally addressing crowds of interested coal men.

How Strike of 1922 Affected Working Forces

How the strike of bituminous-coal miners in 1922 curtailed the productive capacity of various districts is shown in a table just issued by the U. S. Geological Survey. The figures represent the per cent of miners absent from work, based on the weekly reports of production and running time furnished by about 3,000 mines, supplemented by

Hoover Appointed Head of Transportation Committee

A meeting of President Coolidge's committee to study ways and means of co-ordinating rail and water transportation was held at the White House April 3, when plans were mapped out for a comprehensive study of the problem. The President named Secretary of Commerce Hoover as chairman of the committee, which includes the chairman of the Shipping Board, the president of the Fleet Corporation, the chairman of the Interstate Commerce Commission; Daniel Willard, president of the Baltimore & Ohio R.R., and A. G. Smith, president of the American Steamship Owners' Association.

The committee will seek some method of improving the system of handling freight destined for export between terminals, and other steps by which greater co-operation between rail and water lines may result. Chairman Hoover expects to consult with Senator Jones, chairman of the Senate Committee on Commerce, who suggested the study as a step in the direction of assisting the American Merchant Marine.

the annual reports of numbers of men on strike and total numbers employed. The percentage of district capacity closed during the strike varied from zero in the Logan, Hazard, Harlan and Alabama districts, less than one-half of 1 per cent in Kenova-Thacker and Pocahontas and Tug River to 92 per cent in central Pennsylvania, 95 per cent in the Pittsburgh district and 100 per cent in Illinois, Indiana and southern Ohio.

Loss of District Capacity Caused by 1922 Strike

District	Maximum Per Cent of District Capacity Closed During 1922 Strike	District Production in 1918	Tonnage Loss (Product of Columns 1 & 2)
Central Pennsylvania.....	92	61,629,000	56,699,000
Northwestern Pennsylvania.....	81 (a)	8,051,000	5,394,000
Pittsburgh, Pennsylvania.....	95 (c)	48,299,000	45,884,000
West Virginia Panhandle.....	44	3,255,000	1,432,000
Westmoreland, Latrobe, Greensburg & Ligonier.....	65 (a)	17,701,000	11,506,000
Connellsville.....	81 (a)	35,677,000	28,898,000
Somerset.....	88 (a)	7,194,000	6,331,000
Cumberland-Piedmont.....	85	7,073,000	6,012,000
Fairmont, West Virginia (d).....	87	20,104,000	17,490,000
Northern Ohio.....	95	30,287,000	28,773,000
Michigan.....	100	1,465,000	1,465,000
Southern Ohio.....	100 (c)	15,768,000	15,768,000
Northeastern Kentucky.....	8	7,109,000	568,000
Hazard, Kentucky.....	0	2,364,000	0
Kanawha (e).....	90	13,324,000	11,992,000
Kenova-Thacker.....	(b)	7,024,000	35,000
Logan.....	0	10,307,000	0
New River.....	58 (a)	9,929,000	5,389,000
Winding Gulf.....	15 (a)	5,156,000	773,000
Pocahontas and Tug River.....	(b)	23,128,000	116,000
Southwestern Virginia.....	0	9,041,000	0
Southern Appalachian (f).....	57	11,712,000	6,676,000
Harlan County.....	21	3,202,000	672,000
Alabama and Georgia.....	0	19,252,000	0
Western Kentucky.....	7	10,833,000	758,000
Indiana.....	100 (c)	30,679,000	30,679,000
Illinois.....	100 (c)	89,291,000	89,291,000
Iowa.....	100	8,192,000	8,192,000
Missouri.....	93	5,668,000	5,271,000
Kansas.....	94	7,562,000	7,108,000
Arkansas.....	96	2,227,000	2,138,000
Oklahoma.....	79	4,813,000	3,802,000
Texas.....	25	2,261,000	565,000
North Dakota.....	37	720,000	266,000
Montana.....	98	4,533,000	4,442,000
Colorado.....	53	12,408,000	6,576,000
Utah.....	45	5,137,000	2,312,000
New Mexico.....	15	4,023,000	603,000
Washington.....	50	4,082,000	2,041,000
Wyoming.....	100	9,438,000	9,438,000
Average.....	73.3 (g)	579,281,000	425,355,000

(a) Partly estimated. (b) Less than half of one per cent. (c) Certain stripping pits and mines serving purely local trade continued to operate. (d) Includes all of northern West Virginia except the Panhandle and Cumberland-Piedmont districts. (e) Includes all high-volatile coal produced in southern West Virginia except that in the New River, Logan, and Kenova-Thacker districts. (f) Includes Tennessee and all of southeastern Kentucky except Harlan County. (g) Because the moment of maximum effectiveness did not come in all districts at the same time the shutdown over the country as a whole was never quite as great as is here indicated.



Music Hall at Cincinnati, Ohio, Where Coal-Mining Exposition and Convention Will Meet May 12-17, 1924

Here operators, executives and engineers will discuss the vital subjects relating to mine operation and have an opportunity of acquainting themselves with the most up-to-date equipment for expediting the extraction of coal and lowering the costs of pro-

duction. Opportunities of this character are not frequently presented and once a year is none too often to take a glimpse of the new facilities for lightening the labor cost of production, which is this year of more vital importance than ever.

Pineville Mine Resumes Under the Protection of Machine Guns and Infantry

Special Dispatch to Coal Age

Louisville, Ky., April 7.—The Liberty Coal & Coke Co., on Straight Creek, Pineville, Ky., resumed operations this morning, with thirty-five men, with the camp protected by two companies of national guardsmen, one a machine gun company of sixty men, and the other an infantry company of the same number, the troops having arrived on Sunday.

Governor Fields and state military officials had quietly sent the troops on advice of the sheriff at Pineville. It was reported that shots were exchanged this morning under cover of darkness at about 2 o'clock, prowlers having been discovered near the power plant. It is reported that the valley is now protected by machine-gun nests on the hillsides and patrols of infantry. The miners are working today, all men being armed.

Company officials reported that they were willing to confer with Governor Fields relative to the situation, but would not arbitrate with former union employees, who had left the company employment.

They Shoot Non-Union Men Down in Kentucky

Two non-union miners were shot and one of them killed by mountainside riflemen near Pineville, Ky., April 3. They were employees of the Liberty Coal &

Jobs For Jobless Miners

The United Mine Workers Journal, official union publication, recognizing that many union miners must leave the industry, announces that Secretary of Labor Davis will "place the entire resources of the Department of Labor at the command of mine workers who wish to obtain employment in other industries." The director of the Federal Employment Bureau of the department receives applications and tries to find the jobs. The *Journal* quotes Secretary Davis as saying: "There is no need of men now employed in mines working short time, because there is plenty of opportunity for steady work in other industries."

Coke Co. on Straight Creek. This company recently reopened its property on the 1917 wage scale and evicted from company houses all miners who did not go back to work. Last November the company asked its miners to decide between working at the 1917 scale and shutdown of the mines. The question went to an arbitration board, which never has reported. After a period of shutdown the company decided to operate on the 1917 basis of wages and invited its union men to remain on that basis if they wanted to. Some did. Non-union men were brought in from Virginia and elsewhere and finally some evictions of union men who refused to work were made. Then the shooting began.

Yukon Blast Unofficially Laid To Open Lamp in Gas Pocket

The explosion at No. 2 mine of the Yukon-Pocahontas Coal Co., on March 28, which took a toll of 24 lives, was caused by the flame from a miner's lamp when a gas pocket was encountered, according to an unofficial opinion following a preliminary inspection by R. M. Lambie, chief of the State Department of Mines. More complete investigation seems to indicate that when the second trip was wrecked those who remained behind to help replace the motor on the track escaped and that those who went forward met death when they encountered the gas pocket.

West Kentucky Still Wobbles On Wage Problem

No settlement is yet in sight between the union and the operators in western Kentucky—or that part of western Kentucky whose contract was extended from April 1 to April 15 to permit a possible new agreement. Meantime the impression is spreading fast that no contract will be signed and that the whole territory will be non-union by summer.

In Henderson County, in the northern edge of the western Kentucky field, where a sort of agreement with the union ran out April 1, no new agreement has been made and the region with its ten mines is now on a non-union basis.

Fewer Coal-Mine Fatalities
In February

The fatal-accident rate for coal mines during February, 1924, showed a gratifying reduction as compared with the preceding month and with February, 1923, according to reports received from state mine inspectors by the Bureau of Mines. For each million tons of coal produced the death rate was 2.69 as compared with 3.94 in the previous month and 6.07 for February last year. For bituminous mines alone, the rate for February, 1924, was 2.32, as compared with 6 for February, 1923; for anthracite mines the rate was 5.05 as against 6.43.

The actual number of fatalities reported during February was 138, of which 118 occurred at bituminous mines and 40 at anthracite mines. In February last year the number of fatalities was 303, of which 253 were at bituminous mines and 50 at anthracite mines. The 303 fatal accidents in February, 1923, include the loss of 120 lives in an explosion at Dawson, N. M.; during February, 1924, no single disaster killed as many as five men.

The record for the first two months of 1924 shows a production of 112,071,000 tons of coal, 461 lives lost, and a fatality rate of 4.11 per million tons, the bituminous rate being 3.84 and the anthracite rate 5.79. For the corresponding months of 1923 the output of coal was 108,824,000 tons, the number of deaths was 509 and the fatality rate was 4.68, the bituminous rate being 4.49 and the anthracite 5.70. Thus the fatality rate for January and February of the present year is about 12 per



Van H. Manning

Formerly director of the U. S. Bureau of Mines, Mr. Manning has been for several years director of the division of research of the American Petroleum Institute, from which he resigned recently. Since March 10 he has been with the Pan-American Petroleum & Transport Co., with headquarters in New York City.

cent below that for the same months last year.

All of the main causes of fatal accidents show reduced fatality rates per million tons in 1924, as indicated by the following figures:

	Jan.-Feb. 1923	Jan.-Feb. 1924
Falls of roof and coal.....	1.819	1.633
Haulage.....	.680	.473
Gas and dust explosions.....	1.314	.723
Explosives.....	.128	.125
Electricity.....	.110	.072

Moses Weakening on Printing
Of Coal Commission Report

While it has been impossible to convince Senator Moses, of New Hampshire, chairman of the Senate Committee on Printing, that the report of the Harding Coal Commission should be printed, he did show signs of weakening last week when his attention was called to an opinion that his action is one of the best cases on record of foregoing the harvest as an economy after the expense of producing the crop.

The printing of the entire report, a portion of which was not mimeographed, will cost, the Public Printer estimates, \$22,000. An effort now is being made to exclude certain portions of the report and a new estimate is being prepared.

Coal Consumption and Power
Output by Utilities Higher

Electric public-utility plants consumed 3,627,322 net tons of coal during January, according to a report just issued by the U. S. Geological Survey. This compares with 3,392,983 tons consumed in December and 3,474,152 tons in November. Fuel oil consumed by utility plants in January totaled 1,562,622 barrels, compared with 1,473,045 barrels in December and 1,379,281 barrels in November.

The average daily production of electricity by public-utility power plants during January was 167,000,000 kw.-hr., which exceeded all previous records, being 3.5 per cent higher than in November, last, when the previous high mark was set.

Coal-Mine Fatalities During February, 1924, by Causes and States

(Compiled by Bureau of Mines and Published by Coal Age)

State	Underground											Shaft				Surface				Total by States							
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1924	1923
Alabama.....	3		1	1		1		1				1	8													8	5
Alaska.....																										0	0
Arkansas.....																										0	1
Colorado.....		3	2										5													5	4
Illinois.....	9		5										14													14	19
Indiana.....	7		2										9													9	5
Iowa.....	1												1													1	2
Kansas.....																										0	2
Kentucky.....	4	2	2					1	1				10						2					1	3	13	10
Maryland.....																										0	0
Michigan.....																										0	0
Missouri.....	1																									1	1
Montana.....																										0	2
New Mexico.....																										0	0
North Dakota.....																										0	0
Ohio.....	4		2							2			8						1					1		9	9
Oklahoma.....																										0	2
Pennsylvania (bituminous).....	12	2	4								1	19							3					3		22	37
South Dakota.....																										0	0
Tennessee.....	1						1						2													2	1
Texas.....																										0	0
Utah.....		1											1													1	0
Virginia.....	1	1						1					3													3	4
Washington.....													1													1	4
West Virginia.....	13	3	6			2							24						2	1				3		27	22
Wyoming.....	2												2													2	2
Total (bituminous).....	58	12	24	1		3	1	4	1	2		2	108					3	6	2	1		1	10		118	253
Pennsylvania (anthracite).....	10	2	4	1		4		4	1	2		6	27	2	1				6	1			2	1	10	40	50
Total, February, 1924.....	68	14	28	2		7	1	4	1	2		8	135	2	1			3	12	2	2		2	2	20	158	
Total, February, 1923.....	84	6	38	11	120	3	2	5	2	3		7	281			3		3	4		4		3	8	19		303

B. M. Clark Sees Gloomy Outlook for Central Pennsylvania with Renewed Pact

The outlook for business in the coal mines of central Pennsylvania under the present agreement is not at all reassuring, according to a statement issued April 4 by B. M. Clark, president of the Central Pennsylvania Coal Producers' Association. "The renewal of the wage agreement for three years at Philadelphia," said Mr. Clark, was in line with the generally accepted policy throughout the United States, to take the coal business out of the public eye and to bring peace to the industry, which has been in a chaotic condition since the outbreak of the European War.

"That section of the industry which maintains its relations with its employees through the United Mine Workers, and is generally described as unionized, in renewing the agreement for three years took into consideration the effect upon the public mind of another great coal strike. It also is the opinion of many of the leading coal operators that the operation of economic forces would bring about any adjustments that may be necessary in wages or other conditions in the industry. It is also the opinion of these operators that the peaceful method of adjusting the coal industry to present business conditions can be brought about more satisfactorily without a strike than with one.

High Wage Scale a Mistake

"If business conditions in the industry remain as bad as they are today—and indications are they will grow worse—the miners and operators will soon be brought to realize the mistake of trying to maintain a very high wage scale in the face of the overwhelming force of competition from fields where wage rates are much lower and accordingly production costs much lower than they are in the unionized sections of the industry.

"At the present time in central Pennsylvania there are approximately 550 tippie mines completely idle out of a total number of 1,000. These mines represent about 50 per cent of the productive capacity of the district, or, roughly speaking, 2,500 carloads per day, and employ about 30,000 men. Of these 30,000 men a number have gone to work in other union mines in the district; some have gone to work in other occupations, and still others have gone to work in mines operating in the non-union section of Pennsylvania.

"It is conservatively estimated that of the 30,000 men formerly working in the mines that are now totally idle, about 12,000 have found work as indicated. This would leave 18,000 idle miners now in the district. The mines that are at work, generally speaking, are working from two to three days per week. Their production per day has been increased by higher efficiency of the men due to short running time and by the additional men obtained from the mines that are totally idle, so that the working time of the regular employees in mines still at work is being constantly decreased.

"Many of the mines that have been operating have been filling contracts that were made a year ago. Practically 85 per cent of the coal contracts expire at the end of the coal year, April 1. The present low prices offered for contract business have precluded the possibility of many central Pennsylvania producers taking business this coal year. Railroad-fuel contracts are being made at prices below the cost of production under the union scale in central Pennsylvania. This also is true of other contractors such as public utilities, manufacturing and industrial plants. The net result of this condition is that there is only about 30 per cent of the total volume of contract business on the books of central Pennsylvania operators today as compared with the amount of such business on the books of the same operators one year ago.

Working Time at Low Level

"The full significance of this statement may be grasped by the following tabulation of working time of the total 653 tippie mines located on the Pennsylvania R.R. in the central Pennsylvania district:

Mines idle	341
Mines working 1 day	49
Mines working 2 days	60
Mines working 3 days	56
Mines working 4 days	65
Mines working 5 days	51
Mines working 6 days	31
653	

"On the New York Central, out of a total of 190 mines, 86 are completely closed down. This also is true on the Pittsburgh & Shawmut and Pittsburgh, Shawmut & Northern railroads.

"The Buffalo, Rochester & Pittsburgh Ry. is one of the largest coal-originating railroads in our district. Due to the fact that the contracts which the Rochester & Pittsburgh Coal & Iron Co. held for business last year have expired and the company has been unable to renew them under the present conditions, the company has closed its mines located in Helvetia, Eleanor, Adrian, Aultman, Ernest, McIntyre, Snyder, Coy, Whiskey Run and Nesbit Run. These mines when working produce 11,000 tons per day and employ 3,000 men.

"Practically every mine in the Broad Top region, where they employ 1,200 miners, is now idle without hope of operation in the near future. Mines employing about 1,000 men on the Allegheny Valley division of the Pennsylvania R.R. in our district have been idle for months, and this condition will continue.

"The total production of the central Pennsylvania district should exceed 60,000,000 tons per year. The union mines in the central Pennsylvania district ought to produce 45,000,000 tons of this amount. It is agreed by many men in the business that the union mines in central Pennsylvania will not produce, if the present situation continues throughout the coal year, more than 15,000,000 tons, or a loss to the unionized mines of central Pennsylvania of a possible production of 30,000,000 tons.

Monongahela Field Adopts Jacksonville Agreement

At a joint wage conference of the Monongahela Coal Operators Association of West Virginia and representatives of the United Mine Workers, held in New York City on April 2 and 3, the Jacksonville agreement was adopted effective three years from March 31.

"The labor cost of producing coal in central Pennsylvania under the union scale is approximately \$2 per ton. The mines in the non-union fields of Pennsylvania that have reduced their wages to what is known as the 1917 base can produce coal at \$1.40 labor cost per ton. The present wages paid in the Pocahontas field of West Virginia will permit production of coal at a labor cost of \$0.90 per ton. Present wages in the New River field of West Virginia will permit production of coal at a labor cost of \$1.12 per ton. These figures, of course, do not include the cost of supplies and general overhead. Labor cost is only 70 per cent of the total cost of production. These fields have a productive capacity of about 50,000,000 tons of the same quality and character of coal—namely, low volatile—as is produced in the central Pennsylvania district and is sold in the same markets.

"The full force of this competition is now reflecting itself in the idle mines and miners in the union fields of central Pennsylvania."

No Wage Adjustment in New River Field

Adjustments of wages and working conditions have not been necessary this year in the New River field of West Virginia, as in other years, so that the new coal year was ushered in without much attention. With the disintegration of District No. 29, which formerly embraced the New River field, miners and operators in that field have been free to make their own agreements for the last two years and wage scales and working conditions have been worked out in that way, with wages rising as prices rose and with wages lowered as prices dropped to the point where the operators could no longer pay the higher wages so that under existing conditions New River mines are paying their employees on the basis of the 1917 wage scale. There are a few exceptions of course, among them the Low Moor company, the New River, Pocahontas Consolidated and the Fordson company.

Even with lower wages in effect however the market is in such shape that operations are becoming more irregular and many concerns are operating at a loss but are nevertheless continuing operations in order to afford employment to their men and in order to hold their organizations together.

In such sections as Keeney's Creek, where miners have been employed in connection with development work, it has been necessary to give the men furloughs.

Brophy Refutes Clark

Clearfield, Pa., April 7.—John Brophy, president of district No. 2, United Mine Workers of America, has issued the following statement in reply to B. M. Clark, president of the Association of Bituminous Coal Operators of Central Pennsylvania:

"Last week at Philadelphia the operators of central Pennsylvania signed a wage agreement for three years. This week they say, 'It can't be done.'"

"They said the agreement was made in order to take the coal business out of the public eye. But is it taken out of the public eye when they issue such statements in the press as that released on April 4, in which they predict that the whole district is going to the demnation bow-wows?"

"They tell us there are many idle mines in the district. We agree with them—we are very well aware of the fact. But their statement is misleading because it fails to state that the other bituminous fields throughout the country are in the same (or worse) plight."

"For a remedy they suggest the same old panacea they have been offering for the last thirty years—lower wages."

"They say competition is too keen to admit of high wages—if wages were lower they would get more orders and the miners would get more work. They tell of the non-union fields of West Virginia, where the wages are far below the union rates. But do the low wages there provide steady work? The last report of the Geological Survey (March 29), which covered the week ending March 15, shows the New River field producing 46.9 per cent of capacity; the Pocahontas field producing 54.9 per cent of capacity; the central Pennsylvania field producing 55.3 per cent of capacity, and the non-union Maryland field was producing only 38.7 per cent."

"The miners know full well that lower wages never increase the opportunity to work but only decrease their earnings and will not agree to any such 'wage adjustment' as suggested in the operators' statement."



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James Brown

"Jamie" Brown, Scotch coal miner, is extremely busy these days "learning the ropes" to play the principal part as King George's representative during his residence at Holyrood Palace next month in the capacity of Lord High Commissioner to the General Assembly of the Church of Scotland. He is being advised and assisted in the intricacies of the forthcoming ceremonies by the Duke of Atholl, former High Commissioner. The Duchess of Atholl has put her knowledge at the disposal of Mrs. Brown, a former mill girl, and the Marchioness of Ayr, wife of the Lord Lieutenant of the County of Ayr, will be lady in waiting to "Mrs. Jamie."

"The truth of the matter is that the bituminous-coal industry is overdeveloped and will stay in the public eye until some order is brought into it. We now have a capacity sufficient to produce twice as much coal as the market can consume. Consequently slack work is a chronic disease of the industry and will remain so until something is done to check development in order to permit demand to catch up with production."

Coal Co. Allowed \$373,401 Amortization Claim

J. M. Clack, an auditor of the Internal Revenue Bureau, which is being investigated by the Finance subcommittee of the Senate, explained to the subcommittee the tax case of the Berwind-White Coal Mining Co. of Philadelphia, which had been mentioned before the committee as one concern that had its case reopened after an amortization claim had been disallowed. It put in a claim for amortization for 1918 of \$257,668.16, and for 1919 of \$66,966.10, a total of \$324,634.26, on a power plant that was built to assist in the operation of coal mines during the war.

A revised claim was filed Oct. 1, 1921, for \$575,591.31 amortization. The increase was explained as being due to the fact that the 1918 law put a limitation of 25 per cent on deductions for amortization. Engineers C. G. Woolson and J. P. Moore examined the return and on May 12, 1922, recommended that the claim be disallowed in full. Their reason was given as being that the plant had no excess operating capacity on account of the war, but was needed for post-war activities.

A new investigation was made on protest of the company and Engineer J. W. Swaren recommended an amortization allowance of \$176,953.25. The taxpayer protested this. A re-examination was made and on Nov. 18, 1922, an allowance was made of \$373,401. This was based, it was stated, on additional data and was the result of conferences.

Mr. Clack added that the uniform practice had been to allow amortization to coal companies on their plants erected during the war to take care of increased production.

Senator Couzens said the successive steps in the case of the Berwind-White company disclosed the chance for questionable conduct in the handling of these income tax cases.

"There is an enormous responsibility of the department," the Senator continued, "and this shows the opportunity for favoritism, influence, and even for graft, which I do not charge."

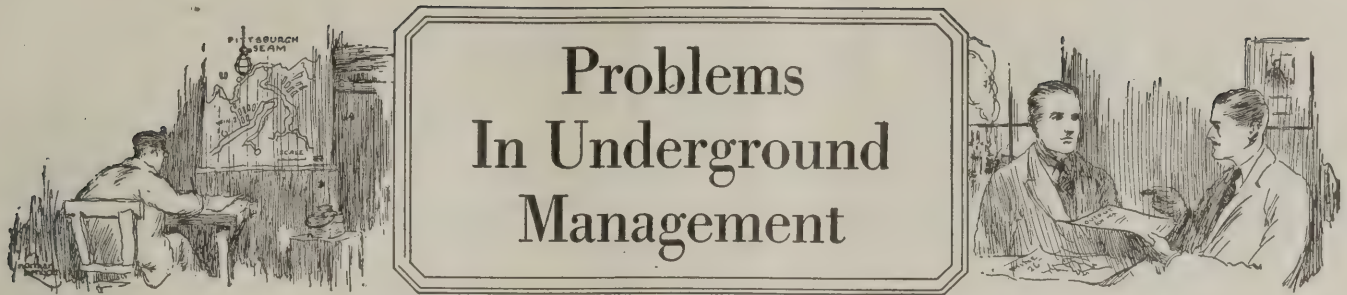
Estimated Monthly Output of Bituminous Coal by States, 1923^(a)

(IN NET TONS)

State	January	February	March	April	May	June	July	August	September	October	November	December
Alabama	1,692,000	1,449,000	1,692,000	1,491,000	1,554,000	1,492,000	1,442,000	1,549,000	1,462,000	1,595,000	1,487,000	1,295,000
Arkansas	146,000	109,000	108,000	93,000	93,000	105,000	112,000	125,000	136,000	136,000	125,000	112,000
Colorado	987,000	917,000	875,000	747,000	732,000	756,000	688,000	755,000	862,000	973,000	959,000	1,049,000
Illinois	9,428,000	8,078,000	7,893,000	6,233,000	6,088,000	5,747,000	5,602,000	6,455,000	6,943,000	7,688,000	6,934,000	6,911,000
Indiana	2,975,000	2,511,000	2,662,000	2,150,000	1,775,000	1,855,000	1,933,000	1,984,000	2,292,000	2,406,000	2,252,000	2,205,000
Iowa	698,000	617,000	627,000	460,000	445,000	436,000	415,000	498,000	540,000	595,000	595,000	574,000
Kansas	455,000	381,000	384,000	323,000	334,000	320,000	322,000	372,000	392,000	416,000	422,000	379,000
Kentucky	3,401,000	2,855,000	3,194,000	3,028,000	3,479,000	3,374,000	3,607,000	3,953,000	3,550,000	4,100,000	3,491,000	2,968,000
Maryland	282,000	239,000	277,000	249,000	244,000	240,000	208,000	229,000	194,000	188,000	170,000	180,000
Michigan	145,000	108,000	147,000	93,000	53,000	52,000	72,000	95,000	112,000	129,000	108,000	86,000
Missouri	425,000	353,000	303,000	268,000	276,000	265,000	270,000	299,000	331,000	353,000	335,000	322,000
Montana	379,000	332,000	324,000	180,000	196,000	171,000	179,000	229,000	289,000	388,000	356,000	277,000
New Mexico	294,000	216,000	221,000	223,000	234,000	205,000	202,000	200,000	212,000	240,000	234,000	219,000
North Dakota	151,000	101,000	105,000	43,000	44,000	41,000	41,000	62,000	75,000	111,000	98,000	78,000
Ohio	3,519,000	2,727,000	3,284,000	3,091,000	3,739,000	3,821,000	3,544,000	3,778,000	3,427,000	3,594,000	3,049,000	2,427,000
Oklahoma	333,000	302,000	305,000	246,000	246,000	255,000	248,000	297,000	324,000	336,000	360,000	298,000
Pennsylvania	13,894,000	11,446,000	13,600,000	13,446,000	14,678,000	14,674,000	14,403,000	15,290,000	13,459,000	13,066,000	11,258,000	10,786,000
Tennessee	590,000	510,000	537,000	496,000	534,000	496,000	475,000	522,000	488,000	534,000	486,000	432,000
Texas	104,000	86,000	81,000	74,000	88,000	85,000	91,000	98,000	96,000	109,000	109,000	79,000
Utah	466,000	372,000	298,000	275,000	315,000	375,000	354,000	357,000	406,000	532,000	446,000	404,000
Virginia	866,000	791,000	968,000	946,000	1,026,000	971,000	933,000	1,019,000	927,000	972,000	829,000	752,000
Washington	326,000	310,000	336,000	148,000	195,000	195,000	153,000	206,000	238,000	307,000	295,000	241,000
West Virginia	7,709,000	6,652,000	7,887,000	7,726,000	9,164,000	9,051,000	9,300,000	9,749,000	8,724,000	9,496,000	7,681,000	6,961,000
Wyoming	884,000	672,000	662,000	511,000	523,000	489,000	516,000	727,000	724,000	897,000	813,000	782,000
Other States (b)	29,000	26,000	32,000	24,000	21,000	19,000	16,000	16,000	13,000	16,000	19,000	19,000

Total bituminous production..... 50,178,000 42,160,000 46,802,000 42,564,000 46,076,000 45,490,000 45,126,000 48,864,000 46,216,000 49,177,000 42,911,000 39,836,000

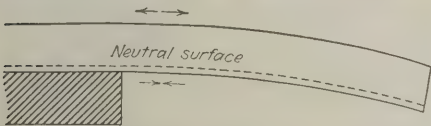
(a) United States Geological Survey, March 22, 1924. Revised in accordance with more complete information than was available at the time of the first publication in the weekly coal report. (b) Includes Alaska, California, Georgia, Idaho, North Carolina, Oregon and South Dakota.



Problems In Underground Management

How Far Beyond Excavated Area Is Surface Broken?

Many British inquiries into the character of subsidence have shown that the surface of the ground is broken considerably back of the line of fracture in the excavation below. The angle between a vertical line from the face of the excavation and a line drawn from the point of break on the surface down to the face is called the angle of draw because owing to the tensional stresses



Neutral Surface Near the Coal

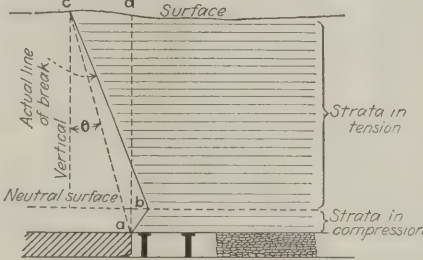
Where the material is stronger to resist compression than tension the surface of no strain or neutral surface lies near the coal.

the measures are broken beyond the coal face.

Ira C. F. Statham in a thoughtful paper read before the Yorkshire branch of the Institute of Mine Surveyors of Great Britain summarizes the findings in various parts of that country. Of course, the roof does not subside at the point where the draw or fracture from tension takes place. It is the point of break at the surface and not the point of subsidence. In fact though Mr. Statham does not say so, the surface actually may rise at that point. The coal being crushed, however, the area of actual subsidence is larger than the area of excavation, for the face of the coal is crushed downward under the

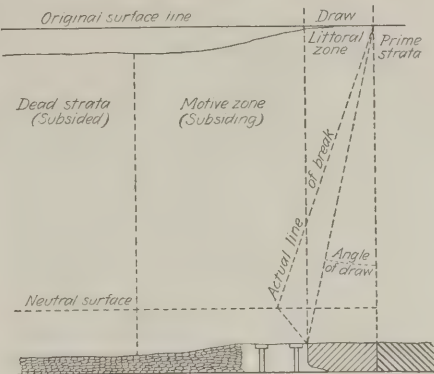
load and the clay is squeezed out into the excavated area.

Among Mr. Statham's notable remarks is the following: "Rocks are stronger in compression than in tension. The average figures for sandstone are: Tensile strength in short tons per square inch 0.46; compressive strength 3.93; hence sandstone is about nine times as strong in compression as in tension, so that the neutral axis will be roughly one-ninth of the depth above the seam or eight-ninths below the surface." Apparently he believes the roof below the neutral axis breaks in a line over the excavation and that this break at the neutral axis meets another break extending down from the point of draw on the surface, this fracture, of course, making a larger angle with the vertical than the line of draw. Most of us



As Statham Views Roof Fracture

The roof does not fracture from *a* to *c* but breaks forward to *b* which is on the neutral surface and backward to *c* at the surface. This is an interesting viewpoint. Some have thought the nether roof which did not constitute part of the monolithic roof broke over the excavation, but Mr. Statham declares it is that part of the roof proper below the neutral surface which breaks in that manner.



How Subsidence Develops

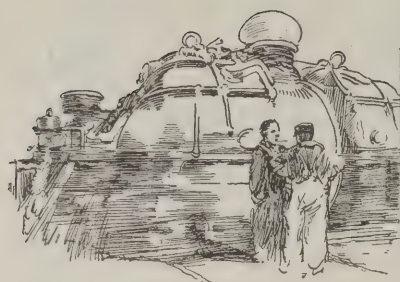
Mr. Statham designates three zones, the dead or subsided area, the motive or subsiding area and the littoral zone which lies over the standing coal and moves but little.

would be disposed to believe that the break over the excavation was an entirely unrelated break in the nether roof or draw slate which does not form any part of what Mr. Statham well names the "absolute" roof. But as no one has ever been immured in the roof when it tore apart, possibly this question may not be settled for some time. Here are two breaks of unlike direction, what more simple explanation can be imagined than that they meet at an angle on the neutral axis or neutral surface? So that is where Mr. Statham places it, probably without any justification.

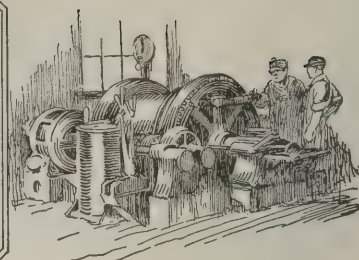
Observations show, says Mr. Statham, that not only breaks but also actual subsidence commences ahead of the coal face or over the solid coal and is a maximum behind the coal face.

Summary of Subsidence Observations Quoted by Various Authorities

Authority	Locality	Depth Ft.	Thick- ness Ft.	Dip. Deg.	Draw. Ft.	Angle of draw. Deg.	Subsi- dence. Ft.	Subsi- dence. P.C.	Remarks
Knox, G.	Ayrshire	321	6.0	...	...	15	...	...	...
Fayol, H.	...	...	8.0	...	...	...	2.08	25	First slice
Dixon, J. S.	Bent. Coll., Lanark- shire	650	5.5	3	100	...	1.92	23	Second do
Kirkup.	...	646	...	...	83	Av. 8	4.00	73	Max. subsidence 186 ft. back from face
...	...	240	...	...	66	14-18	3.76	68	...
...	...	600	...	...	180-200	...	...	...	...
Snow, C.	Hickleton	...	...	...	433	...	4.5	...	...
Piggford, J.	Teversal and Pleasley, Notts and Derby	600	5' 6"	...	...	16	...	...	...
Hay, W.	Shirebrook	1,500-1,700	5.0	2½	240-300	8-10	1.34-1.74	Av. 30	...
Kay, S. R.	...	360	5.0	...	...	...	...	70	...
Lloyd, W. D.	Yorkshire	1,066	3.83	1½	nil	...	...	...	Width of excavation, 128 ft.
...	...	...	...	...	20	1.14	0.28	7.3	194 ft.
...	...	...	...	...	30	1.6	0.57	15.0	325 ft.
...	...	...	...	...	40	2.14	0.75	19.0	477 ft.
...	...	...	...	...	60	3.23	1.06	28.0	557 ft.
...	...	...	...	...	84	4.5	1.23	32.0	666 ft.
...	...	...	...	...	95	5.1	1.47	36.0	823 ft.
...	...	...	...	...	109	5.83	1.65	43.0	823 ft. 6 months after stoppage
...	...	...	...	...	119	6.4	1.75	46.0	283 ft. 12 months maximum
Morgan, R. C.	South Wales	1,920	9.0	4.75	...	...	2.75	48	Six ft. worked to dip. Took place 40 ft. behind
...	...	1,650	...	...	...	...	2.83	43	face 67 days after passing
...	...	2,140	...	...	...	8.25	3.41	57	6.58 ft. worked to rise 40 ft. from face, 92 days
...	...	2,410	...	...	...	...	3.16	56	after passing
Greaves, P.	Wakefield	...	3.5	...	...	...	2.42	69	To strike 70 ft. from face, or 122 days after
Whitlock, C. H.	South Yorks.	400-700	...	...	...	5.7-9.5	...	40-75	passing
...	...	...	...	...	...	...	...	...	Subsidence complete 5 years after working



Practical Pointers For Electrical And Mechanical Men



Cheap and Efficient Battery Transfer Rack

By constructing the battery compartments of storage-battery locomotives so that one man can readily remove and replace them the cost of operation is often considerably reduced. Sometimes it is convenient to be able to use a chassis for more than one shift thus saving the purchase of an additional locomotive. In that case the unit should be provided with two batteries and with means for their rapid interchange. A removable battery arrangement is also desirable where charging must be done during the day, no power being available for night charging.

Where the battery on the chassis is not sufficient to do a day's work the locomotive may often be enabled to give satisfactory service when an additional battery is provided and arrangements are made for the quick replacement of one battery by another.

There are, of course, many ways of removing battery compartments and conditions at the mine will determine the best method to be adopted. However, what undoubtedly is the cheapest and easiest method of accomplishing this operation is shown in the accompanying drawing. This method is recommended by the Ironton Engine Co. It avoids the introduction of additional tracks with their frogs and switches, thus saving much space. It does away with the older method of lifting the battery.

Rollers are provided on the chassis and similar rollers on platforms at either side of the track. Racks are provided on the bottom of the battery compartment and arranged to engage spur pinions mounted on the chassis, and driven by a roller chain, and sprockets through spur gearing to which a removable crank is attached.

With this system, and without any

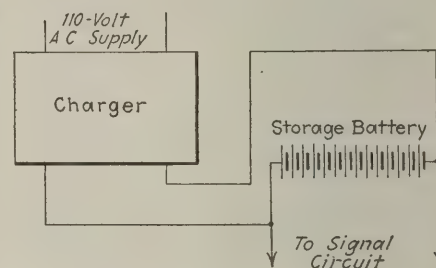
especial effort, a change of batteries has been made in five minutes. This includes disconnecting the discharged battery, removing it, putting on a charged battery and connecting it up, ready for use. This would not be possible with any arrangement that required the shifting of the locomotive from one track to another.

One man working the crank can easily move off the discharged battery and move on the charged one. With this arrangement as only one track is required the locomotive chassis does not have to be pushed around by hand from one track to another when the transfer of the battery is being made. Space must be provided on each side of the track sufficient to store one battery, but a series of these platforms can be provided on the same track to take care of any number of locomotives.

Bell-Ringing Battery Floats On Automatic Charger

A number of mining companies in the anthracite field are now installing Magnar vibrating rectifiers and nine-cell storage batteries on shaft and slope signal systems. The rectifier and battery are usually placed in the engine house outside, the former being connected to the 110-volt alternating-current circuit. The rectifier is equipped with a small vibrating unit which charges the battery continually at from 0.1 to 0.5 amp. The signal bell circuit is in series with the battery.

When the outfit is installed the resistor on the charger is set at 3/10 amp. and by checking the gravity of the battery for the first two or three days, it is possible to regulate the current to the proper charging value. The plan is to float the battery on the charging circuit so as to charge at a rate fractionally higher than the load



Battery Floats on Charger

This little rectifier keeps the battery fully charged, thus greatly increasing its life. Renewals are infrequent and proper voltage is always available for the whole signal system.

which the signal bell circuit puts upon the battery.

The rectifier has proved to be dependable. There is little wear and tear on the vibrating contacts, and in case of a power interruption the vibrator stops and starts again with the resumption of power. The battery should be made up of nine 2-volt cells of from 35 to 40 ampere-hour capacity. In this class of service the battery lasts from 5 to 6 years.

The battery is always in a practically fully charged condition—most of the acid is out of the plates and in the solution, thus considerably increasing the life.

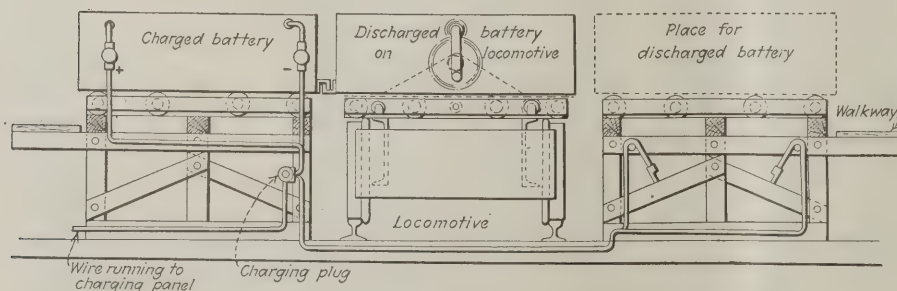
CHAS. L. LEAF.

Don't Blame Mine for the Faults of Those in It

A recent article by T. F. McCarthy, published in *Coal Age* on the subject of the care of electrical mine equipment, prompts me to make the following comments:

We all know that the conditions under which electrical equipment must operate in the mines are necessarily bad, for moisture and dust are always present. However, we too often hear some one say that a certain piece of equipment is not operating satisfactorily because the mine conditions are unfavorable. Breakdowns and delays are not always ascribable to this cause. Often, I have almost come to believe that a fuse on a direct-current coal cutter is an accessory which has been practically forgotten. I have seen only too many fuse blocks which have been tampered with and damaged, because some one has replaced the proper fuse with a rail spike, or a heavy piece of copper wire.

Much of the high maintenance cost on locomotives is due to broken track bonds, which are allowed to continue as such until the locomotive absolutely refuses to move its load. Another cause



One Man Can Transfer Battery in Five Minutes

The locomotive stops between the two platforms and delivers its battery to the empty platform, taking a fully charged battery from the opposite side of the track.

It will be noticed that both platforms are equipped with charging cable thus obviating the necessity of any additional handling of the discharged battery.

of high maintenance to haulage equipment is the bad condition of the feeder circuits. Very seldom do we find the feeder wire properly spliced or tapped, so as to form a low-resistant joint. Cables are often suspended on props by means of spikes and in many cases both the positive and negative wires may be found buried in rocks and mud.

A serious offense often committed by locomotive motormen is to apply the hand brake so as to block the locomotive wheels before the controller is turned on. I have seen motormen do this and then turn the controller to the "full-on" position, after which they would gradually release the brake and slowly start the loaded trip. Then again, many battery locomotives are required to operate under full load for from eight to sixteen hours, and the battery is charged in from four to eight hours. Naturally, a very high current is needed to charge the battery in so short a time and its capacity and life are seriously affected.

On one occasion, I found a gathering pump motor driving its load through a gear which was submerged in about 4 in. of water. The motor was of the open type and the water picked up by the gear was carried directly onto the commutator and windings. These and similar conditions exist in nearly every mine with which I have been acquainted, and it is my opinion that much can be done to reduce the maintenance cost of mine electrical equipment by giving the apparatus reasonable attention, and by placing it where conditions of operation are favorable and are so maintained.

Linton, Ind.

J. R. LUXTON.

Protecting Motor-Generators And Rotary Converters

In an article on direct-current circuit breakers by Royce L. Grimes, which appeared in the Feb. 7 issue of *Coal Age* are remarks on the protection of rotary converters and motor-generator sets.

In one part of this article Mr. Grimes pointed out the danger of the load on one of several interconnected machines increasing to a point where the direct-current circuit breaker should open up but fails to do so, either due to the type of the breaker used or to some part not functioning properly. It is true that if such machines were connected in parallel with other direct-current generators and the load was sufficiently high to trip the alternating-current circuit breaker, serious trouble would almost certainly result.

To meet just such conditions it has been the practice of our company to supply standard control equipment for synchronous converters, induction motor-generator sets, and synchronous motor-generator sets, with alternating-current and direct-current breakers so interlocked that in case the alternating-current breaker is opened for any cause whatever, the direct-current breaker will also be tripped open. Incidentally, it may be added that this protective feature is furnished not only when the machines operate in parallel with another source of power but also when used independently. We have always found this necessary because in the de-

velopment of the electrical system of a mine it is quite probable that some machines originally operated separately will be tied in together. When this occurs it will be essential that this protective feature be installed and in operation.

Whenever any type of converter unit is operated in parallel with a direct-current generator, driven by a direct-connected prime mover such as a water-wheel or steam turbine, we furnish, in addition to the interlocking circuit mentioned above, a reverse-current relay. This relay is connected so that it will trip both the alternating-current and direct-current breakers at a current value sufficiently low to insure that the machine will be stopped before it has reached such a speed as will cause the overspeed trip to function. This is added protection to prevent the possibility of any mechanical damage to the commutator and the windings of the machine which might otherwise result if the machine should overspeed.

When power-converting machines are operated with their direct-current ends in parallel, but with their alternating-current ends fed from different alternating-current circuits a reverse-current relay is furnished and connected so that both the alternating and direct-current systems will be disconnected from the machines in case of failure of alternating-current power supply. Such protection as this is no doubt better than any other yet designed, because it does not depend upon the speed of the machine, thus making the possibility of any danger more remote.

N. S. TAYLOR,

Switchboard Engineer.

Westinghouse Electric & Mfg. Co.
E. Pittsburgh, Pa.

Cleating and Supporting Copper

Properly supported copper stands up well against vibration. In fact, one finds it extensively used in certain applications where vibration occurs, because of its good behavior in this respect. But improperly supported, copper fails miserably under vibration. This point is frequently ignored in connecting car wiring cables to the motor leads when cleats are not applied. Care should be observed to study this point with the purpose of properly locating the cleats in supporting the cables. It often happens that the weight of a solid connector, even though it may look rather small, is sufficient under vibration to cause the copper strap or stranded cable to break at a point just behind the connector where stresses are localized.

Sickness of Copper

Copper is subject to a form of sickness which so far as has been experienced is peculiar to copper alone. All commercial copper contains a small amount of oxygen in the form of copper oxide, without which it has poor mechanical characteristics. When it is heated in a flame which is rich in free hydrogen, this hydrogen unites with oxygen, forming free copper and steam.

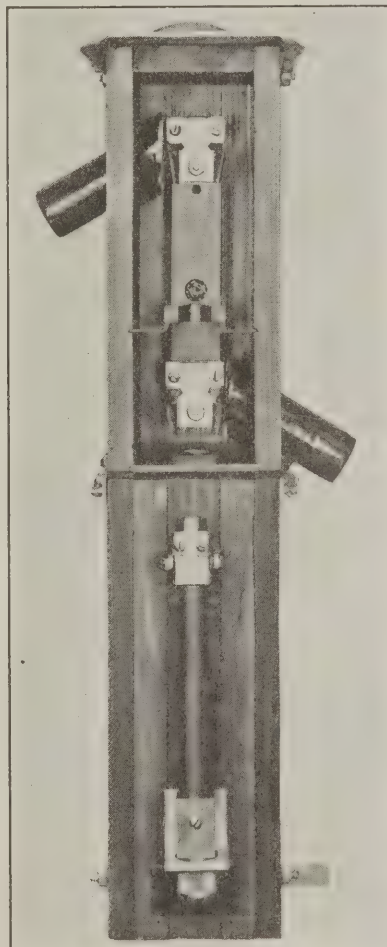
It is a peculiar characteristic that the hydrogen will readily enter the hot copper, but the steam cannot get out. The copper is thus not only weakened by the elimination of the copper oxide but the high pressure steam expands, producing a spongy effect which still further weakens the copper. This effect is, of course, greatest near the surface. This peculiar form of sickness should be guarded against by the operating men.

Safety Fuse Box Proves Successful

The accompanying illustration shows a fuse box which we are using on outdoor circuits. Its peculiar advantages around mining properties lies in the fact that when it becomes necessary to renew the fuse the door of the box acts as a switch and the fuse is replaced between two "dead" clips.

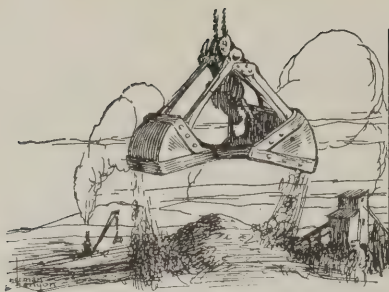
The box may easily be placed on a cross-arm in a position where it will be impossible for the workman to come in contact with an electrically charged conductor. Whenever a section of a line must be cut off for test or repair the fuse box may be opened and used as an extra protection against accident.

O. E. KENWORTHY.



Combination Fuse and Switch Compartment

This fuse may be replaced with absolute safety even if some one may have forgotten to cut off the power. When the door of the fuse compartment is opened the circuit is broken and the fuse is replaced in the two "dead" clips on the door.



Production And the Market



Coal Markets Continue to Display No Animation; Contracting Backward; Strike Menace Recedes

April 1 has come and gone and the soft-coal market is rapidly getting no better. For weeks the consumer has been awaiting the coming of that fateful day—"to see what would happen" before making a move in the coal market. Not much happened, and he hasn't done a great deal about it. Industrial clouds continue to disappear from the horizon as one by one district settlements are signed, northern West Virginia and central Pennsylvania, which came in last week, having been followed by the Monongahela district, which also signed up for three years. Agreements in Kanawha and western Kentucky have been deferred and the Southwestern fields and Alberta have completely suspended.

While these successive adjustments of wages and working conditions are hailed in many quarters as an assurance of industrial peace, the consumer interprets them as removing the incentive to buy coal and seems to have decided to play the waiting game to the limit. Even the contract business usually in evidence at this time is far behind the seasonal level.

Coal Age Index declined 2 points to 171, as of April 7, the corresponding price being \$2.07. This compares with \$2.09 on March 31.

Steam Prices Firmer in Middle West

Steam coals in Illinois and Indiana are somewhat firmer, most of the other sizes being in difficulty. "No bills" are much in evidence. Business is hard to get in Franklin County, the mines that are running getting from two to three days a week. Duquoin and Jackson County find it even worse, many mines closing down and the others working only one and two days a week. Demand for screenings is good in the Standard field, but little else that is favorable can be reported.

Kentucky markets are unsettled pending a wage settlement, April 15, and little business is being booked.

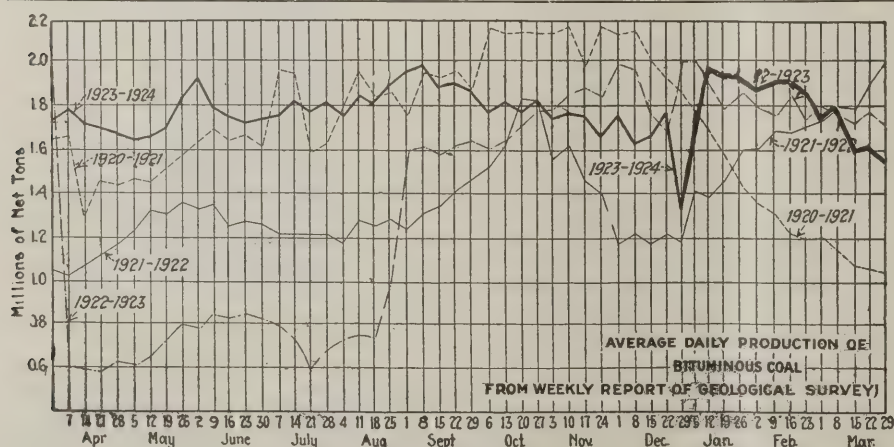
Business in the Northwest has gone flat, prices having broken as the result of some dock companies making cuts and the others following suit, but business is not eagerly sought at the reduced level. The spurt of brisk business in the Southwest continued right up to April 1, when operations were suspended until a wage agreement shall have been negotiated. A cold snap in Colorado and Utah has helped business there, and the outlook is still bright.

Better Tone in Cincinnati Market

Buying in Ohio markets is at a low ebb, the trade in general being quiet, though the tone at Cincinnati is better. Contracting for steam tonnage is lagging, awaiting prices on railroad fuel, and production is falling off steadily. Not a ray of hope is discernible through the deadly dullness that has settled over New England—low as production has fallen, demand is too meager to absorb it. Consumers are indifferent in the Atlantic seaboard markets. Supply and demand in West Virginia are more nearly equal, and as a result prices are more stable.

Production of bituminous coal during the week ended March 29, according to the Geological Survey, amounted to 8,837,000 net tons, which was 424,000 tons less than was produced during the previous week. Output of anthracite totaled 1,942,000 net tons, an increase of 138,000 tons compared with the preceding week.

New price circulars on anthracite came out April 1, reductions by the companies on domestic sizes ranging from 40c. to 60c., except on pea, on which the cut ranged up to \$1.15. Reductions on steam sizes range from 35c. to 50c. on buckwheat and from 25c. to 50c. on rice, there being no cut in the price of barley. Independents are said to be shading prices in order to move their product.



Estimates of Production

(In Net Tons)

BITUMINOUS

Week Ended	1922-1923	1923-1924
March 15.....	10,428,000	9,626,000
March 22(a).....	10,424,000	9,261,000
March 29(b).....	10,430,000	8,837,000
Daily average.....	1,738,000	1,473,000
Coal year to date.....	427,598,000	540,803,000
Daily average to date.....	1,396,000	1,773,000

ANTHRACITE

March 15.....	2,057,000	1,941,000
March 22.....	2,126,000	1,804,000
March 29.....	2,008,000	1,942,000
Coal year to date.....	46,486,000	93,060,000

COKE

March 22(a).....	384,000	315,000
March 29(b).....	388,000	296,000
Cafendar year to date.....	4,658,000	3,661,000

(a) Revised from last report. (b) Subject to revision.

Midwest Steam Firms Up

A slight firming up of steam coal in Illinois and Indiana was the only change marked during the week in the Midwest market. This was insufficient to change prices much, but most steam coals stuck closer to circular than they have been doing. Most other sizes were in trouble in those states, however. "No bills" in all the domestic sizes were backing up in southern Illinois in spite of an earnest effort to move them and of the recent cut in their prices. Some business is expected in this district from the Missouri Valley region since the shutdown of the Southwestern Interstate district mines of Kansas, Oklahoma and Missouri, but the effect of the shutdown has not yet had time to make any great difference.

The domestic trade of the Midwest region is taking a little Pocahontas at the prevailing \$2@2.25 price on mine run and \$3@3.25 on lump and egg, but the volume is small. The April 1 cut in anthracite started a small movement of hard coal in domestic sizes to dealers throughout the Midwest region, as was expected. A good many dealers had withheld orders for two or three weeks before April 1 awaiting the drop. Present prices are expected to prevail throughout the summer.

Such mines as are open are getting from two to three days per week in Franklin County and all mines have "no bills" in some sizes. Railroad tonnage has practically stopped. The independent operators are having a hard time getting any business, in view of low prices made by the organization operators. In the Duquoin and Jackson County fields most mines are shutting down and business is hard to find with mines working one and two days a week.

In the Mt. Olive district business is bad. Steam sizes are in good demand, but lump fails to move. The operators at Mt. Olive are asking \$2.75@2.85 on 2-in. and 3-in. lump, whereas 6-in. lump from surrounding mines is selling as low as \$2.65. In the Standard district screenings are in good demand. Everything else is just plugging along with many mines shutting down and all mines with "no bills."

Cool weather keeps St. Louis coal yards busy, on small lots principally and on the cheaper grades. The only change in the market has been that of Carterville, which was reduced from \$8 to \$7.25 and \$7.50. There is a fairly good demand for this in small quantities. Anthracite, smokeless and coke are a little bit slow, with new prices expected at once. The new prices on coke are: Byproduct, \$10.75; gas-house, \$10.25, for sidewalk delivery. Local steam wagonload is good and carload is fairly active. Country domestic is

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Apr. 9 1923	Mar. 24 1924	Mar. 31 1924	Apr. 7 1924†
Smokeless lump	Columbus	\$6.25	\$3.60	\$3.25	\$3.25@	\$3.50
Smokeless mine run	Columbus	4.25	2.10	2.10	2.25@	2.50
Smokeless screenings	Columbus	3.75	1.60	1.60	1.75@	2.00
Smokeless lump	Chicago	6.10	3.25	3.25	3.00@	3.25
Smokeless mine run	Chicago	3.75	2.10	2.10	2.00@	2.25
Smokeless lump	Cincinnati	6.00	3.25	3.25	3.25@	3.50
Smokeless mine run	Cincinnati	3.85	2.20	2.10	2.00@	2.25
Smokeless screenings	Cincinnati	3.85	1.75	1.80	1.75@	2.00
*Smokeless mine run	Boston	6.25	4.65	4.20	4.15@	4.25
Clearfield mine run	Boston	2.90	2.05	2.00	1.65@	2.50
Cambria mine run	Boston	3.75	2.60	2.55	2.00@	2.90
Somerset mine run	Boston	3.35	2.30	2.10	1.75@	2.50
Pool 1 (Navy Standard)	New York	4.00	3.00	3.00	2.75@	3.00
Pool 1 (Navy Standard)	Philadelphia	4.10	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard)	Baltimore					
Pool 9 (Super, Low Vol.)	New York	3.35	2.20	2.20	2.00@	2.40
Pool 9 (Super, Low Vol.)	Philadelphia	3.30	2.30	2.20	2.00@	2.45
Pool 9 (Super, Low Vol.)	Baltimore	3.25	2.25	2.25	2.00	
Pool 10 (H.Gr. Low Vol.)	New York	2.85	1.95	1.85	1.75@	2.00
Pool 10 (H.Gr. Low Vol.)	Philadelphia	2.80	1.85	1.85	1.70@	2.00
Pool 10 (H.Gr. Low Vol.)	Baltimore	2.90	1.90	1.90	1.75	
Pool 11 (Low Vol.)	New York	2.50	1.40	1.40	1.25@	1.60
Pool 11 (Low Vol.)	Philadelphia	2.40	1.65	1.50	1.30@	1.70
Pool 11 (Low Vol.)	Baltimore	2.25	1.60	1.60	1.50	
High-Volatile, Eastern						
Pool 54-64 (Gas and St.)	New York	2.30	1.50	1.50	1.40@	1.65
Pool 54-64 (Gas and St.)	Philadelphia		1.60	1.55	1.45@	1.70
Pool 54-64 (Gas and St.)	Baltimore	2.25	1.70	1.70	1.50@	1.70
Pittsburgh sc'd gas	Pittsburgh	3.00	2.55	2.55	2.35@	2.50
Pittsburgh gas mine run	Pittsburgh		2.30	2.30	2.25	
Pittsburgh mine run (St.)	Pittsburgh	2.00	2.10	2.10	1.75@	2.00
Pittsburgh slack (Gas)	Pittsburgh	2.00	1.35	1.25	1.25@	1.35
Kanawha lump	Columbus	4.00	2.55	2.55	2.40@	2.70
Kanawha mine run	Columbus	2.50	1.55	1.55	1.50@	1.80
Kanawha screenings	Columbus	2.35	1.05	1.05	1.25@	1.35
W. Va. lump	Cincinnati	3.60	2.50	2.25	2.00@	2.50
W. Va. gas mine run	Cincinnati	2.60	1.30	1.30	1.25@	1.50
W. Va. steam mine run	Cincinnati	2.35	1.30	1.30	1.25@	1.50
W. Va. screenings	Cincinnati	2.35	.85	.85	.80@	1.00
Hocking lump	Columbus	3.00	2.55	2.55	2.40@	2.70
Hocking mine run	Columbus	2.10	1.70	1.65	1.60@	1.75
Hocking screenings	Columbus	1.75	1.05	1.05	1.25@	1.40
Pitts. No. 8 lump	Cleveland	2.90	2.35	2.35	2.00@	2.75
Pitts. No. 8 mine run	Cleveland	2.20	1.80	1.80	1.75@	1.85
Pitts. No. 8 screenings	Cleveland	2.00	1.25	1.20	1.20@	1.40
Midwest		Market Quoted	Apr. 9 1923	Mar. 24 1924	Mar. 31 1924	Apr. 7 1924†
Franklin, Ill. lump	Chicago	\$3.85	\$2.85	\$2.85	\$2.75@	\$3.00
Franklin, Ill. mine run	Chicago	3.10	2.35	2.35	2.25@	2.50
Franklin, Ill. screenings	Chicago	2.05	1.80	2.05	2.10@	2.25
Central, Ill. lump	Chicago	2.75	2.60	2.60	2.50@	2.75
Central, Ill. mine run	Chicago	2.10	2.10	2.10	2.00@	2.25
Central, Ill. screenings	Chicago	1.60	1.55	1.65	1.60@	1.75
Ind. 4th Vein lump	Chicago	3.35	2.85	2.85	2.75@	3.00
Ind. 4th Vein mine run	Chicago	2.85	2.35	2.35	2.25@	2.50
Ind. 4th Vein screenings	Chicago	1.85	1.85	1.95	1.90@	2.00
Ind. 5th Vein lump	Chicago	2.85	2.60	2.60	2.50@	2.75
Ind. 5th Vein mine run	Chicago	2.10	2.10	2.10	2.00@	2.25
Ind. 5th Vein screenings	Chicago	1.55	1.60	1.65	1.60@	1.75
Mt. Olive lump	St. Louis		2.85	2.85	2.75@	3.00
Mt. Olive mine run	St. Louis		2.50	2.50	2.50	
Mt. Olive screenings	St. Louis		1.50	1.50	1.50	
Standard lump	St. Louis	2.50	2.30	2.35	2.25@	2.50
Standard mine run	St. Louis	1.85	1.95	1.95	1.90@	2.00
Standard screenings	St. Louis	1.10	1.30	1.20	1.10@	1.30
West Ky. lump	Louisville	2.60	2.85	2.75	2.25@	2.50
West Ky. mine run	Louisville	1.85	1.60	1.60	1.25@	1.75
West Ky. screenings	Louisville	1.75	1.30	1.00	1.10@	1.35
West Ky. lump	Chicago	2.85	2.60	2.60	2.50@	2.75
West Ky. mine run	Chicago	1.80	1.20	1.10	1.00@	1.25
South and Southwest						
Big Seam lump	Birmingham	2.50	2.60	2.60	2.50@	2.75
Big Seam mine run	Birmingham	2.10	2.00	2.00	1.75@	2.25
Big Seam (washed)	Birmingham	2.35	2.20	2.20	2.00@	2.40
S. E. Ky. lump	Chicago	3.85	2.85	2.60	2.25@	2.50
S. E. Ky. mine run	Chicago	2.85	1.60	1.60	1.40@	1.85
S. E. Ky. lump	Louisville	4.00	3.00	3.00	2.50@	2.75
S. E. Ky. mine run	Louisville	2.80	1.70	1.70	1.25@	1.75
S. E. Ky. screenings	Louisville	2.50	.95	.95	.85@	1.25
S. E. Ky. lump	Cincinnati	3.50	2.85	2.10	2.25@	2.50
S. E. Ky. mine run	Cincinnati	2.50	1.45	1.35	1.25@	1.50
S. E. Ky. screenings	Cincinnati	2.35	.85	.85	.75@	1.00
Kansas lump	Kansas City	3.85	4.50	4.50	4.50	
Kansas mine run	Kansas City	3.25	3.25	3.25	3.25	
Kansas screenings	Kansas City	2.60	2.50	2.50	2.50	

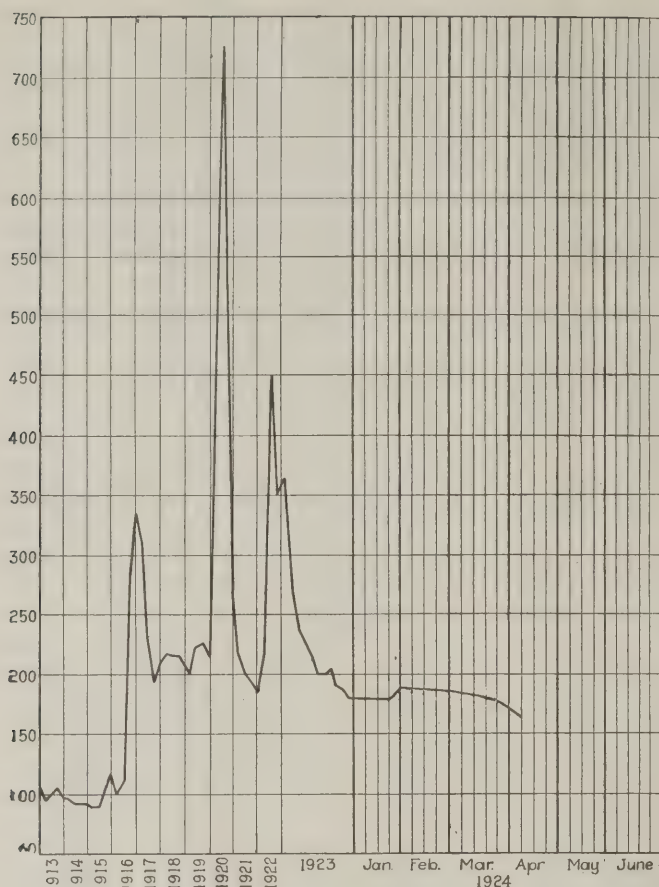
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	April 9, 1923		March 31, 1924		April 7 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....	\$2.34		\$7.75@ \$8.35		\$8.00@ \$9.25		\$8.00@ \$8.65
Broken.....	Philadelphia.....	2.39		7.90@ 8.10				8.50@ 8.65
Egg.....	New York.....	2.34	\$8.25@ \$10.00	8.00@ 8.35	\$7.75@ \$8.25	8.25@ 9.25	\$7.75@ \$8.25	8.25@ 8.65
Egg.....	Philadelphia.....	2.39	9.25@ 9.50	8.10@ 8.35	8.50@ 10.00	8.75@ 9.25	8.25@ 9.40	8.60@ 8.65
Egg.....	Chicago*.....	5.06	12.00@ 12.50	7.20@ 8.25	7.50@ 8.80	8.00@ 8.35	7.59@ 7.81	7.60@ 7.72
Stove.....	New York.....	2.34	8.25@ 10.00	8.00@ 8.35	8.75@ 9.25	8.25@ 9.25	8.50@ 9.00	8.25@ 8.75
Stove.....	Philadelphia.....	2.39	9.25@ 9.50	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	8.60@ 9.00	8.65@ 8.85
Stove.....	Chicago*.....	5.06	12.00@ 12.50	7.35@ 8.25	8.00@ 9.25	8.00@ 8.35	7.90@ 8.03	7.81@ 7.93
Chestnut.....	New York.....	2.34	8.25@ 10.00	8.00@ 8.35	8.75@ 9.25	8.25@ 9.25	8.50@ 9.00	8.25@ 8.75
Chestnut.....	Philadelphia.....	2.39	9.25@ 9.50	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	8.60@ 9.00	8.65@ 8.75
Chestnut.....	Chicago*.....	5.06	12.00@ 12.50	7.35@ 8.35	7.95@ 9.25	8.00@ 8.35	7.81@ 7.94	7.72@ 7.95
Range.....	New York.....	2.34		8.30		9.00		8.50
Pea.....	New York.....	2.22	6.30@ 7.50	6.00@ 6.30	4.50@ 5.25	5.75@ 6.65	4.50@ 5.00	5.50@ 6.00
Pea.....	Philadelphia.....	2.14	7.00@ 7.25	6.15@ 6.20	4.75@ 6.50	6.35@ 6.60	5.00@ 6.75	6.00
Pea.....	Chicago*.....	4.79	7.00@ 8.00	5.49@ 6.03	4.50@ 5.60	5.40@ 6.05	5.13@ 5.36	5.36@ 5.55
Buckwheat No. 1.....	New York.....	2.22	2.50@ 3.25	3.50@ 4.15	2.25@ 2.75	3.00@ 3.50	2.25@ 2.75	3.00@ 3.15
Buckwheat No. 1.....	Philadelphia.....	2.14	3.50	3.50	2.25@ 3.00	3.50	2.75@ 3.00	3.00
Rice.....	New York.....	2.22	2.00@ 2.50	2.50	1.75@ 2.25	2.00@ 2.50	1.75@ 2.25	2.00@ 2.25
Rice.....	Philadelphia.....	2.14	2.50	2.50	1.75@ 2.25	2.50	2.00@ 2.25	2.25
Barley.....	New York.....	2.22	1.25@ 1.50	1.50	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley.....	Philadelphia.....	2.14	1.50	1.50	1.25@ 1.50	1.50	1.50	1.50
Birdseye.....	New York.....	2.22		1.60	1.60@ 1.75	1.60	1.60@ 1.75	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924	1923
April 7	171	233
March 31	173	233
March 24	176	233
April 9	207	233
Weighted average price	\$2.07	\$2.13

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

fairly good for cheaper grades; country steam is quiet.

Business is better at this particular season this year than in many years, considering the fact that there is no strike, and on the other hand nothing that would indicate a prosperous territory in the vicinity of St. Louis.

Kentucky Is Upset

Failure of the operators and union leaders to reach a wage scale agreement and extension of the old contract to April 15 leaves the western Kentucky field in an unsettled condition, as operators do not know what conditions will prevail after April 15, and are unable to book much business. Some sections are taking the bull by the horns and going non-union now, their old contracts having expired, regardless of the extension at Louisville.

Demand for coal is very quiet, and while western Kentucky screenings have advanced from 90c. to \$1.10@1.35 it is due principally to lack of production rather than real demand. Mines are operating from one day to a day and a half a week, with just a few getting in two days. Prices of prepared sizes have slumped off, and egg, lump and block are all quoted at \$2.25@2.50 this week, and probably can be shaded a little in some instances.

Some eastern Kentucky operators are asking \$2.75 and even \$3 for block coal, but \$2.50 appears to be about the top at this time. Many of the eastern Kentucky mines are non-union, and can therefore make the price without hurting themselves; the rest are being forced to come to it. Some contract business is pending, but no new business has been reported as placed over the past several days, although railroad contracts are due. There is no early inquiry on Lake business.

Northwest Trade Goes Flat

The market has dropped off at Duluth all around, with bituminous suffering to the extent of \$1 to \$1.50 and anthracite off about 25c. The break was caused by three dock companies which sent around a circular letter cutting prices, and the other companies followed suit. The prices are: Kentucky lump, \$5.50; mine run, \$5; screenings, \$4.25; Youghiogheny lump, \$5; mine run, \$4.50; screenings, \$4; Hocking lump, \$5; mine run, \$4.50; screenings, \$3.75; Splint lump, \$5; mine run, \$4.50; screenings, \$4.25; Pocahontas lump, \$7; mine run, \$5.75; screenings, \$4.75. Anthracite prices are these: Stove, \$13; egg, \$12.70; nut, \$13; pea, \$10; buckwheat, \$8. The market has no activity. The docks are not anxious to sell at the new prices, as they claim they will lose money, and the public is showing no disposition to buy.

The coal market continues quiet at Milwaukee with demand for domestic grades fluctuating with weather conditions. The steam trade also is light. Consumers who put in heavy supplies last autumn in anticipation of a strike in the spring are now working off their surplus.

April brought a reduction of 50c. per ton on anthracite and \$2 per ton on coke. Egg size hard coal is now held at retail at \$15.90; stove, \$16.30; nut, \$16.15; pea, \$13.80, and buckwheat, \$11, with an extra charge of 75c. per ton when coal is carried to bins. Large sizes of Solvay coke now sell at \$12.90 and pea coke at \$9.90. Gas coke is quoted at \$11.75 for egg and nut, and \$10 for small and pea coke. Dock companies announce that there will be no change in soft coal prices until May 1.

West Does Some Business

A brisk business preceded the closing of mines through the Southwestern district April 1, pending the agreement of operators and miners on a new wage scale. Industries and railroads bought heavily, leaving small surplus of screenings at the mines. Domestic sizes moved more slowly, and mines report some surplus. But, as it is generally expected that the suspension of work will continue through April, this is causing no worry.

Business continues fairly good in the Colorado coal market. Mines worked on an average of a little better than three and one-half days last week. The cheaper grades are the popular selling coals. The cold weather which has prevailed for the past few weeks is still hanging on and the outlook for next week appears bright. Prices are unchanged since March 1.

A cold snap in Salt Lake City has stimulated consumer demand, but industrial buying is light. The slack situation is improving a little as a result of the better demand for prepared sizes. Slack prices are 25 cents higher than last week, mine prices being \$2 for screen slack and \$1.50 for straight slack. Other mine prices are: Lump, \$4; domestic lump, \$3.50; stove, \$3; nut, \$2.50; pea, \$1.75. Retail prices are \$8, \$7.50, \$7, \$6.50, \$6 and \$5, respectively.

Improved Tone in Cincinnati

A better tone is observable in the Cincinnati market. Less "consignment" coal is coming to the market and "distress" coal that had been cluttering things up for three weeks, is moving. Pocahontas producers have cut production to actual contractual demands plus a reasonable allowance for current sales, which is about one or two days a week. Low-volatile business has perked up noticeably, New River and off-grade shippers bringing their prices more on a line with the circular of "standard" companies. The high-volatile trade also shows improved tone, the "don't care" attitude being less in evidence. The volume of business is still far below normal. Specialized coals are quoted as follows: Block, \$3@3.50; egg, \$2.25@2.75. Retailers were greeted with a flock of small orders on the heels of a cold snap, but prices remain unchanged.

Trade at Columbus continues quiet and featureless. Buying is at a low ebb both for steam and domestic tonnage, although some attention is being given to railroad-fuel contracts. General contracting for steam tonnage is being held up to ascertain prices on railroad fuel and it is believed that some contracting will take place the latter part of the present month. Prices are still low and irregular although there is not nearly as much distress coal on the market and quotations are working toward stability. Demand for steam tonnage is not large, as many of the larger consumers still have considerable surplus. Domestic trade is quiet as it is between seasons and dealers are cleaning

up. Production in Ohio is lower than at any time in months. Little has been done in contracting for late shipments.

About 20 to 30 per cent of the mines in eastern Ohio already have closed or are closing, due to lack of orders and there is no indication that this heaviness will lift in the near future, as large consumers are well stocked. Especially is this true of the railroads, public utilities and large steel plants. Because of the abundance of fuel, negotiation of contracts is being deferred, and it is likely that the major portion of tonnage moving during the new coal year will be in the open market rather than upon a contract basis. Due to the lower production of prepared sizes, slack and nut and slack have become less abundant and prices have stiffened 10 to 15c. per ton as compared with a week ago.

The situation at Buffalo has not changed materially. The market is markedly dull and the outlook is for a continuance of this state of things.

Production in the Pittsburgh district continues to decline. The decrease in shipments of gas lump decreased the supply of gas slack offered in the spot market, which is now up 5c. from a week ago. Steam slack also is higher, owing to the practical disappearance of domestic coal shipments. The spot market continues dull.

New England Market Drags

In New England the steam coal market drags along in discouraging fashion. New low levels at Hampton Roads are the only new feature. There are no developments for all-rail. The industries complain of dull business; neither in shoes nor in textiles nor in machinery is there demand sufficient to absorb current production. The prospect is so uniformly drab that practically no buyers are in the market.

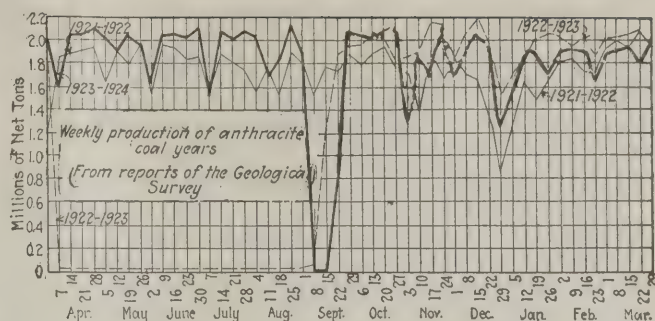
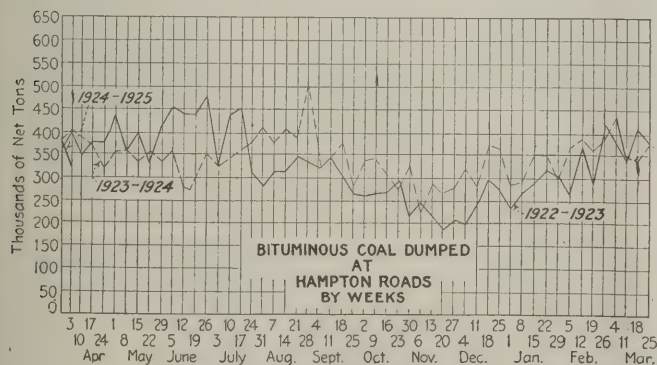
At Hampton Roads there are still heavy accumulations. The Western market is not particularly helpful and since operators seem disinclined to curtail there are likely to be further bargain sales at the Virginia terminals. A few sales of No. 1 Navy Standard Pocahontas and New River at \$4 flat have been rumored, but it is the impression of the trade that it would be difficult to pick up a cargo of any considerable size of really first-grade coal at less than \$4.15 per gross ton f.o.b. vessel.

On cars at Boston the quotations of the various factors are similarly depressed; \$5.50 per gross ton on cars has been an open price now for more than ten days, and there is a feeling among possible buyers that this figure will be materially shaded by certain of the agencies who have coal now en route for disposition inland from railroad wharves.

From central Pennsylvania all-rail there is likely to be decreasing movement, now that 1923 contracts have expired in so many instances. Neither via New York nor Philadelphia is coal being dumped in any volume worth mentioning. The differential in cost at seaboard operates so strongly in favor of Hampton Roads coals that April is certain to be a very light month for bituminous in Pennsylvania.

Seaboard Markets at Low Ebb

The coal trade at New York has settled down to a dull summer in the opinion of many coal men. Consumers are not showing any disposition to increase present stocks and operators are inclined to close more mines rather than operate at a loss. Complaint is current that considerable coal is now sold below the cost of production. Contract making is far below normal and demand in the spot market is at low ebb. Tidewater business is slow and there is some distress



coal in the New York harbor, but the tonnage is not large. Local houses are carefully watching the British situation, hopeful of obtaining some business if the miners go on strike. Quotations at Hampton Roads are off, but there is practically no foreign business being booked.

The ripple created at Philadelphia by the wage parley of the central Pennsylvania operators quickly melted away after the operators gave into the miners and adopted the union scale. Some shippers seemed to feel that the occasion warranted price increases, but it is doubtful if any considerable coal was sold at increased figures. Stockpiles continue to shrink and there is no indication that consumers will replace stock in the immediate future. Railroad buying also is quiet.

At Baltimore it is a "beggar's market," a case of survival of the fittest. The export outlook, however, is bright.

Prices are much better stabilized in West Virginia largely as a result of more limited production following a period during which coal was being literally thrown on the market. Even with production curtailed, demand is hardly equal to supply, but supply and demand are becoming more nearly equalized.

Market conditions at Birmingham show little change. Inquiry for spot steam coal is light and negotiation of contracts for industrial and railroad fuel has not assumed much proportions as yet. Reports indicate that producers of the better grades of domestic coal are comfortably sold up, in many instances for the entire year.

Anthracite Trade Dull Despite Price Cut

Reductions in the prices of domestic sizes of anthracite by the operating companies ranging from 40c. to 60c. on broken, egg, stove and chestnut coals and from 50c. to \$1.15 on pea coal failed to arouse any interest in New York so far as demand goes. There was no increase in movement, although retail dealers reported a fair volume of orders. Consumers show no anxiety about delivery although the present prices are for April only. Stocks in the retail yards are so large that consumers who ask for prompt delivery are easily accommodated. Independent operators, endeavoring to move their coals, often find it necessary to shade prices considerably in order to make shipments. Steam coals are moving in fair volume. Company reductions range from 35c. to 50c. on buckwheat and from 25c. to 50c. on rice. There was no cut in the price of barley, this remaining at \$1.50. A couple of the companies will make quotations only on application. A heavy snowfall on April 1 brought a busy week to Philadelphia dealers in delivering emergency orders, and on top of this they have received considerable business for cellar filling, yet the operators have fewer orders on their books now than in any spring for years. Though steam prices have been reduced, all shippers are finding difficulty to induce their contract trade to sign up. Retail prices at Baltimore have taken a tumble of between \$1 and \$1.25 per ton, the greatest drop in recent years in the history of the trade.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended March 22, 1924.....	908,651	161,149
Previous week.....	916,953	170,554
Same week in 1923.....	916,818	184,931

	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
March 22, 1924.....	213,093	115,361	361
Previous week.....	275,002	88,479	604
Same date in 1923.....	12,741	4,111	75,993

Foreign Market And Export News

Strong Domestic and Foreign Demand in British Market; Output Higher

Pressure is strong for immediate supplies on the Welsh coal market, and all the collieries are heavily booked right up to the date when the strike is due. Buyers have been influenced by the rejection by the miners of the operators' offer, which is regarded as generous. Demand is strong from both domestic and foreign buyers.

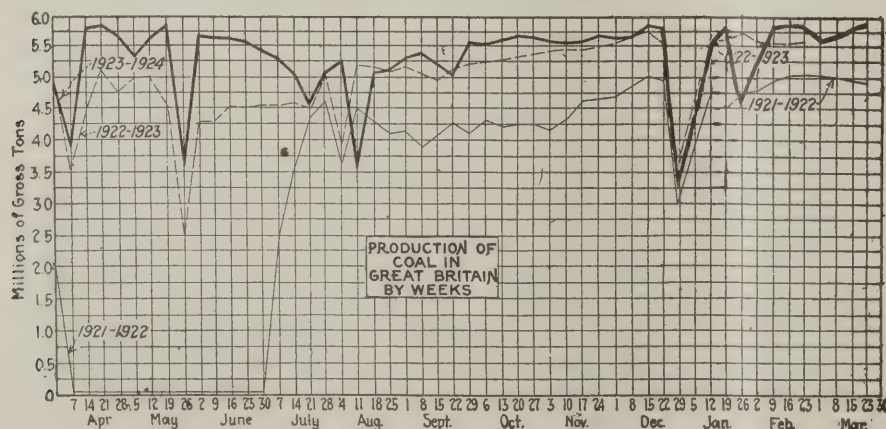
As a result of this pressure prices are rising strongly and many collieries are refusing new business until they have cleared off arrears occasioned by the rail and dock strikes. The impression is growing in some quarters, however, that the threatened strike will be averted, for some of the miners' associations are advising acceptance of the mine owners' proposals.

Loading congestion at South Wales is unabated, twenty-eight steamers awaiting berths although there is coal at the docks. The operators are trying to get the night loading shift at the docks reinstated to meet the rush for supplies, but with little success so far, the trimmers holding out for a 33½ per cent boost for the night shift.

The Newcastle market is firm for shipment up to April 15. Home demand is very strong but foreign buying has fallen off owing to the unsettled labor position, European exchanges and the dock strikes in Germany. British public-utility corporations are laying in heavy stocks against a miners' strike.

It is reported that Tyne has received a contract from the Paris, Lyons and Mediterranean Ry. for 400,000 tons of Durham coking coal, April-December loading. The French State Rys. also are seeking 60,000 tons for April-June delivery. A strike of Scottish coal trimmers is delaying Forth loadings. Rail deliveries to London are still badly congested.

Production by British collieries during the week ended March 22, a cable dispatch to *Coal Age* states, was 5,786,000 tons, according to the official reports. This compares with 5,778,000 tons in the week ended March 15.



Trade at Hampton Roads Dull But Hopeful

Dullness continues to mark the trade at Hampton Roads, with prices declining rapidly under distress orders, to save demurrage on large accumulations at tide. Export business has dropped slightly, while coastwise trade is barely holding its own. Bunkers show a slight gain.

Contracts are scarce, despite expectations that April 1 would bring large bookings. The tone of the market is rather weak, although the trade is optimistic, with a fair outlook.

Activities at the piers during March reflected a generally growing coal movement, under unfavorable conditions. The decline of the market was responsible for dullness here.

Industrial Demand Absorbs French Coal Output

Demand from industrial consumers in the French markets is ample to absorb the output. Trade in coal for household use, however, has eased up. The French collieries are receiving a large number of orders for replacement of purchases usually made abroad. Nevertheless, imports of British coals have been larger during recent weeks following the strikes in England.

Transportation has become easier during the week, due to an improvement in the supply of rolling stock.

Reparation deliveries to France and Luxemburg during the month of February were 332,700 tons of coal, 410,600 tons of coke and 65,000 tons of lignite briquets, a total of 808,700 tons, as compared with 775,900 tons in January and 584,000 tons in December. Deliveries to Belgium in February were 408,727 tons, including 53,587 tons of coke and 9,635 tons of lignite briquets.

The production of the Ruhr coal basin in February was 7,050,758 tons of coal (against 6,187,452 tons in Janu-

ary), including 6,371,451 tons for the occupied regions (as compared to 5,485,040 tons in January); 1,298,556 tons of coke (against 1,097,722 tons in January), a total for the occupied areas of 1,147,592 tons (against 881,910 tons in January). The results of the direct working of the mines and cokeries under Franco-Belgian administration are not included in the above figures.

Coal Imports by the United States During February (In Gross Tons)

	1923	1924
Anthracite.....	101,820	25,410
Bituminous.....	384,142	46,362
Imported from:		
United Kingdom.....	190,455	4,095
Canada.....	157,631	42,267
Japan.....	8,240	
Australia.....	16,784	
Other countries.....	11,032	
Coke.....	18,395	4,012

Export Clearances Week Ended April 5, 1924

FROM BALTIMORE

	Tons
For Argentina:	
Gr. Str. Evelpis.....	4,601
For France:	
Belg. Str. Daniel.....	9,364
For Italy:	
Br. Str. Betwa.....	4,537
Ital. Str. Vincenzo Florio.....	9,249

FROM HAMPTON ROADS

For Canada:	
Br. Str. Maraval for Georgetown....	982
For Newfoundland:	
Br. Schr. Anna MacDonald for St. Johns.....	307
For France:	
Sw. Str. Sir Ernest Cassel.....	8,611
For Cuba:	
Sw. Str. Ada Gorthon for Havana....	3,566
Nor. Str. H. C. Flood for Havana....	2,704
Br. Str. Berwindmore for Havana....	9,321
For Brazil:	
Br. Str. Haleric for Rio de Janeiro..	6,343

FROM PHILADELPHIA

For Cuba:	
Nor. Str. Vendeggen for Havana....	

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	March 27	April 3
Cars on hand.....	2,618	2,040
Tons on hand.....	164,269	118,498
Tons dumped for week.....	141,821	133,323
Tonnage waiting.....	20,000	12,100
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,807	1,853
Tons on hand.....	122,750	128,850
Tons dumped for week.....	117,707	67,573
Tonnage waiting.....	208	2,200
C. & O. Piers, Newport News:		
Cars on hand.....	2,224	1,967
Tons on hand.....	111,870	99,190
Tons dumped for week.....	74,788	88,863
Tonnage waiting.....	4,150	5,025

Pier and Bunker Prices, Gross Tons

PIERS	March 29	April 5†
Pool 9, New York.....	\$4.75@ \$5.00	\$4.75@ \$5.00
Pool 10, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 11, New York.....	4.25@ 4.50	4.25@ 4.50
Pool 9, Philadelphia.....	4.80@ 5.20	4.80@ 5.20
Pool 10, Philadelphia.....	4.55@ 4.90	4.55@ 4.90
Pool 11, Philadelphia.....	4.35@ 4.65	4.35@ 4.65
Pool 1, Hamp. Roads.....	4.40	4.15@ 4.25
Pool 2, Hamp. Roads.....	4.20	3.85@ 4.00
Pools 5-6-7 Hamp. Rds....	4.10	3.75@ 3.85
BUNKERS		
Pool 9, New York.....	5.05@ 5.30	5.05@ 5.30
Pool 10, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 11, New York.....	4.55@ 4.80	4.55@ 4.80
Pool 9, Philadelphia.....	5.10@ 5.55	5.10@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 5.00	4.65@ 5.00
Pool 1, Hamp. Roads.....	4.40	4.15@ 4.25
Pool 2, Hamp. Roads.....	4.20	3.85@ 4.00
Pools 5-6-7 Hamp. Rds....	4.10	3.75@ 3.85

Current Quotations British Coal f.o.b. Port, Gross Tons

	March 29	April 5†
Cardiff:		
Admiralty, large....	31s.6d.@ 32s.6d.	32s.@ 33s.
Steam smalls.....	22s.6d.@ 23s.6d.	22s.6d.
Newcastle:		
Best steams.....	26s.@ 26s.6d.	26s.6d.@ 27s.
Best gas.....	25s.@ 25s.6d.	25s.6d.
Best bunkers.....	24s.6d.	24s.6d.

† Advances over previous week shown in heavy type, declines in *italics*.

News Items From Field and Trade

ALABAMA

George C. Randall, formerly manager of the southwest division of the American Railway Association, Dallas, Texas, has been appointed district manager of the association for the Southeastern division, according to announcement of M. J. Gormley, chairman. Mr. Randall succeeds S. H. Charles, who died recently.

ILLINOIS

The Central Illinois Coal Traffic Bureau has dissolved. It ceased to function April 1, when its office lease ran out in the Old Colony Building, Chicago. W. A. Holley, manager of the bureau for several years, is counting on enjoying a summer of ease for once in his life. G. B. Hemphill, who was assistant to the manager, has joined the Chicago Coal Merchants Association as traffic manager with offices in the Transportation Building.

The West mine broke its record again March 27, when 6,045.85 tons was hoisted in eight hours. The previous record was 6,020.25 tons made on Nov. 27, 1923. To make the record there were 1,239 hoists. No. 9 mine is known as West mine in Nokomis. Average tonnage for month of March was 5,742 tons per day. F. W. Schneider is mine manager at No. 9 mine, and E. H. Hebenstreit is superintendent of the company.

The Franklin County Coal Co., formerly the Taylor Coal Co., has sold its retail department in Chicago to Wright & Co., of Chicago. The Taylor retail division controlled a small dock and did a considerable business in steam coal for Chicago downtown buildings. Its manager, R. H. Hatfield, joins Wright & Co.

INDIANA

The Sugar Valley Mining Corporation, Terre Haute capitalized at \$50,000, has filed articles of incorporation with the Vigo County Recorder. This company will lease from the Macksville Mining Company, recently incorporated for \$500,000, the Sugar Valley mine, operated by the Sugar Valley Coal Co. before it went into the hands of a receiver. Directors of the new corporation are John F. O'Brien, Joseph Mullikin, A. J. Beasley, Edwin H. Long and Arthur C. Boston. Directors say the Macksville Co. and the newly incorporated company are the same, with the exception that the new organization has a few additional stockholders. Eventually, it is said, the Macksville Co. will dissolve.

Seventeen months of litigation in the federal court over the Central Indiana R.R., known as the "Indiana Coal Road," ended recently when Judge A. B. Anderson entered a decree discharging William Pirtle Herod as receiver. The Central Indiana Railway Co. will operate the road. A fee of \$25,000 was allowed Herod for his services. The road is between Muncie and Brazil, and goes through the coal fields. The latest difficulties of the old Midland began when the Central Union Trust Co., of New York, filed a complaint against it. It was ordered sold by Judge Anderson, but Charles Martindale, master in chancery, could find no buyer. The decree of sale was returned unexecuted. The new decree set out that all outstanding obligations had been cared for and mortgages had been satisfied. Herod was ordered to give up all property that he held as receiver to the Central Railway Co. The company assumed liability for all claims.

KANSAS

Kansas coal mines produced 4,650,479 tons in 1923, an increase of 1,132,236 tons over the output of the preceding year, according to the annual report of James Sherwood, who retired as state mine inspector on April 1 and was succeeded by Leon Besson. Crawford County deep mines produced 3,091,743 tons, or 87 per cent of the total; Crawford County strip mines 324,545 tons, or 7 per cent; Cherokee County deep mines 392,392 tons, or 8

per cent; Cherokee County strip mines 337,327 tons, or 7 per cent. The chief producers outside these principal fields of the state were Leavenworth County, with 137,563 tons, and Osage County, with 74,047 tons. The total number of men employed in mining was 10,459, an increase of 383 over the preceding year. The mines averaged 118 days' work, a decrease from 1922.

KENTUCKY

The Columbus Mining Co., 332 Michigan Ave., Chicago, Ill., is contemplating doubling the size of its No. 5 mine at Al-lais, by opening two seams on the side of a hill across a valley from its present tippie. A long conveyor is to run up the slope, connecting the new operations with the old tippie. Allen & Garcia, of Chicago, are the engineers.

Federal Judge A. M. J. Cochran, Eastern Kentucky division, in a decision at Frankfort, on April 2, granted a temporary injunction to the Liberty Coal & Coke Co., on Straight Creek, in Bell County, restraining members of District No. 19, United Mine Workers, from interfering with operation of the company's mines and with its employees. The judge has under advisement contempt proceedings against union miners charged with violation of a previous injunction.

A report from Harlan, Ky., under date of March 31, stated that the Henry Ford interests, operators of the Banner Fork mines on Wallins Creek, were planning a million dollar water-power development to furnish power to Ford operations.

It is reported from Whitesburg that W. J. Wray and Thomas Miller, of Northfork, W. Va., connected with the Elkhorn-Hazard Coal Co., operating at Sandlick, were recently in Whitesburg, making arrangements for enlargement of the company operations, the concern planning expenditure of around \$100,000 in improvements. It was also reported that the Reliance Coal Co., Cincinnati, is erecting sixty additional miners' homes at the Glomawr plant.

An imposing monument has been erected at Jenkins to the memory of John G. Smyth, former manager of the Consolidation Coal Co. and founder of the coal towns of Burdine, Jenkins, McRoberts and Dunham, who was killed by a slate fall in a mine at Elswick about eighteen months ago. The monument was erected in a public park through contributions from thousands of company workers.

Two hold-up men who looted the Bank of Vico, Perry County, of a \$6,000 payroll of the Knott Coal Corporation, and \$8,000 of bank money, were captured a few miles from the town, riding the rods of a coal train. The country is so wild and passes are so few that there is not much opportunity for a thief to escape.

S. T. Ballard, of Louisville, official of the Liberty Coal & Coke Co., of Straight Creek, who has been spending the winter at Eau Gallie, Fla., was taken to Jacksonville, Fla., for an emergency operation for appendicitis. He was in a dangerous condition, but is reported to be improving.

The Louisville & Nashville R.R. has placed some contracts for its own coal supply with mines on its lines. One Louisville concern stated that it had obtained eastern Kentucky contracts at around \$1.75 a ton, but understood that business had been placed at all the way from \$1.65 to \$1.90 a ton for mine run in eastern Kentucky, and that some business had been placed at from \$1.85 to \$1.90 in western Kentucky.

MASSACHUSETTS

Sealed proposals for furnishing approximately 6,000 gross tons anthracite for use of the Commonwealth of Massachusetts in its various institutions will be received by the Commission on Administration and Finance, Room 315, State House, Boston, Mass., until 2 p.m., Monday, April 14, 1924, and then publicly opened and read. Copies of specifications and bidding sheet may be secured upon application to the commission.

NEW YORK

Shipment of coal contributed heavily toward the prosperity of the Erie R.R. in 1923. The increase of more than \$14,000,000 from this source and from the transportation of general merchandise was in a large measure responsible for the excellent results attained from operations in 1923, when net income after taxes and charges was \$8,435,272, as compared with a deficit of \$3,132,770 in 1922. After allowing for 4 per cent dividend requirements on the first and second preferred stocks, the company earned \$5.22 a share on \$112,481,900 common stock. The sole explanation for the increase in the item "Coal" was the fact that in 1923 the company's revenues were not affected by strike conditions like those in 1922. The income account for the year ended Dec. 31 last shows total operating revenues of \$132,978,455, as compared with \$106,874,103 in 1922. Operating expenses were \$108,070,145, as compared with \$100,101,523. After deducting sinking fund charges the company had a surplus of \$7,218,207 in 1923, as compared with a deficit of \$4,078,817 in 1922. Decrease of some \$3,000,000 in cash in the statement of assets on the company's balance sheets as of Dec. 31 last was more than made up by the decrease of more than \$6,000,000 in loans and bills payable. "Accounts and wages payable" decreased from \$17,081,700 in 1922 to \$15,357,309 in 1923.

The American Coal Co. for 1923 reports profits of \$1,112,691 against \$821,166 in 1922, after allowing for all operating expenses. After reserves for depreciation, depletion and other charges there was a balance of \$915,852, against \$639,765 in 1922. The 1923 balance was equal to \$18.46 a share on the 49,598 shares of \$25 par value capital stock before provisions for federal taxes, against \$12.90 a share in 1922.

The Louisville & Nashville R.R. in the year ended Dec. 31, shows net income of \$13,498,935 after taxes and charges, equal to \$11.53 a share on \$117,000,000 capital stock, against \$10.598,019, or \$14.72 a share on \$72,000,000 stock in 1922. Operating revenue was \$136,375,672, against \$121,138,840; operating expenses \$109,865,090, against \$99,604,496; dividends paid during the year increased to \$5,850,000, as compared with 5,040,000 in 1922. The company's surplus rose to \$7,427,833, against \$5,387,134 in the previous year.

OHIO

The Shores-Allen Land & Fuel Co., St. Clairsville, has been incorporated with a capital of \$100,000 to mine and deal in coal and coke. A general jobbing and retail business also will be done. Incorporators are Ethan E. Allan, Albert E. Clark, William Hickman, R. S. Fry and Louis M. Shores.

Stockholders of the Hocking Valley Railway Co., at their annual meeting recently at the Spahr Building, Columbus, elected the following directors: O. P. Van Sweringen, Cleveland; M. J. Van Sweringen, Cleveland; W. J. Harahan, Richmond, Va.; J. J. Bernet, Cleveland; C. L. Bradley, Cleveland; W. A. Colston, Cleveland; Thomas J. Davis, Cincinnati; Parmely W. Herrick, Cleveland; F. R. Huntington, Columbus; Otto Miller, Cleveland; J. R. Nutt, Cleveland; Walter L. Ross, Toledo, and J. B. Zerbe, Cleveland.

The Mid-West Coal & Mining Co. has opened an office in the Union Trust Building, Cincinnati, with R. N. Osborne, Jr., as district manager and H. K. Howard as assistant. Mr. Osborne formerly was sales manager of the Borderland Coal Sales Corporation, and previously was with the Smokeless Fuel Co., and the Glen Alum Fuel Co. Mr. Howard formerly was with the Black Diamond Coal Co. of Cincinnati, and for a short time was with the Old Dominion Coal Corporation as resident manager. A. F. Dietrick is the head and general manager of the Mid-West company, with general offices at Cairo, Ill.

The Central Fuel Co., of Cincinnati, has liquidated, according to a statement issued by its president, B. Lee Hutchinson. The company was started during wartimes to do a jobbing business, but for the past two years has been handling mostly the output of the mines of Mr. Hutchinson and his brother. Negotiations are said to be pending by which these, which are in the Logan County and Kanawha fields, will be taken over by a large Fairmount (W. Va.) corporation. James Hatch, of the Cincinnati office, has joined the forces of the Hutchinson coal company.

After nearly three years, the final record has been filed in the closing of the business of the Peerless Coal Co. in Cincinnati with the filing of the report of Charles T. Greve, referee in bankruptcy. This shows that the total liabilities were \$20,873 with assets realized of \$9,381, hence the creditors received \$8,610, or 41½ per cent.

Pickands Mather & Co. announces the removal, March 31, of its offices from the Western Reserve Building to the twentieth floor of the Union Trust Building, Cleveland.

The Crown mine, Rose Farm, which had been idle for several months, has resumed operations giving employment to approximately 300 miners. Several large contracts have been obtained by the owners.

PENNSYLVANIA

Indications are that the strike at the Vintondale Collieries, at Vintondale, will be prolonged for some time. District President John Brophy states that every man employed about the operations has joined the union, there being now 400 members in the Vintondale Local. From other sources this is denied. Evictions continue. Governor Gifford Pinchot has advised the evicted miners to resort to the courts to stop evictions, as, to his mind, the leases are perfectly legal. President Charles M. Schwerin, in reply to the Governor, said he could scarcely stop evictions now as the twenty families notified to vacate company property had already moved out. Mr. Schwerin declared that "when we find these occupants trouble makers, we feel that we are in the right when we ask them to leave, as we consider the homes the workers occupy just as much the property of the company as the mines, the pumps, fans or dynamos." Governor Pinchot notified company officials that he had sent a mediator into Vintondale to see what could be done to end the strike.

A \$46,000,000 program of hydroelectric development has been announced by the Penn Public System of the Pennsylvania Electric Corporation, which is erecting three dams and power stations as part of the program, on the Clarion River, in Clarion County. The plant is expected to be ready for operation by June. The project is known as the Piney Development. It was started in 1922 as the smaller of three projects on the Clarion which will cost \$28,000,000. The other part of the program takes in the Youghiogheny River in Garrett County, Md. There, 2,400 feet above sea level and "at the top" of the Alleghenies, the first of four dams and three power stations are under construction, at a cost of about \$18,000,000. According to officers of the corporation, each of the underlying companies is able to finance its developments through the sale of bonds and stocks. They include the Erie Lighting Co., Home Heating Co. (Erie), Warren Light & Power Co., Jefferson Electric Co., Du Bois Electric & Traction Co., Centre & Clearfield Railway Co., Johnstown Fuel Supply Co., Sykesville Electric Light, Heat & Power Co., Big Run Light, Heat & Power Co., Penelec Coal Corporation and the Venango Public Service Corporation group of nine others. Other participating corporations in the development of the system are the Clarion River Power Co., Eastern Land Corporation, Clarion Water Co., Youghiogheny Hydroelectric Corporation, Eastern Coal Corporation and the Penelec Water Co.

Thursday evening, April 24, has been set as the date for the banquet for the members of the Johnstown Mining Institute. State Geologist George H. Ashley, of Harrisburg, has been invited to deliver an address. Charles O'Neil, of Altoona, secretary of the Central Pennsylvania Coal Producer's Association, also will speak. Five hundred are expected to attend.

An analysis of the causes of accidents that, during the past five years, have cost Pennsylvania's mining industry the labor represented by approximately 16,000 men employed steadily through that period—80,145 man-years—has just been completed by the Coal Mine Section of the Pennsylvania Compensation Rating and Inspection Bureau. The analysis, comprising more than fifty tables and charts prepared under the direction of Rush N. Hosler, superintendent of the section, covers Pennsylvania's mine-accident experience during the seven years from Jan. 1, 1916, the time when the Pennsylvania workmen's compensation law went into effect. During this period there were 3,620 fatalities in the anthracite field and 3,003 fatalities in the bituminous regions of the state. The analysis covers these as well as the non-

fatal casualties. Contrary to the popular belief, the analysis shows, explosions in the mines are not the cause of the greatest number of accidents. Falls of rock and roof rank first among the causes of injury and death to the mine workers. Haulage accidents come second. The miner killed at his work leaves an average family of three children, and the average age of each dependent child is six years and thirty-four weeks.

Thomas Elliott, of Brownsville, president of the Lilley Coal & Coke Co., of West Brownsville, is making an extended tour of Europe. He will be away for several months.

A state charter has been issued to the Red Top Coal Co., Indian Head, with a capital stock of \$50,000. The purpose of the company is to acquire coal and coal lands and their operation. The incorporators are Ralph P. Barnard, 1420 New York Avenue, N. W., Washington, D. C., treasurer; Charles S. Harper, Philadelphia and George N. Ault, Ridley Park.

TEXAS

For the year ended Dec. 31, 1923, the Texas & Pacific Coal & Oil Co. reports a net loss of \$279,238 after depreciation, depletion, amortization and inventory adjustments. This compares with a net income of \$2,077,736, after depreciation, but before depletion, amortization, etc., in the previous year. After the payment of dividends there was a deficit of \$701,520, as compared with a surplus of \$1,233,175 for 1922. The gross earnings for the year were \$5,625,306, as compared with \$7,316,287 for 1922.

UTAH

The U. S. Fuel Co., of Salt Lake City, has contracted with Roberts & Schaefer for the complete installation of new steel tipples and screenings bins at East Hiawatha.

Nels R. Erickson, formerly general sales manager of the Premier Coal Co., has been appointed to a similar position with the Rock Springs Coal Co., of Ogden. Mr. Erickson has been in the coal business since 1912.

VIRGINIA

The State of Virginia has awarded a contract for 25,000 tons of New River pool No. 1 coal to the Lake & Export Coal Co., to be delivered over the Chesapeake & Ohio at \$1.95 net tons at mines. A contract for 35,000 tons of Pocahontas pool No. 1 was awarded to the Virginia Smokeless Coal Co., to be delivered over the Norfolk & Western at \$2.10.

The City of Norfolk has awarded a contract for 9,000 tons of navy standard Pocahontas coal to the Smokeless Fuel Co., at \$2.25.

WASHINGTON

Foreseeing less oil fuel competition with the decline of California oil production, the Pacific Coast Coal Co. is now developing two new mines near Seattle. One is the new Newcastle mine, now getting into its stride, and the other is to be called the Indian mine, at the village of Indian, in the Cedar River valley. This mine is expected to attain a production of 1,000 tons a day by Sept. 1. These mines are to replace the old Newcastle mine and the old Black Diamond mine, both of which are approaching exhaustion.

WEST VIRGINIA

The Thomas & Wilson Coal Co. will commence the development of coal territory on Cabin Creek in the Kanawha field in the near future, having leased about 515 acres on the west side of Cabin Creek from the Ohley Coal Co., subject to the rights of way of the Chesapeake & Ohio Ry. and the Virginian Power Co. and the surface rights of the Don Coal Co. The company is headed by John Oldroyd, of Upshur County. The lease runs for a period of 20 years, dating from March 6 and gives the Thomas & Wilson Co. the exclusive right to mine coal, make coke on the premises and to erect any necessary buildings. The lessee is to pay a royalty of 7c. a net ton except when coal is down to \$2 a ton or less, when a royalty of 5c. a ton is to be paid. From June 1, 1924, to Sept. 1, 1924, the minimum royalty payment is to be \$100 a month whether that much coal is mined or not, and thereafter \$2,400 a year whether the amount of coal mined would yield that sum annually or not.

The annual report of the West Virginia Department of Mines for the year ending June 30, 1923, just submitted to Governor E. F. Morgan, shows that 81,136,729 gross tons of coal and 823,912 net tons of coke was shipped over the railroads from West Virginia mines. Shipments by river totaled 1,097,277 tons, 925,830 tons of which originated on and was floated down the Great Kanawha and 171,447 tons was shipped on the Ohio River. This does not include the tonnage consumed by water craft and local river trade. There was no coal shipped on the Monongahela River and no coke was shipped either on the Kanawha, Monongahela or Ohio rivers during the year. The report of the department shows that during the year the average wage received by pick miners throughout the state for mining run of mine coal was 97c., which was an increase of 2c. over the price paid in 1922. Each pick miner produced an average of 1,237 tons, an increase of 126 tons over the fiscal year 1922. The average annual wage of pick miners (all pick miners included) was \$1,199.89, an increase of \$144.44 over that of 1922. The average selling price of coal shipped from the mines of the state was \$3.18 per gross ton, run of mine coal, an increase of 63c. a ton over that for 1922. Coke was sold f.o.b. at the ovens at an average price of \$7.14 per net ton, an increase over the previous fiscal year of \$1.23 per ton.

The Diamond Coal Co., of Fairmont is building a new steel Marcus tippie at Riversville.

WASHINGTON, D. C.

The U. S. Civil Service Commission announces an open competitive examination for Junior Engineer, mining, to fill vacancies in various branches of the government service at an entrance salary of \$1,860 a year. The examination will be held throughout the country on May 7. Full information and application blanks may be obtained from the U. S. Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. Civil Service examiners at the post office or custom house in any city.

CANADA

A resolution calling upon the government to initiate a policy which would give to the Dominion an all-British and Canadian coal supply, was moved in the House at Ottawa March 31 by T. L. Church, Conservative member for North Toronto. Mr. Church's motion asked that a duty be placed on coal from the United States so as "to insure an all-British supply for Canada, and thus afford adequate protection to coal mined and coked under the British flag."

The Maritime Coal Co., operating mines at Joggins, for many years, has negotiated an agreement with the company's employees. The agreement is the same as that rejected by the miners of the British Empire Steel Corporation. The indications are that the miners of the Maritime company, while continuing with the United Mine Workers will refuse to recognize the Communist majority in the district who have repudiated the agreement.

The River Hebert pits will resume operations within the next few months, according to indication. A company is being formed to take over the mines, and all that is now necessary is to effect a wage and conditions agreement with the miners. The prospects are that the same agreement rejected by the miners in the district, by majority vote will be acceptable to the River Hebert miners. Indications are also that the miners employed in the Springhill mines will accept the so-called Barrett agreement. The Springhill miners are known to be out of sympathy with the Communist majority in the United Mine Workers and took no part whatever in the elaborate reception to J. B. McLachlan on his release from prison.

The Saunders Ridge Coal Co., Ltd., with head office at Calgary, Alberta, has been granted Dominion incorporation with an authorized capital of \$1,500,000.

The Liverpool Chamber of Commerce announces the formation of a company, including Sir Alfred Mond and representatives of other Welsh colliery interests, to install a complete breaking plant in Montreal to handle Welsh anthracite of the sizes required by Canadian trade. The plant will be ready to deal with shipments at the opening of this year's navigation season. In the first year the Welsh coal interests are expected to ship a minimum of 100,000 tons of anthracite to Canada.

Traffic News

C. & O. Buys Three Short Lines

The American Rolling Mill Co. announced the sale, April 1, to the Chesapeake & Ohio R.R. of the Ashland Coal & Iron Ry., a forty-mile road extending from Ashland to Seaton, Ky. The deal was said to involve approximately \$4,100,000 and was described as "cash." The deal was consummated in Cleveland, Ohio, by the Van Sweringen interests, which control the Chesapeake & Ohio.

Purchase of the Long Fork branch of the Baltimore & Ohio Railroad and the Miller's Creek line, both connecting with the Big Sandy division of the Chesapeake & Ohio Ry. was announced March 21 by the Chesapeake & Ohio. Both lines tap some of rich coal fields of Kentucky. The Long Fork line is about twenty-five miles long, and in its operation the Baltimore & Ohio was obliged to make use of the Chesapeake & Ohio's tracks from Martin to its own main line. The Miller's Creek road is little more than four miles in length, but it opened into fields which, on account of their geographical location, were regarded as belonging to Chesapeake & Ohio territory. The Chesapeake & Ohio, it is understood, has sought for several years to acquire these two lines. The purchase price was not made public.

Association Activities

Delegates attending the twentieth annual convention of the **Canadian Retail Coal Association**, in Toronto, on April 4 and 5, gave consideration to the problem of Alberta coal. The coal men pointed out a number of obstacles to economical distribution of Alberta coal in Eastern markets. Freight rates as arranged by the president of the Canadian National Rys. are prohibitive, and as the coal will not stand storing in the open air there is a problem of providing storage space and other facilities which would have to be faced. A crayon talk on "Coke and Its Manufacture" was given by F. E. Lucas, B.A., specialist of the Dominion Coal Co., and Major Charles B. Staats, director of the National Association, dealt with some of the problems and aims of the parent organization. The following officers were elected for the ensuing year: President, W. H. Smith, Owen Sound; Vice-President, F. A. Dunlop, Hamilton; Secretary-Treasurer, Bert Caspell, Brantford; directors, M. F. Cray, Guelph; T. E. Pratt, Peterboro; Fred Mann, Brantford; J. C. Fowlds, Oshawa; F. H. Marlatt, St. Thomas; G. F. Rogers, St. Catharines, and J. A. McLean, Wingham. A model of the Loree breaker, owned by the Hudson Coal Co., attracted considerable attention. C. D. Winter was in charge and in explaining its operation pointed out some of the problems of the mine operators.

Industrial Notes

S. A. Emery, former Eastern manager of the Dodge Manufacturing Co., has joined the sales force of the **Royersford Foundry & Machine Co.**, Philadelphia, Pa. He will sell the entire Royersford line, including Sells and Royersford bearings, hangers, couplings, collars and other transmission equipment. He joined the company March 1.

The **Semet Solvay Co.**, of Syracuse, N. Y., has contracted with the Roberts & Schaefer Co. for pneumatic dry cleaning tables for cleaning coke breeze at their Detroit operation.

Obituary

Charles Herr, proprietor of the Lackawanna Coal Co., in the city of Lackawanna, adjoining Buffalo, died in hospital on April 1, from injuries received from a falling coal conveyor in his yard. He was president of the Lackawanna Chamber of Commerce and otherwise prominent in business affairs. He was 53 years old and left a wife and eleven children.

W. C. Mullan, superintendent of the Continental No. 1 mine of the H. C. Frick Coke Co., at Uniontown, Pa., died at his home there on the afternoon of March 24. He was 70 years of age. Mr. Mullan was a native of Bradford, Pa., and at one time he was considered among the applicants for president of the Frick company. He was well known in mining circles in northern West Virginia, especially among those having connections with the coke belt. Burial was at Mount Pleasant, Pa., on Thursday, March 28.

Spencer H. Rhoads, auditor of the Rochester & Pittsburgh Coal & Iron Co., died at his home in Indiana, Pa., on March 28 of heart disease. His death was sudden, as he had attended to business during the day. He leaves a wife and daughter.

Howard Vernon McCardell, Cresson, Cambria County, Pa., coal operator, died at his home there on April 1 from burns received in a gas explosion in one of his mines on March 11. He was the son of Mr. and Mrs. James B. McCardell, of Cresson, and is survived by his wife, his parents and two brothers and a sister.

Stephen B. Jones, 69, of Chicago, father of Homer D. Jones, recent president of the National Retail Coal Merchants' Association, and for years in the retail coal business in Chicago, died March 23 at his home after a nervous breakdown.

Coming Meetings

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

West Virginia Coal Association. Annual meeting May 13-17, Cincinnati, Ohio. Secretary, W. H. Cunningham, First National Bank Building, Huntington, W. Va.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

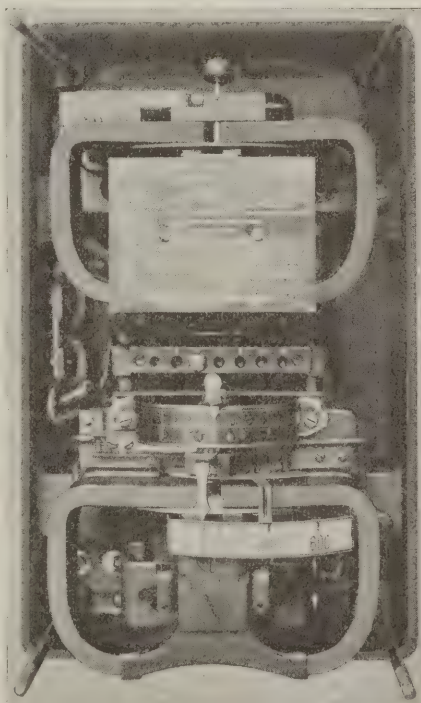
New Equipment

Current Relay Equipped with Self-Contained Ammeter

A line of overcurrent and directional relays equipped with a current-indicating element has just been developed by the Westinghouse Electric and Manufacturing Co. These relays differ from the standard CO and CR, overcurrent and directional relays respectively, in that they have self-contained ammeters which give a continuous indication of the current flowing in the circuit. They are designed for use where the relays are mounted on the front of a switchboard and where there is insufficient room to provide separate ammeters.

In addition to operating as protective relays, they indicate the current flowing through the circuit, thus showing that the relay is receiving current through its circuit and is in condition to operate if a short-circuit should occur.

The indicating element of this new relay consists of a thin copper disk mounted on a separate shaft and having its own jewel bearing and control spring. It is actuated, however, by the same flux which operates the main disk to close the contacts of the relay. This prevents the indicating element from operating when there is any trouble either inside or outside the relay that would prevent the main electro-magnet from being energized. This meter and



Directional Current Relay with Ammeter

Aside from protecting the circuit against any possible overload, this new relay gives a direct indication of the current in the circuit. This makes it relatively easy to set the relay for the proper current overload.

relay gives a visual indication of load variations and will show how the load builds up on the circuit.

Flow Meter Functions by Transformer Principle

A new type of electrically operated flow meter which works on the principle of an alternating-current transformer has been recently developed. This meter can be made indicating, recording or integrating to measure the flow of gas or liquid through a pipe. Owing to the electrical principle of operation the instruments can be placed

winding on a transformer. To supply this secondary current an increased current must flow in the primary which will be indicated on the ammeter.

The difference between the two currents will be a measure of the fluid flowing in the pipe line, as the height of the mercury in chamber A is a measure of the quantity. The current flowing in the mercury ring will be in direct proportion to its height. That is, a ring $\frac{1}{4}$ in. deep will have one half the current flowing in it that a ring $\frac{1}{2}$ in. deep would have, as the former has twice the resistance of the latter. Increasing the current in the secondary would cause proportional increase in

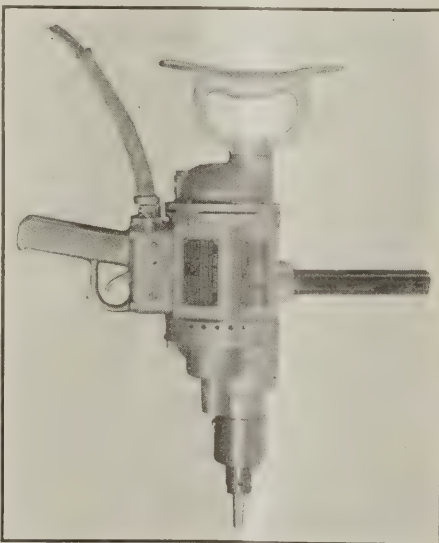
the primary current. The ammeter could be made to indicate the quantity of fluid directly by adjusting it so that with no flow in the pipe line, its needle would point to zero. Then calibrate it so that, as the mercury rises in chamber A, the increased current flow in the primary will cause the needle to point to divisions

on the scale representing the flow in the pipe.

This new meter is the product of the General Electric Co. and is not intended to supersede the mechanically operated flow meter of this company.

Electric Screwdriver and Socket Wrench

Quantity production methods demand the very latest designs in portable electric tools and their substitution wherever possible for the much slower and more costly hand operations. The



Motor-Operated Screwdriver and Wrench

Shop and repair work will be greatly facilitated by the use of this new machine, which is light in weight and easily controlled. Note the pistol grip and trigger switch, which greatly facilitates handling.

Black & Decker Manufacturing Co., Towson Heights, Baltimore, Md., announces a No. 3 portable electric screwdriver and socket wrench for heavy-duty production work. This tool, which weighs only 15 lb., has been designed particularly for driving very large wood screws, lag screws, and running up nuts on large bolts. The spindle is equipped with a positive clutch which automatically disengages when the forward pressure on the tool is released. The patented pistol grip and trigger switch is standard equipment. A universal motor furnishes the power and can be supplied for all standard voltages up to 250.

Instrument for Measuring Insulation Resistance

A new testing device known as the Junior Megohmer has recently been developed by Herman H. Sticht & Co., 15 Park Row, New York. Like other models of this kind made by the same company it combines a megohm-meter with a voltmeter. The instrument is one of the smallest of its kind, and is especially suitable where relative values of resistance are of more importance than very accurate measurements. It is a convenient instrument for inspectors because of its light weight.

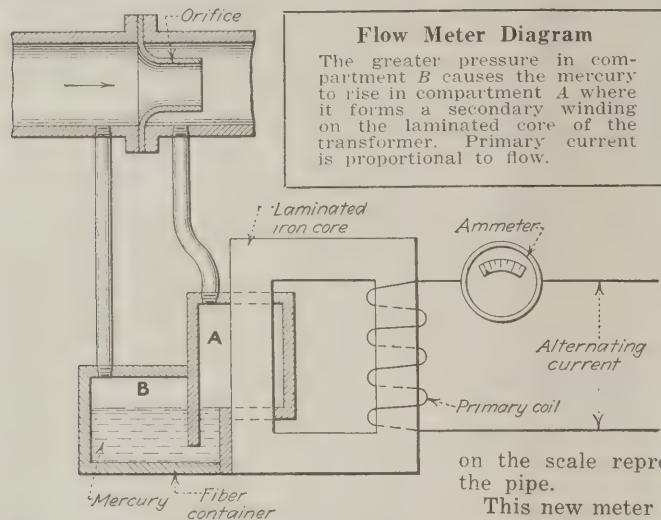
The measuring system consists of a small but high grade D'Arsonval galvanometer, with a double scale gradu-



Testing Instrument with Megohm-meter and Voltmeter

This instrument is suitable for making high-resistance insulation tests. It is complete in that it has its own generator and is provided with a voltmeter and a scale for measuring resistance in megohms.

ated 0-20 megohms and 0-120 volts. Four binding posts are provided, thus giving the instrument two voltmeter ranges, 0-120 and 0-240 volts, in addition to the megohm scale. Operating instructions are mounted in the cover of the instrument and are always visible to the operator when the instrument is in use. A hand operated magneto-generator furnishes 110-volt pulsating direct current which serves as a source of potential for insulation measurements.



any distance away from the pipe line through which the flow is being metered.

The electrical element is a transformer with a primary winding which is connected to a source of alternating current of constant potential. Without any secondary load on the transformer, the only current flowing in the primary winding is that to magnetize the core and supply the losses in the core and coil. If a properly calibrated ammeter is connected in the circuit as shown, it will indicate this current.

On the secondary leg of the core is a fiber container made in two compartments—one, A, that surrounds the core, and another, B, that contains mercury but is in communication with compartment A. These compartments are connected on the opposite sides of an orifice in the pipe line through which the fluid or gas flows. With no flow in the pipe line the pressure in A and B will be the same, and the mercury is at a height so as to be at a level with the bottom of A. When there is a flow in the pipe line, a difference in pressure is created across the orifice, so that the pressure in A will be lower than in B, resulting in mercury being caused to rise into A to a height that will equalize the pressure between the two chambers. When the mercury rises in chamber A, it surrounds the laminated core and forms a short-circuited secondary winding of one turn.

This ring of mercury around the core is similar to a copper ring, except that it has a higher resistance for a given cross-section. In the mercury around the core a current will be induced just as in a closed secondary

COAL AGE

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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. Dawson Hall
Engineering Editor

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Bad Work Never Pays

DOES the isolated plant pay? Only if it is well conducted and rightly equipped. That, in normal times, is true of almost any establishment. No one can persistently do the work wrongly and "get away with it." So perversely was the isolated plant slighted by its owner, starved, spurned, forgotten, that we wonder it so long endured. It was a marvel that purchased power did not come to the coal fields sooner. But today, the isolated plant at the coal mines is looking up. The Nason plant to which reference is made in last week's issue is a case in point and there are many others. Rightly planned, well executed, and properly operated, the isolated plant burning mine refuse survives and deserves to survive.

Making One Prosper Where Two Died Before

MOST of the mining companies are over extended. A few mines well worked and better equipped are better than many mines working slow time and inefficiently. A well-pruned tree grows more greenly than one that is limby. Some of the companies are doing a pruning job this spring and shutting down certain of their mines, and the evidence is that it is not being done any too drastically. One mine with conveyors, machine loaders and careful supervision will produce as much as three without these assisting factors and make a big profit into the bargain. A great man is he who makes two blades grow where one grew before, but greater is he who makes one mine bring in big dividends where before were two headed for a knockout blow by the auctioneer's hammer. The years 1924 to 1927 may set many operators into a way of thinking more clearly. The motto of these years will be "Better rather than more mines."

Talk Mines, Not Politics

FOR many years executives have been prone to talk politics rather than mines. A new era seems in prospect. We shall talk mines rather than politics. We seem likely to interest ourselves for a decade at least in new methods and new machinery rather than in log-rolling and lobbying. Conditions forced the latter on us whether we would or not. We were attacked and threatened. We were bullied and cajoled, and we could not mind our proper business even if we would. But that is over now, thank goodness. Even the U. S. Coal Commission is gone, and the politics of industry is over. We can leave the cracker barrel, the soap box and the picket fence and go back to the mines.

As a symbol of the new spirit, the operators, their engineers and executives are going to meet at Cincinnati—under the auspices of the American Mining Congress, mind you—to talk lower costs per ton, not the

Capitol, nor the President, the Fuel Administration, the Attorney General or the Governor of Pennsylvania, but, what is more important for all mining men, just plain and everyday mining and how it can be bettered. It takes almost a wrench to get back to business, and away from Washington. But it's worth while. We never mined much coal or did it cheaply, so long as it was being mined at Washington and Indianapolis. The Washington miners are little better than those at Moscow.

Selling Coal in Kilowatts

STUDIES by the experts under the Department of Commerce show that after 1930 there probably will be no growth in the use of northeastern hydro-electric power. This may be regarded by mine owners as a hopeful sign, and indeed it will make for increased prosperity, probably for commercial-mine owners and certainly for the industry. One must distinguish between the two because they are not necessarily the same. Indications tend to show that the power plants are rapidly acquiring mines and when they do they turn all the coal to their own properties and cease to absorb the byproduct of coal mining—slack.

What will be the fate of the commercial-mine owner if he can sell only domestic coal and has no market for steam sizes? Will it be to the advantage of the country and the custom-mine owner if the slack must be wasted or be a drug on the market? The metallurgical plants are already almost completely supplied with mines. The power plants and gas companies are coming into the same class, and little place is left for slack when these three are completely satisfied. When this tendency has become a universal condition, the coal operator will be back in the same place where he lay before the mechanical stoker was introduced.

Consequently, it would seem desirable that coal companies organize their own power-manufacturing companies or manufacture power themselves—running their stations, not with their entire product, but with their fine coal only, sending the coarse coal to the domestic market. In this way they will put each product to the purpose for which it is best adapted, and they will prevent the power, metal and gas companies from closing out their market for slack.

The field is not yet so completely filled that there is no room for starting this enterprise. Probably the mining companies will not need to merchandise power. They can put it on the busbars and leave to others its transmission and marketing.

The right place to manufacture is at the mines except where the distances are great. Mr. Hoover's survey shows that it is cheaper for Cleveland, which is 125 miles from the coal field, to get electricity from the mines than to generate it with coal transported to the city. The cost of delivered energy per kilowatt-hour is 6.7 mills, whereas the cost of energy on the

same basis generated by coal at Cleveland is 7.0 mills. At Baltimore, power transmitted from the mines 275 miles will cost 7.4 mills whereas power generated at that city will cost 7.45 mills.

At Philadelphia and New York, which are 350 and 425 miles distant respectively, it is cheaper apparently to generate at the city than at the mines using coal in both places as the source of power, but the difference at New York is only 0.6 of a mill, a quantity that might easily be offset by the use of inferior coal at the mine and other conditions. All this is dependent on a sufficient life being provided at the mine to keep the plant working for as many years as might be expected of the city plant without the necessity to ship in coal.

Two factors, however, militate against the conclusions given. One is that if the mine is to be used both as a source of power and as a source of domestic coal, it will either not have the necessary life or will have to be aided by railroad service. Two mines may be needed instead of one and an additional cost for transportation to the plant by railroad, mine track or conveyor will be incurred. This may be met, however, because the price of coal is estimated at \$3, which is high where the coal used is not the whole coal output but what is regarded as an inferior product. The average mine would be glad to get half that price for screenings.

A second consideration is that as the plant is at the mines, it is subject to the risk of strikes and possibly in case of a strike it might be hazardous to bring in coal from other mines to sustain operation whereas the plant in the city can use any coal that is on rails or on water, and so can weather the storm.

This difficulty is not preventing central stations from being erected at coal mines and should not prevent the mine owner from building such a station. When all the stations are tied together, hydro and steam, partial provision will have thereby been made for the exigencies of strikes. In any event much of the sale of power will be local and a strike will reduce the local demand for power greatly. Hence, failure of supply will occur at the same time as a failure of demand and no one will suffer.

Our Labor Exodus

IN METAL mines it has been customary to work the plant or some section of it at the full force or not at all. Restriction of output meant closing down units and not, as a rule, running a few days a week. In consequence, when a lull came in the market, a number of metal miners had perforce to move. Most of them went into other industries and many of them did not return. This kept the number of men in the metal industry normally below saturation. In the bituminous coal industry, the miners have worked in slack times only a few days each week, and when business became brisk there were always more men on hand than were needed to fill the tonnage requirements of the country.

Today, large concerns in the bituminous coal industry are taking a leaf out of the metal industry's book. They close down some mines and work the others intensively and at greater advantage. Fewer men are displaced, however, than in metal mines because the miners not being paid by the ton are engaged in larger numbers than actually needed and are given a place but only an inadequate supply of mine cars. They work

more nearly every day than in past years of depression, but do not get so generous an opportunity as they might to produce coal when they do work.

On the whole, however, the men are leaving the industry and the proposed car-rating plan if adopted will prevent their return, for the old mines when reopened will run less intensively than the mines that have continued working and will afford less opportunity to returning men. It is probably just as well. When all the mines are short of men, the new mines will have less chance to open, and the older mines which have the men will work more steadily. The miners also will profit by getting steadier work. That will make for greater contentment and give less time for that factional activity which breeds strikes.

Time for Lewis to Retire?

THERE have been indications for some time that President John Lewis of the United Mine Workers was diligently seeking a new job. It has long been known that he would like to succeed to the power and prestige of Samuel Gompers, for a quarter of a century head of the American Federation of Labor. Lewis was audacious enough to make an open bid for Gompers' office at the Denver convention of the Federation—and lost. So he settled back to wait; for Mr. Gompers is full of years. Since then it has been rumored persistently around Washington that Lewis was in a receptive mood toward a government appointment of some kind, though he has never been offered one publicly.

And now comes K. C. Adams, everybody's friend and a sort of unofficial publicitor for Lewis, suggesting that at the election next autumn the international President would make a pretty good running mate with Calvin Coolidge on the Republican ticket. In two interesting pages on the subject in a recent issue of his magazine published in the shadow of United Mine Worker headquarters at Indianapolis, Mr. Adams sets out a full trip load of reasons why Lewis would make a good candidate and wants to know "how that sounds."

It sounds to us very much like a feeler by a union leader who never has taken a backward step and who fears that he is going to be compelled to take one unless he sidesteps it. Lewis has led the union miners to a high pinnacle of power through a period extremely conducive to that sort of upward progress. And now he has pitched the union camp on that pinnacle for a three years campaign at a time when the rigors of that pinnacle promise to be severe for unionism. Attempting to hold out is going to be so costly in blood and treasure that the position may prove untenable. Somebody may have to direct that union army of miners in a strategic retreat of a few steps.

Mr. Lewis has never led such a maneuver. But he is a strong man and resourceful. He has proven himself a sterling leader of miners in periods of success. Now let him prove himself that greater man—the sterling leader in times of adversity. There are many serious problems for the United Mine Workers to meet during the coming three years. They need a man like Lewis to help solve them. Their sane and proper solution will be essential to the well being of the whole coal industry. They should not be solved for the Mine Workers by some "nit wit." Lewis should stick to his army—and anyway the Republican party and the people are not demanding his services as a candidate.



Reinforced Tippie, No. 12 Mine, O'Gara Coal Co.

"Build Everything of Concrete" Is O'Gara Policy

Tippie and Rescreener Cast Monolithic and in One Unit—Concrete Also Used in Shaft Bottoms, Roof Arches, Mule Stables, etc., Underground—Concrete Haulageway Roadbed Under Test

BY RALPH D. BROWN
General Superintendent, O'Gara Coal Co.
Harrisburg, Ill.

A COAL mine should be considered as a wasting asset with a definite and limited life. The designing engineer planning the plant may intelligently choose his materials of construction in accordance with this idea, provided no other reasons overbalance that consideration. Other factors that may affect the decision as to what materials shall be used are: (1) Availability and adaptability of the material to the proposed design, (2) first cost, (3) cost of maintenance, and (4) statutory regulations. The geographic location of the plant and the availability of any material at a reasonable price may be the determining factors, but in Illinois, the state law fixes definitely the type of construction; that is, it must be fireproof—and consequently of either brick, concrete or steel.

After weighing all considerations in the balance, including ultimate economy, the management of the O'Gara Coal Co. operating at Harrisburg, Ill., has chosen concrete as being best suited to the conditions found in that locality. At Mine No. 12 it has constructed and put into successful use a monolithic concrete tippie and screening plant and at other operations it has built concrete shaft linings, overcasts and stoppings, haulageways, arches for roof support, mule stables, fan houses and various types of surface build-

ings. The results obtained have been entirely satisfactory. When the rebuilding of the surface plant of O'Gara Mine No. 12 was under consideration, fabricated structural steel was quoted at \$125 per ton, and deliveries could be made only in from six to nine months, whereas cement could be had for \$2.80 per barrel, with immediate delivery. In addition, the company carried a construction force trained in concrete work. Concrete was therefore chosen as the material, and the design of the various structures prepared accordingly.

CANNOT ESTIMATE STRESSES IN A HEADFRAME

Many practical builders have considered concrete ill adapted to tipples and structures of like character because of its tendency to vibrate. They feared that stresses resulting from such vibrations might eventually disintegrate this material. In the tippie designed for Mine No. 12 vibrations were reduced to a minimum, and at the same time the bond between the steel and concrete was given due consideration where it was deemed probable that vibration might be expected.

It is not possible to measure accurately or even assume the stresses existing in an up-to-date tippie structure, hence a truly economic design cannot be made. It is better to be safe even at the expense of a possible

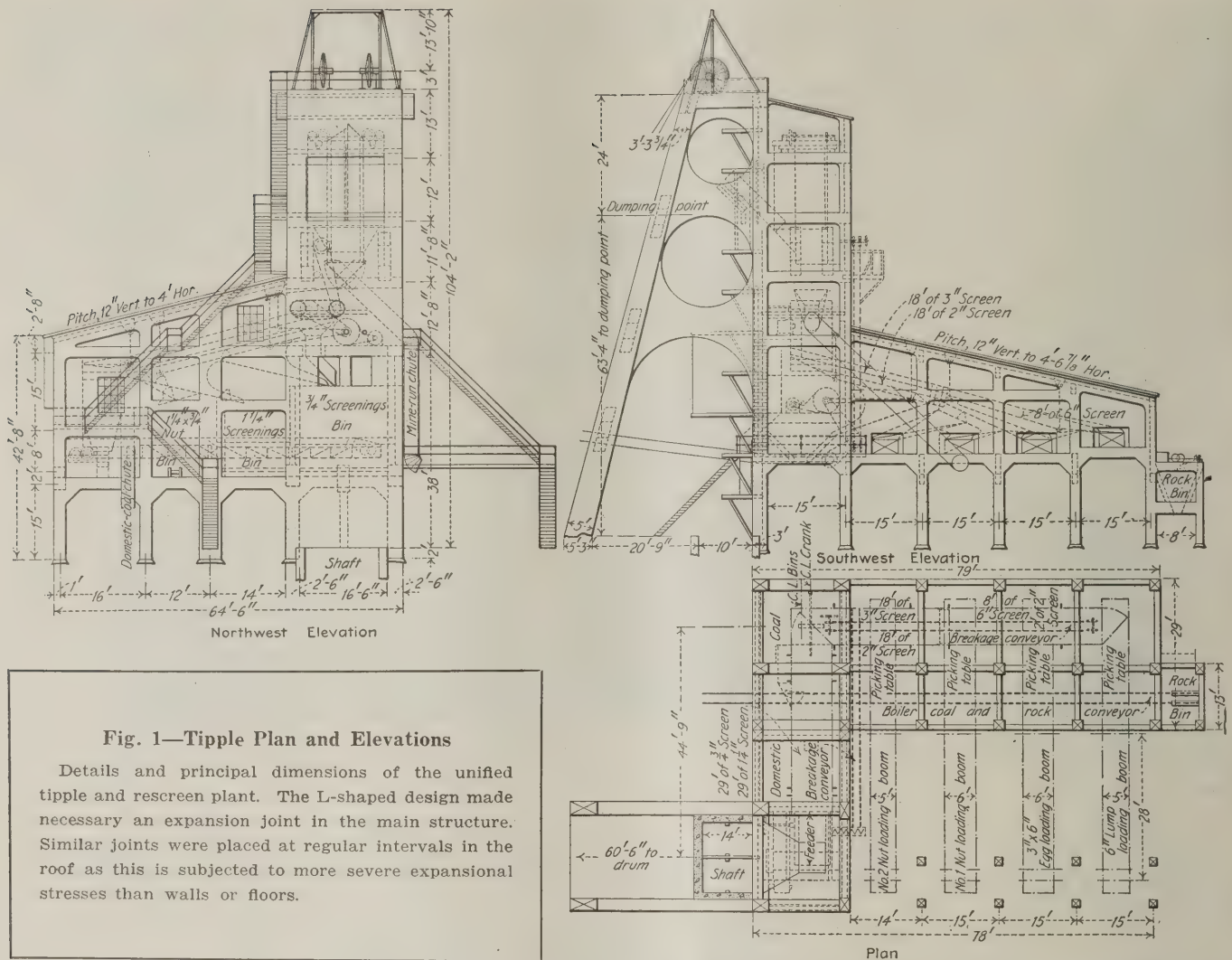


Fig. 1—Tipple Plan and Elevations

Details and principal dimensions of the unified tipple and rescreen plant. The L-shaped design made necessary an expansion joint in the main structure. Similar joints were placed at regular intervals in the roof as this is subjected to more severe expansional stresses than walls or floors.

surplus of material, for if the structure is too light the vibration will be excessive, causing eventual weakness and disintegration.

Referring to the plans of the concrete tipple, Fig. 1, it will be evident that the coal is prepared in more sizes than is generally attempted in a single unit. For this reason the structure housing the preparation equipment is more extensive and complicated than usual.

This plant provides for the sizing, preparation and loading of seven sizes of coal in one continuous process with a minimum of labor and equipment. Concrete bins, which have a combined capacity of 450 tons, are built as a monolithic part of the tipple and not only provide storage capacity but also facilitate the loading of the three smaller sizes of coal on one track. Picking tables and booms for loading railroad cars are provided on four additional tracks. The preparation equipment is entirely modern and adequate to handle a capacity output of 3,000 tons in eight hours. The screens are arranged in two units and protected from overcharging by a grizzly feeder, which is itself a screen, removing all coal less than $\frac{3}{4}$ -in. diameter before discharging its burden onto the shakers. The primary screen is constructed as a single-section, double-deck unit. This removes all coal less than $1\frac{1}{2}$ -in. diameter and passes the remaining lump to the secondary screen which extends at right angles to the first. The primary screen sizes all the coal under $1\frac{1}{2}$ -in., discharging each size in its respective bin. The secondary screen has two sections, is double-decked, and receives all coal above

$1\frac{1}{2}$ -in. diameter, regrading it and discharging the four sizes thus made onto four picking tables where hand picking assures a clean product.

Any breakage occurring after the coal has been sized is taken by a special conveyor to the primary screen where it may be re-sized. Refuse picked from the tables is conveyed to the refuse bin, and coal containing small quantities of impurities is delivered to a conveyor and taken direct to the boiler plant for fuel.

Reference to Fig. 2 will show that the equipment prepares all the commercial sizes without a separate re-screening plant. Such an arrangement requires shaker screens of more complicated design than are commonly employed and a housing structure adequate to resist all the vibratory stresses due to this more concentrated system of operation. Apparently reinforced concrete furnishes a material well fitted to satisfy all requirements of such a structure.

A foundation capable of carrying the enormous weight of a massive concrete structure is not always available near the surface. This in itself may form a limiting circumstance that would make the use of concrete impracticable. At Mine No. 12 a hard shale rock was found at a depth of only 22 ft. All footings of the main structure were accordingly carried down to this stratum and made of sufficient size so that no bearing stress was greater than 6 tons per square foot. The excavation for the foundation footings was made in an open pit by a crawler crane operating a clamshell bucket. The pit was made of ample size to insure that

no caving would block the required section, and the concrete was poured into forms which were removed as soon as possible so that the clamshell could fill behind the foundation.

Provision was made for carrying the enormous weight concentrated at the mouth of the shaft by lining the walls of the shaft for a width of 3 ft. to a depth of 35 ft. at which elevation solid strata were reached. Here a spread footing 5½ ft. wide was notched into the rock. This ties into the concrete end walls of the shaft by reinforcements of 60-lb. relaying rails set horizontally and vertically with 1-in. steel rods placed 12 in. apart. At a depth of 40 ft. an additional spread footing was provided and tied into the footing above by steel-rail reinforcements set both horizontally and vertically on 12-in. centers.

It is not possible within the limits of this article to go into the detail of the general design of the main structure, but a general idea of it can be obtained by reference to Fig. 1. The detail plans of the reinforcing have also been omitted for lack of space. Special care was taken to provide ample ties and bonds for all reinforcement rods in the various structural members.

Another interesting feature of this installation was the method by which the steel members were anchored to the mass of concrete. For example, the steel bunnions that hold the guides are built-up members riveted

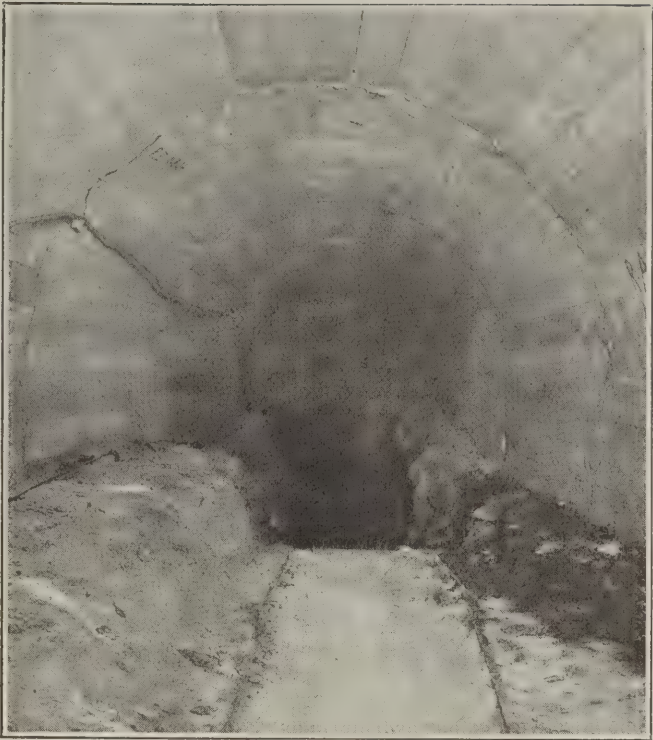


Fig. 3—Concrete Archway Through Fault

Passage through this 30-ft. downthrow was originally roofed with steel timbers. These, however, could not withstand heavy rock falls and upkeep was costly. This archway, 12 ft. wide and 75 ft. long, was built for \$27.50 per lineal foot. It has proved entirely satisfactory.

to steel channel anchors projecting from the concrete a distance sufficient to make a strong gusseted joint. This construction was used so that any serious displacement or bending of the steel bars through accident readily might be repaired without injuring the effective anchorage in the concrete.

The main structure being L-shaped an expansion joint was provided at the juncture of the two sections so that either can expand or vibrate without danger of rupture. This expansion joint is located where the planes of vibration meet at right angles. Additional expansion joints were placed in the roof at 40-ft. intervals. With these exceptions the structure is a monolith. The additional expansion joints in the roof were provided to absorb the relatively excessive expansion and contraction of this part of the structure.

BUILT TO SUSTAIN ABNORMAL LOADS

The head structure of the hoist tower was designed with special care, so as to provide for any unusual stresses that might be caused by the lodging of cages in the shaft. Four built-up, steel-plate girders 3 ft. in depth anchored to the concrete at both ends carry the sheave wheels. All other structural members (except those supporting walkways) are of reinforced concrete.

The beams supporting the shaker screens, weighing from 15 to 30 tons each, will be subjected to continuous live loads of measured intensity. Accordingly they are constructed with ample reinforcement and of such a size as to withstand the calculated stresses.

The shaker screens are driven by connecting rods from steel crank shafts set on piers cast monolithic with the floor and outside walls of the building. The entire tippie equipment is electrically driven. Remote-control equipment makes it possible for one man, conveniently located, to manipulate efficiently the entire

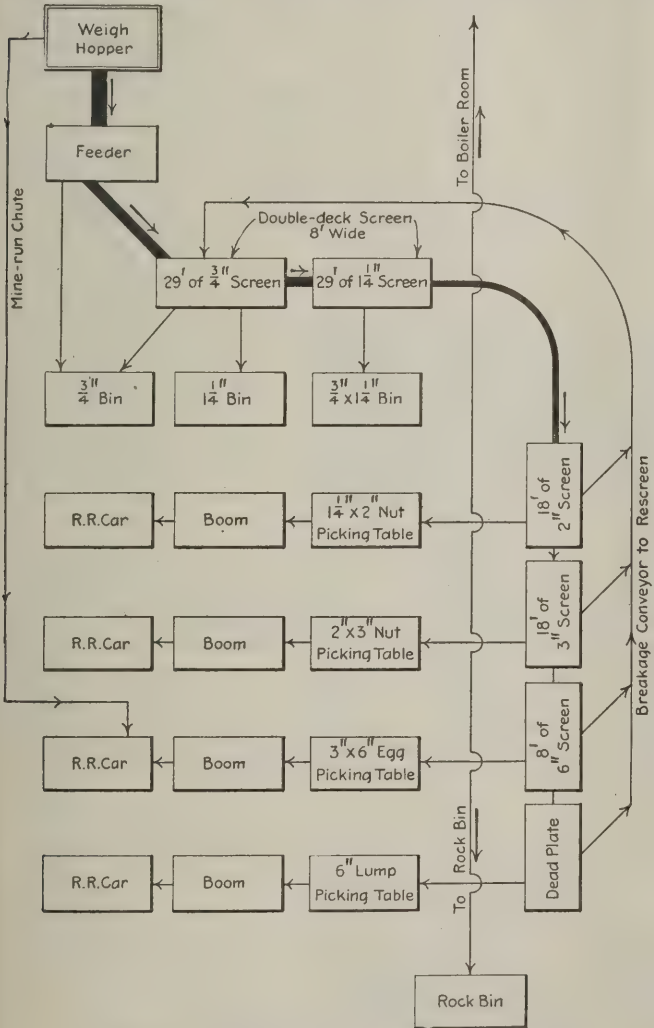


Fig. 2—Flow Sheet of No. 12 Tippie

By the use of bins the three small sizes can be loaded on a single track. The four other sizes are loaded each on its own track. The undersize goes back to the rescreen to be reprepared. The worthless material taken from the picking table goes to the rock bin. The better class of bone goes to the company's boilers.



FIG. 4

Concrete Roadbed on Main Haulageway

Tired of spending from 50c. to 75c. per lineal foot each year for maintaining haulage roads laid on wooden ties, the O'Gara company built this 300-ft. section of concrete roadbed in May, 1923, to test the possibilities of such a road. The first cost was \$2.50 per foot but thus far results have fully justified this expenditure.

system. In fact the arrangement of all machinery is correlated to the general principles of the design.

The construction plant employed in building Mine No. 12 was similar to that used on any ordinary large concrete job. The materials were unloaded and placed conveniently by a gasoline crawler crane. The concrete was mixed by an electrically driven batch mixer of 14-cu.ft. capacity located centrally at the foot of a 120-ft. hoist tower. After mixing, the concrete was discharged into a $\frac{3}{4}$ -cu.yd. bucket raised in the tower by a small steam hoist, dumped automatically and shot to place by gravity.

Concrete was made from portland cement, river sand and crushed rock in the proportions of 1:2:4. In the foundation the mixture was 1:3:6 and some large rocks 12 to 18 in. in diameter were embedded in the mass structure of the foundation. The reinforcement consisted of deformed bars and discarded mine hoisting rope. A sufficient force of carpenters was kept on the ground so that the pouring operation was practically continuous, thus preventing the formation of joints that might result in a future line of failure. Forms were not removed until the concrete had aged at least three weeks. Inasmuch as this work was done during the summer months of June, July and August, the concrete was well cured before any great stresses developed.

The mine roof in Saline County is comparatively good but a tight seal or stopping is sometimes difficult to build. The gray shale roof contains sufficient lime and other chemically unstable elements to disintegrate under the action of fresh moist air. Roof fracture is definite along certain planes, and disintegration crevices may extend well up into the strata. Consequently a seal to be tight must of necessity be made strong.

A plain concrete stopping is highly effective and satisfies the conditions when safety and fireproofness are essential, its only drawback being high first cost. In the mines of Saline County at the present time a hollow-tile stopping, plastered with stucco on one side is ordinarily employed because of its comparative cheapness and durability. When the roof is unusually bad a concrete seal is built. In closing off old workings this

seal is built double. A stopping of this character is composed of two walls from 6 to 10 ft. apart, filled in between with clay or sand. This affords a relatively tight seal having great strength and adaptability to any stresses that eventually may reach it from subsiding strata.

If the mine roof is badly faulted and at the same time subject to chemical disintegration through the action of fresh air, expensive timbering of some kind is necessary. Under ordinary conditions concrete is the best material to use in roof sustention. As there has been little need for systematic and regular artificial support of roadways in the mines of this locality, concrete has not been much used for this purpose. As a general rule the shaft bottom is secured by one of two methods, both satisfactory. The more usual plan is to erect substantial concrete walls along the entry sides and span the roadway between them with "I"-beams supporting either wood or steel laggings. The cost of such timbering will range from \$15 to \$30 per lineal foot of entry. The other plan is to use a concrete arch.

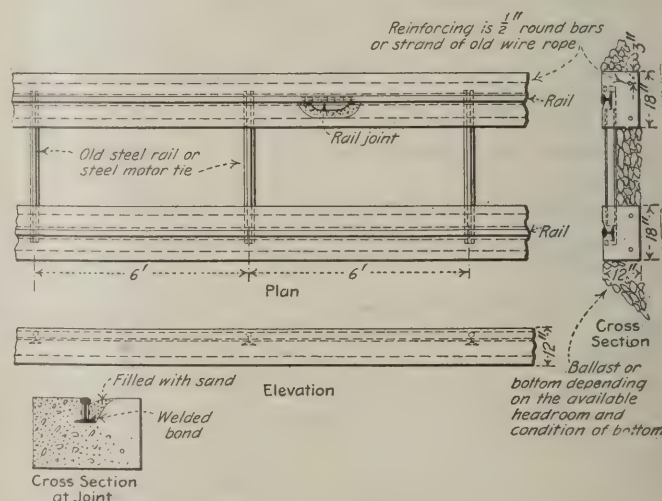


Fig. 5—Details of the Concrete Roadbed

Longitudinal rather than transverse members here afford support to the rails, the cross-members serving chiefly as ties to prevent spreading. As the bottom was fairly soft and could be cut without difficulty under the rail, trenches were excavated for the reception of the concrete. Consequently no forms were necessary for casting the supporting stringers.

This latter method affords the most permanent and serviceable of roof supports for mine bottoms, but the excessive first cost often renders this type of construction prohibitive. With the scale of wages now in force throughout the Central Competitive Field, the cost of an entry 18 ft. wide arched with concrete 12 to 18 in. in thickness will be from \$30 to \$45 per lineal foot.

In the accompanying illustrations Fig. 3 shows a vaulted airway through a 30-ft. downthrow fault. Before this arch was constructed large falls of rock, which the steel roof supports were unable to withstand, frequently had caused the steel timbering to fail. The archway shown is 75 ft. long, 12 ft. in width and cost \$27.50 per lineal foot. This cost included the filling in of all space above the arch with slate pack walls to prevent future falls of roof. No reinforcing was used in this arch and the concrete was placed in 15-ft. sections, forms being moved ahead after each section had been completed five days.

Timber available for mine use in southern Illinois is inferior in character, and its life is consequently limited. A tie placed in the motor road under ordinary conditions has an average life of two years. Such ties cost from 25 to 40c. each, f.o.b. mines. On main-haulage roads renewals are frequent but as they are necessarily made during operation of the mine their number per shift is small. The cost of such renewals will run from 75c. to \$1 each, including both labor and material, or approximately 60c. per foot of track. Adding to this the cost entailed by derailments and other incidental track expenses, we find that a motor road laid with heavy steel will cost annually from 50c. to 75c. per foot of track.

In an effort to reduce this maintenance expense, a 300-ft. concrete section of locomotive road was designed and built at Mine No. 10 during May of 1923. This piece of road was laid as a test to determine the use-

fulness of this type of construction for mine service. The conditions where this strip of road was constructed were ideal, as no water was present and the bottom was soft enough to be trenched for the laying of the concrete stringers underneath the rails. If it had not been possible to trench the bottom, the necessary forms for the concrete would have slightly increased the expense. This road as completed cost \$2.50 per foot.

Since the construction of this track the traffic over it has consisted of a 10-ton locomotive drawing from twenty-five to thirty cars, the gross weight of each being slightly over three tons. The locomotives average two trips per hour. To date, the results secured have been entirely satisfactory. No disintegration of the roadbed can be detected, nor has any disadvantageous condition developed that can interfere with future operation. A concrete roadway can only be constructed profitably on main-line or permanent haulage where no revisions of alignment or level are ever likely to be needed, for it is obvious that such a roadway once constructed is extremely difficult to alter or renew. However, given such conditions of permanency the use of concrete is well justified, for such a roadway if properly constructed will last as long as the mine.

The management of the O'Gara Coal Co. has found it necessary to construct several mule stables underground, and, taking into consideration the provisions of the mining law, it decided to build them of concrete. The stables so constructed are absolutely fireproof, safe, and easily maintained. All individual mangers, water troughs, partition posts and floors are cast monolithic and reinforced with small steel rods. Roof supports are also of concrete, as are also the side walls which seal off all coal or inflammable material.

Fig. 7 shows the design of one of these stables. Its arrangement is convenient and ample space is provided for each animal to rest in comfort without crowding.

FIG. 6

Concrete Stable

Three underground stables like this erected in 1917 have not cost one cent for repairs and have been comfortable enough to increase appreciably the efficiency of the mules. Sidewalls are 36 in. high surmounted by heavy wire netting allowing ample circulation of air. Mangers and feedboxes are also of concrete. Note the complacent expression on the face of Mr. Longears! This alone speaks volumes for the excellent sanitation of this underground stable. The law requires that all underground stables be made fireproof. The walls being of coal are lined with concrete.

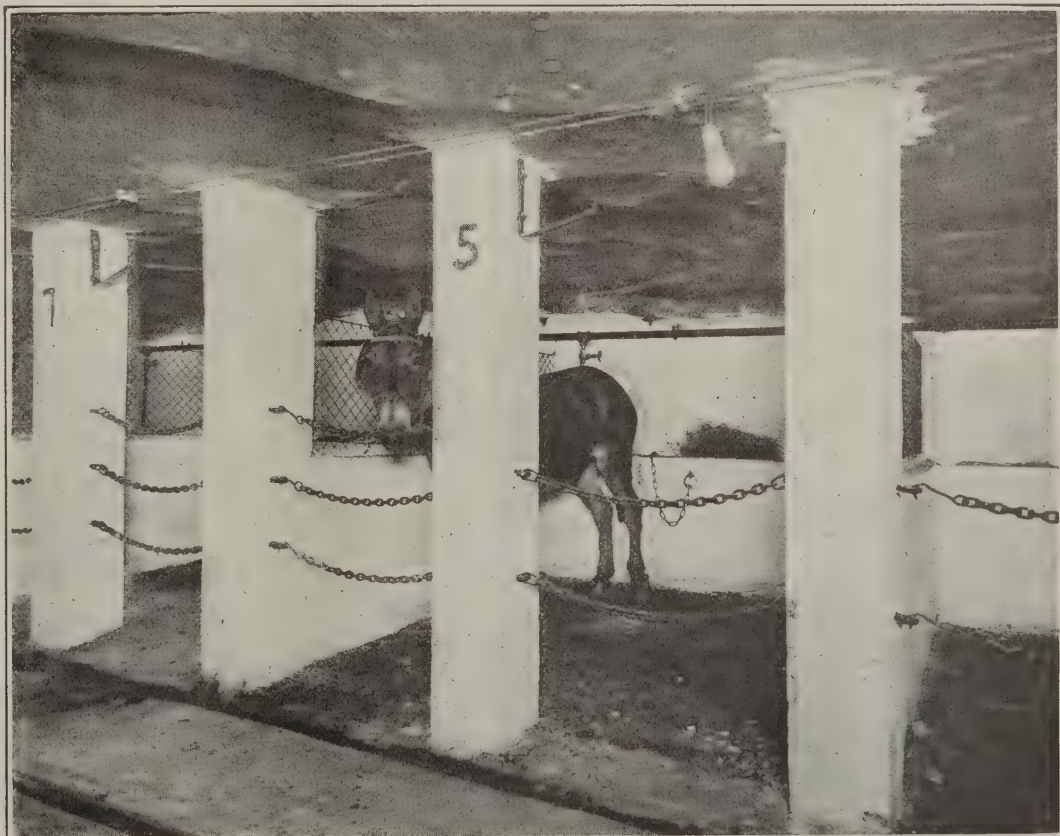
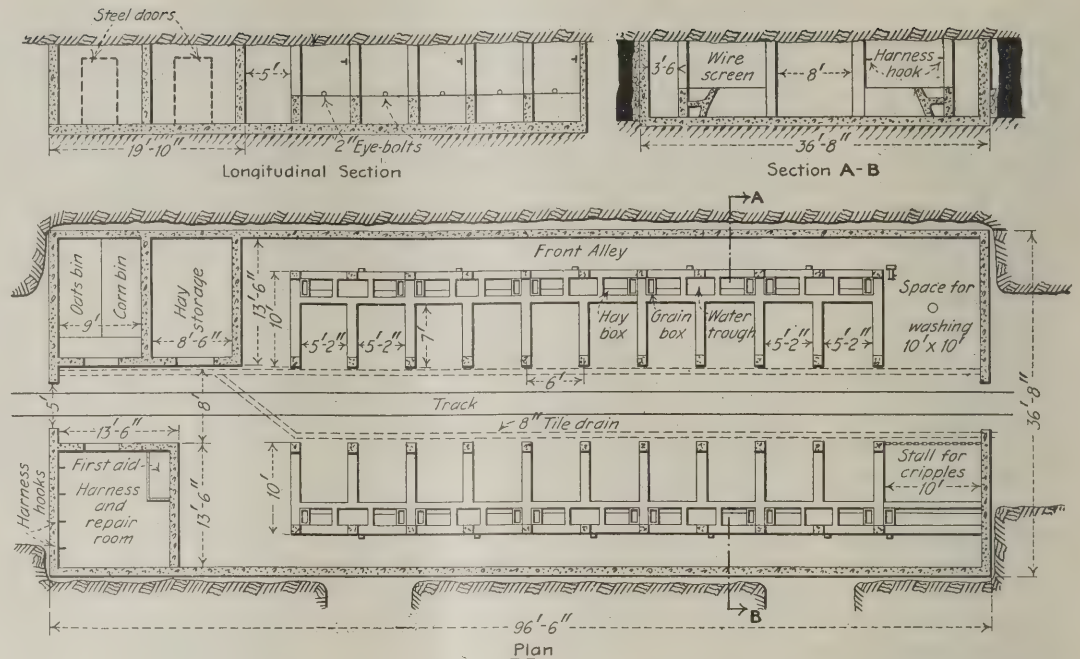


FIG. 7

Underground Stable

This shows the chief details of construction. These of course may be altered in any installation to suit any local conditions peculiar to the particular locality in which it is built. The chief essentials in addition to good drainage are ample room for each animal and adequate ventilation.



With a stable thus arranged it has been found possible to reduce the expense of keeping mules and at the same time greatly increase their efficiency.

Again referring to the design, it will be noticed that the partition walls of concrete between the stalls are not over 36 in. high and that the space from the top of the concrete to the roof is partitioned by heavy wire screen. This allows ample fresh air to circulate throughout the stable, affording the animals that adequate ventilation which is requisite for good health. Three of these concrete stables which were constructed in 1917 have not cost a cent for repairs in seven years.

Within the past four years the O'Gara company has recased with concrete six shafts that originally were timber-lined. Some of these shafts had been retimbered in the preceding six years and yet were found to be unsafe because the timber had decayed. The lining accordingly was replaced with concrete. In addition the company has sunk a 12 x 8-ft. air shaft, 400 ft. deep, lining it with concrete throughout.

There has been some discussion and more or less question as to the advisability of lining downcast shafts with concrete as in some cases the lining has disintegrated, its usefulness being practically destroyed in a

short time. All the concrete-lined downcast shafts in the vicinity of Harrisburg have proved entirely satisfactory although large quantities of alkaline water and frequent freezing and thawing during the winter months make conditions severe. Experience with concrete in this field therefore has demonstrated its usefulness as a material for shaft lining and practically all shafts in southern Illinois are so constructed.

The loss of any unit of the mine plant by fire or by disintegration shuts down the entire operation at least temporarily with a consequent commercial loss. This is especially true of the more important units, such as the fan, engine and boiler houses and the preparation plant. For this reason concrete has been adopted by the O'Gara company as the best material of construction for buildings of this character. It has been demonstrated that with concrete such buildings may be constructed at an equal or lower cost than with any other fireproof material. By this means also insurance premiums may be reduced to a minimum if not practically eliminated and the general overhead decreased.

Furthermore it has been found profitable to construct concrete smokestacks, as may be seen in the headpiece.



FIG. 8
Concrete Fan House

It was found that, considering the cost of labor, no other fireproof material could be used as economically as concrete for the construction of buildings as vital to operation as fan-houses. Incidentally concrete construction of top works appreciably cuts down insurance costs. If one important unit of a plant is destroyed by fire or accident the whole operation is closed down till it is repaired. Consequently it pays to build every part substantially.

Quantity of Timber Used in Soft-Coal Mines and How Much Will Be Needed in Future*

About 0.3 Cu.Ft. for Each Ton Produced—As Other Fuels Fail Bituminous Coal Must Gain—Stable Per Capita Consumption Probably Will Be Reached About 1960

BY NEWELL G. ALFORD
Pittsburgh, Pa.

ONLY with difficulty can forecasts be made of the future consumption of timber in bituminous coal mines, for no records are available of sufficient scope to enable us to determine the present timber requirements of the industry. The data on which this

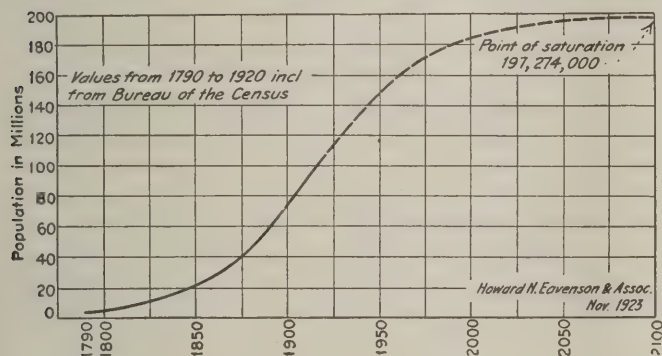


Fig. 1—Past and Estimated Future U. S. Population

From this curve it would appear that the saturation point will be nearly reached by the close of the present century but will not be fully attained until the year 2100 A.D.

survey is based was obtained from plants where records are being kept and from some operators who collected the information for this survey. To these have been added composite figures for the continental area of the United States collected in 1905 and 1919† and for central and western Pennsylvania and for Illinois in

*Paper presented before the meeting of the American Institute of Mining and Metallurgical Engineers held in New York City in February, 1924.

†Forest Service Circular 49, U. S. Dept. of Agriculture (Timber used).

1922.⁴ The result, representing slightly over 928,000,000 net tons, is shown in Table I. Some of the companies furnishing data were unable to segregate the timber into the various purposes for which it was used but for those who did, Table II shows the board feet of posts and cross-bars used per ton of coal mined and what percentage of the total timber consumed was employed in roof support. The wide variation in quantities of timber consumed per ton of coal mined is due to differing mining conditions and to the variation in the quality and strength of the timber.

Fig. 1 shows the past and estimated future population of the continental area of the United States to its

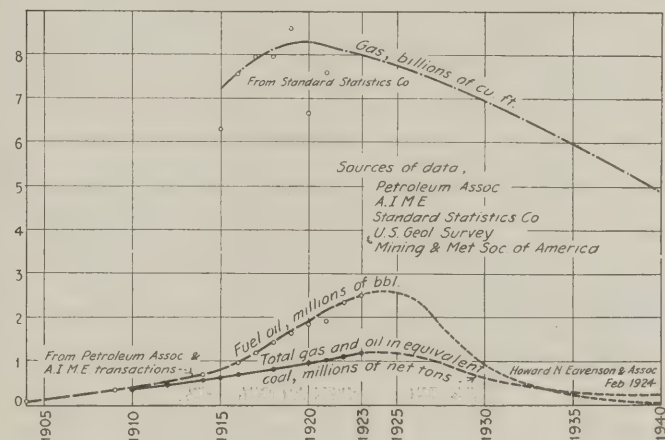


Fig. 2—Past and Future Gas and Oil Production

These curves show not only the past production of gas and oil but their estimated future production as well. Both of these fuels have been reduced to their coal equivalent.

†Reports of Investigations, U. S. Bureau of Mines, Serials Nos. 2465 and 2546, April and November, 1923.

Table I—Timber Used in Bituminous-Coal Mining

State	District	Seam	Net Tons Mined	Bd. Ft. Timber Used	Bd. Ft. Timber Used per Net Ton Coal Mined	Remarks
Pennsylvania	Connellsville	Pittsburgh Upper & Lower	17,064,513	74,415,347	4.36	One year's figures (1923)
Pennsylvania	Somerset Co.	Kittanning	977,814	5,998,919	6.13	One year's figures
Maryland	Frostburg	Georges Creek	237,709	929,232	3.91	One year's figures
West Virginia	Fairmont	Pittsburgh	55,375	191,332	3.45	Figures for one representative month
West Virginia	Fairmont	Pittsburgh	81,481	129,932	1.59	Figures for two representative months
West Virginia	Paint Creek	Eagle	162,512	847,904	5.22	Figures for 10 months
West Virginia	Tug River	Pocahontas	25,205,829	81,871,705	3.25	Figures for 7 years
West Virginia	Thacker	Winifrede	517,013	850,623	1.64	Figures for 2 years
Kentucky	Big Sandy	Millers Creek	137,769	897,342	6.51	Figures for 1 year
Kentucky	Big Sandy	Elkhorn	1,469,566	9,420,422	5.67	Figures for 1 year
Kentucky	Western	No. 9	132,000	227,040	1.72	Figures for 3 months
Illinois 1922	All	All	22,000,000	60,720,000	2.76	Figures for 1 year from 30 operators
Colorado	(a)	Nine seams	3,175,000		6.35	Serial 2465 U. S. Bureau of Mines
New Mexico	Raton	Three seams	609,176	4,041,321	6.63	Figures for 1 year
Illinois		No. 6	2,319,000	3,826,350	1.65	Figures for 9 months
Penna. 1922	Cent. & West.	All	37,000,000	133,200,000	3.60	Figures for 1 year (1921)
U. S. 1919	All	All	465,860,058	1,813,680,000	3.89	Serial 2546, U. S. Bureau of Mines 1923
U. S. 1906	All	All	351,062,785	1,236,506,400	3.52	Consumption in 1919
Total above			928,067,600	3,447,915,119	3.71	R. R. Hornor, U. S. Bureau of Mines U. S. Forest Service Cir. 49 U. S. Dept. of Agriculture Weighted average per ton

(a) In Las Animas, Huerfano and Fremont Counties.

None of the figures given for total states or the U. S. duplicate those of individual companies.

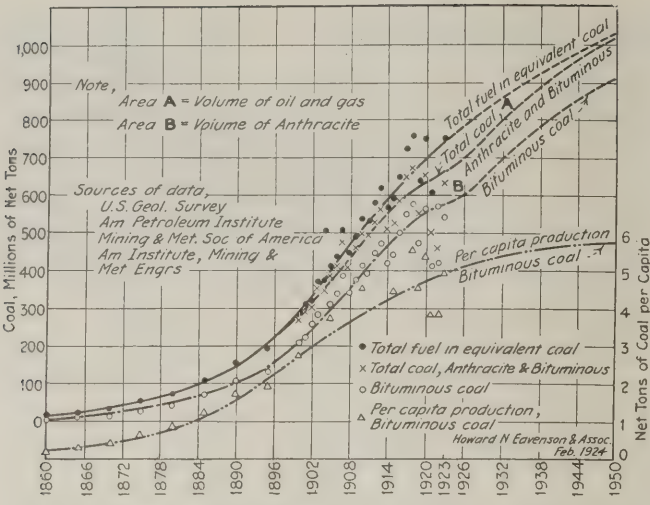


Fig. 3—Past and Estimated Future Fuel Consumption
The per capita consumption of bituminous coal or its equivalent is expected to become stabilized or approximately uniform at roughly 6 tons annually about the year 1960.

probable saturation point in 2100 A.D., this curve being copied from "The Biology of Death." Fig. 3 gives the past and estimated future total fuel consumption, including oil and gas, taken from Fig. 2. Though the latter curve largely explains why the production of bituminous coal has not increased in the past five years, it also shows that the period of peak oil production is passing and that after 1925 a progressive recession may be expected.

Table II—Timber Used for Posts and Cross Bars

State	District	Seam	Board Feet per Net Ton Coal	Percentage of All Timber Used
West Virginia	Tug River	Pocahontas	2.44	75.6
West Virginia	Thacker	Winifrede	3.38	20.6
West Virginia	Paint Creek	Eagle	4.09	78.8
Maryland	Frostburg	Gorges Creek	2.68	68.6
Pennsylvania	Somerset Co.	Upper & Lower Kittanning	5.06	82.3
Kentucky	Big Sandy	Elkhorn	4.56	71.1
Kentucky	Big Sandy	Millers Creek	5.60	55.4
Kentucky	Western	No. 9	0.71	41.3
New Mexico	Raton	3 Seams	6.35	90.6

The curves showing the expected production of all coal and of bituminous coal, Fig. 3, take into account the future recessions in the railroad and industrial use of oil fuel as its supply is curtailed and the consequent increase in demand for coal as oil prices advance.

Concerning the oil production shown in Fig. 2, it should be stated that processes already are developed which will enable the refiner to triple the extraction of gasoline from fuel oil at a relatively small increased cost. Only the added expense prevents these methods from being used. This will decrease the quantity of fuel oil available. Furthermore, the supply of available

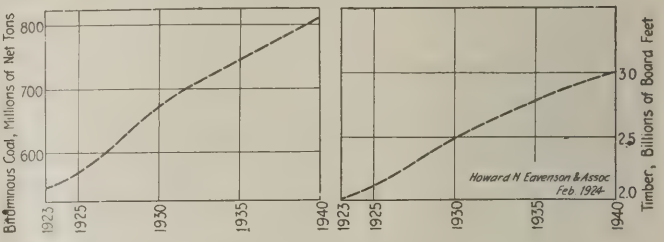


Fig. 4—Trends in Bituminous-Coal Production and Timber Consumption

These curves are practically identical except that they are drawn to different ordinates. In other words, 3.71 board feet of timber are allowed for each one ton of bituminous coal produced.

fuel oil will diminish with the certain enormous increase in the use of gasoline by automobiles. As the shallower fields approach exhaustion the costs entailed in sinking and operating deeper wells will increase, and sooner or later the United States Navy will discount its future need for conservation of fuel oil and secure legislation restricting its use to government purposes. With these factors affecting oil production and consumption, it is believed that the demand for coal and its consequent increased production because of the diminished supply and higher price of oil will rise at least as rapidly as it declined.

Increased efficiency in making electric power, and its wider and more efficient application will restrain, to an extent, the production of coal per capita, as shown in



Fig. 5—Heavy Timbering on Main Haulage Road

A scene in an anthracite, not a bituminous, mine. Over twice as much timber is used in the production of a ton of hard coal as is consumed in the mining of an equal weight of bituminous coal. When it is considered that mine timbers on the average last only about 3 years, it is not surprising that the mine timber costs are high.



Fig. 6—Growing Mine Timber on a Reserve

Some of the larger coal companies have already started reforestation of cut-over areas. It requires about 15 yrs. to grow a log suitable for a mine prop. In the future many coal companies must produce the pit lumber they consume. This reserve is owned by the Kingston Coal Co.

the curve of Fig. 3, the expected stabilization of this quantity taking effect within a decade or so after 1950.

When Is Electricity Safe?

Sliding Fits and Their Dangers in Permissible Equipment—Can a Machine Perfectly Fitted Electrically for Work in Gas Cause an Explosion?

EITHER alternating or direct current at 110 volts constitutes a shock hazard; even low-voltage circuits of high amperage may ignite methane. Consequently, said L. C. Ilsley of the U. S. Bureau of Mines at a recent safety conference in Pittsburgh, Pa., care must be taken even with circuits of the voltage indicated. Many fire hazards arising from electrical causes can be eliminated by good insulation.

In discussing Mr. Ilsley's paper, Graham Bright remarked that mine equipment even if approved by the U. S. Bureau of Mines was not safe if not kept in proper condition. "At the end of several months approved equipment of the sliding fit type is no longer safe," Mr. Bright added as the result of his own observation. A bolted plate cover is permissible only so long as all bolts are in place and sufficiently tight to close all openings. Some system of inspection with proper authority given to those who make it, is needed and should apply to wiring and all electrical appurtenances. Something must be done to keep permissible equipment permissible.

Mr. Ilsley recommended that sliding fits be made of different metals and that the paths or ways be kept well lubricated. The Bureau, he added, had always insisted that permissible equipment was only safe when kept in condition, to which Mr. Bright replied, "Such equipment is not now kept safe; consequently there is only one solution to the problem, and that lies in daily inspections."

According to Henry Walker, deputy chief of the Mines Department of Great Britain, the same difficulty in keeping mining machines and other equipment in safe working order is experienced in that country where mine electricians are relied upon to inspect equipment.

Table III—Estimated Consumption of Timber in Bituminous Coal Mining

Year	Board Feet	Year	Board Feet
1923.....	2,021,950,000	1932.....	2,609,000,000
1924.....	2,062,760,000	1933.....	2,662,500,000
1925.....	2,114,700,000	1934.....	2,708,000,000
1926.....	2,175,000,000	1935.....	2,756,530,000
1927.....	2,226,000,000	1936.....	2,814,000,000
1928.....	2,330,000,000	1937.....	2,860,000,000
1929.....	2,415,000,000	1938.....	2,910,000,000
1930.....	2,485,700,000	1939.....	2,956,000,000
1931.....	2,547,000,000	1940.....	3,005,100,000

Fig. 4 shows the expected trend of bituminous coal production from 1923 to 1940 as based on data developed in Fig. 3. Using the unit of 3.71 board feet of timber per ton of bituminous coal mined, the growth in the use of timber during the same period in bituminous coal mining will be as shown in the right-hand graph of Fig. 4. It is expected, however, that the true average timber consumption per ton of coal produced will be slightly higher rather than lower than this weighted average. The values shown in the expected timber consumption curve of Fig. 4 are recorded in Table III.

The data from which the results shown were obtained are derived from thoroughly reliable sources and, so far as is known, are the most complete yet compiled.

Bolts are omitted in closed machines there just as here.

"An approved undercutting machine in permissible condition is a possible agent of ignition when cutter bits hit pyrite," said S. E. Reynolds. He related an instance in which a safe cutting machine working in a clay bed containing nodules of pyrite was believed to have caused an explosion. Because pyrite ignites at a lower temperature than coal dust, Mr. Ilsley classes its frictional ignition by the cutter bits of a mining machine as a possible source of ignition of coal dust or methane. George S. Rice remarked, however, that such a possibility is remote, considering the large number of cutting machines in use and the comparatively few explosions occurring. Mr. Allison was of the belief that frictional ignition of pyrite is possible and therefore should not be ignored. Mr. Reynolds held that cutter bits working on pyrite generate much heat and therefore might cause an explosion. As a corrective of this possibility Mr. Rice suggested that water be sprayed into the kerf while it is being cut.

Dr. R. V. Wheeler, director of the Government Experiment Station of the Mines Department of Great Britain, was one of the doubters, for he had tried experimentally, he said, to ignite methane by frictional sparks and had been unsuccessful under conditions similar to those existing in coal mines. A steel wheel was heavily weighted and made to revolve at 500 r.p.m. on a steel rail. Even the large stream of sparks thus resulting did not ignite a surrounding explosive mixture of methane with air so long as the sparks were permitted to travel freely and spend themselves in the atmosphere. Ignition, however, was obtained by setting an obstruction in the path of the sparks upon which they could impinge. These experiments led to the belief that frictional sparks must strike an obstruction and thus be enabled to have a prolonged period of contact with the gas if ignition is to be expected. A battery locomotive getting into motion on a sanded track is hardly a likely agent for the ignition of an explosive mixture of methane with air.

What Governor Pinchot's "Philanthropy" to the Anthracite Miners Means to the Public*

Wage Increase Far from Covered by Proposed Advance of 60c. per Ton—Labor Cost Now 170-180 per Cent Higher Than in 1913—Remedy to Consumer Lies in Recourse to Steam Sizes

BY E. W. PARKER

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Philadelphia, Pa.

FROM the U. S. Coal Commission's preliminary report on anthracite the impression might easily be obtained that notwithstanding that business for the entire year of 1922 was "in the red," because of the losses due to the strike, it was a fairly prosperous year for the anthracite industry. In a statement showing the changes in margins from 1913 to 1923 (first quarter only) the average margins for each year are given for the years from 1913 to 1921 inclusive, while for 1922 a fair margin is given for the first quarter of the year, and a much larger margin is reported for the fourth quarter, and for the strike period covering the second and third quarters, it was simply marked "Suspension." It was, to say the least, disingenuous.

The commission evidently felt that it must respond to the public sentiment that exorbitant profits are exacted in the production and distribution of anthracite. Its tabulations of costs and profits showed that on the business done in 1921, the latest normal year, if the 60c. a ton which the Governor of Pennsylvania erroneously stated would be added to the cost by his present to the miners had been absorbed by the operators, 65 per cent of the tonnage would have been mined at a loss. However, as is well known, there are a few companies which, because of fortunate mining conditions, are highly prosperous. In order to prove this fact the commission accordingly published in detail the costs, realizations and profits of these companies from reports furnished with the understanding that they were to be held strictly confidential and which would not have been furnished had it been suspected that their confidential character would be violated.

REPORT THROWS LITTLE LIGHT ON WAGES

The report of the commission on the earnings of anthracite mine workers is one of the many academic products of that fact-finding agency, but it gives little information as to what are the actual earnings that the industry pays its employees. No attempt is made to carry one man or a number of men through the year. Consequently no allowance is made for labor turnover. A man employed during the year at three, four, five or a dozen different collieries appears as that many different men. As a result of this more than 64,000 miners appeared where only 36,500 were employed, and 76,000 miners' laborers apparently received the pay that was actually earned by 19,800. Comparison with other compilations of earnings that have been made cannot therefore be made. We may assume, how-

ever, that all employees who averaged 271 days or more were at the same job during the year, as that was the average days worked in the region in 1921. Every contract and consideration miner who worked this full time earned \$2,700 or over and 163 of them earned over \$4,000. All of the miners' laborers who worked as much as 271 days earned \$2,100, or over, but only one earned over \$3,000, and he earned between \$3,700 and \$3,800. Outside daymen who worked 271 days or more earned anywhere from \$1,200 to \$4,000, and inside daymen earned from \$1,300 up, and that is about as much as can be said on earnings.

10 PER CENT INCREASE RESULT OF ORGANIZATION

How the mine workers have benefited through the power of their organization—through the exercise of force in the settlement of wage agreements—had its latest exhibition in the increase of 10 per cent presented to them by the action of Governor Pinchot last September. When he forced this unexpected and totally unnecessary advance in wages to the miners, the Governor said that it would increase the labor cost 60c. a ton and he suggested with a charming naïveté that the operators might absorb 10c. of this amount and that the transportation companies and the retail dealers should absorb the other 50c., though through what sort of machinery this could legally be brought about he has not yet advised us. He was informed by the experts of the U. S. Coal Commission whom he had invited to advise him on the matter, that 60c. a ton would not cover the increased cost which would result from his proposed 10 per cent advance in wage rates, but that the cost would be 75c. or more per ton. He ignored their advice, however, and assumed responsibility for an incorrect statement which he has repeated upon several occasions since.

The Governor was, or should have been, familiar with some of the facts brought out by the report of the U. S. Coal Commission, and he should have known that if the anthracite operators had absorbed even the 60c. a ton that he erroneously stated would be added to the cost, 65 per cent of the anthracite tonnage would be produced at a loss.

The anthracite operators did not see things in the way the Governor would have had them do. They promptly added to their prices, "each to his kind," the cost which the Governor had by his action forced upon them, and firmly declined to enter into any agreement with him or among themselves to boycott any dealers who advanced their prices to their customers, although they were warned by the Governor that if they did not enter into this conspiracy he would attack the industry. And he has lost no opportunity to carry out this threat.

*Final installment of address entitled "A Few Comments on the Work and Reports of the U. S. Coal Commission," delivered at February meeting of American Institute of Mining and Metallurgical Engineers, coal and coke committee, held at New York City. The first part appeared in *Coal Age*, April 3, 1924.

The reaction that he got from adding to the already too high prices of domestic anthracite was not to his liking and he demanded that the operators rescue him from the pit which he had dug for himself and into which he had fallen, under the penalty of incurring his displeasure and the consequences thereof. He would use this "hard-boiled monopoly," as he calls it, to accomplish his own ends and having failed to obtain their consent to enter into an agreement, which Mr. Warriner, in a letter to the Governor, stated would offend the criminal laws of the United States, he has upon every occasion carried out his threat to attack the industry.

The Attorney-General of Pennsylvania, in an opinion to the Governor, said:

The operators can agree with each other to control prices for the benefit of the public without infringing the common law.

Legally, the operators might be in danger of prosecution under the Sherman law, if they agreed to hold prices below a maximum; but, practically, it is hard to find how they could be attacked unless the federal Department of Justice were hostile to action in favor of the public interest.

The Governor was perfectly willing to enter into an illegal alliance with the anthracite operators in order to serve his own purposes, and they (the operators) could have bought immunity (I use the term advisedly) from his attack had they been willing to run the risk of prosecution under the federal statutes. The Governor ran no such risk. Because they would not, they have become the objects of his vigorous vituperation and denunciation, culminating in the preparation by him and his Attorney-General of a bill which on Jan. 24 was introduced by Senator Borah into the Congress of the United States, and which calls for the regulation by bureaucratic Washington of one of the great industries of his state—a monopolistic industry, yes, but monopolistic only in the fact that it is confined entirely within the State of Pennsylvania; a monopoly created by Nature, not by men, and because of that condition brings revenue into the state amounting annually to approximately three-quarters of a billion dollars, of which about 70 per cent is expended for labor.

I do not know where the Governor got the idea that the anthracite industry is hard boiled in its "monopoly," unless it is because it is kept continually in hot water by the almost uninterrupted investigations of a more or less political character to which it is subjected. One is hardly terminated before another is begun. Here is a list of some of the investigations of the anthracite industry during the last ten years:

- 1914—Interstate Commerce Commission
- 1916—Gawthorp Commission
- 1917—Federal Trade Commission
- 1917—Department of Justice
- 1917-1919—Vardaman Committee, U. S. Senate
- 1918—Federal Trade Commission
- 1919—Governor Sproul
- 1919—U. S. Senate, Frelinghuysen
- 1920—U. S. Anthracite Commission
- 1920—U. S. Senate, Calder
- 1921—U. S. Senate, La Follette
- 1922-1923—U. S. Coal Commission
- 1923—Federal Trade Commission

The 10-per cent advance in wages obtained by the miners through the Pinchot settlement was something like superimposing Pelion on Ossa, as is evidenced by the fact that in 1913 the total commercial production of anthracite was a little over 71,000,000 gross tons, and the payroll was \$113,320,000; in 1921 the commercial production was 70,190,000 tons—a decrease of more than 800,000 tons from 1913—and the payroll increased to \$284,000,000. It is estimated that for 1924 the beneficent action of Governor Pinchot will, for the same tonnage as was produced in 1921, increase the payroll to approximately \$325,000,000.

The labor cost of producing a ton of anthracite in 1913 was \$1.595; in 1921 it was \$4.046. In 1913 the average wage for every man—from miner to laborer—amounted to \$644.80; in 1921 it was \$1,760.38.

The increase in labor cost in 1921 over 1913 was 154 per cent; the boost given by Governor Pinchot will make the increase from 170 to 180 per cent. The daily earnings per man increased 162 per cent from 1913 to 1921, and the annual earnings increased 176 per cent, the

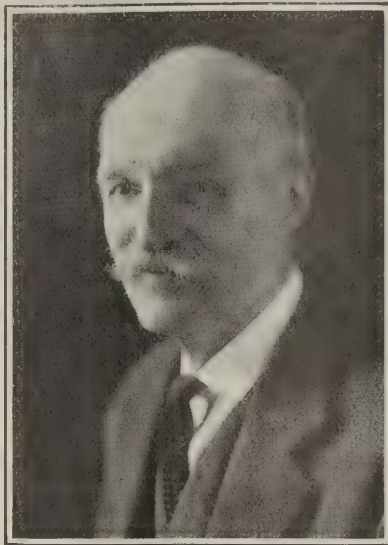
larger percentage in the annual earnings being due to the fact that the men worked an average of 271 days in 1921, as against 257 days in 1913—and, by the way, 271 days is about as much as any wage earner works. The anthracite mine workers have averaged that number or better for the last six or seven years. The industry offers practically 100 per cent employment to its workers. No other basic industry does as well.

The advances to common labor—the lowest paid adult labor—have been at a much higher rate than to other classes of employment. In June, 1914, for instance, according to Research Report No. 47 of the National Industrial Conference Board, the average actual earnings for outside common labor were 18.3c. per hour; in 1921 they were 52.8c., an increase of 189 per cent, and this percentage increase in the pay of common labor in the anthracite region is to be compared with an increase of 117 per cent for common labor in the manufacturing industries and 138 per cent in the wages paid to common labor on the railroads. In the same time the cost of living had increased 64 per cent, so that the purchasing power of the anthracite mine workers' labor has shown a very substantial improvement.

WAGES IN ALL BUT COAL INDUSTRY LOWERED

The wage rates in effect in 1921, and up to September last, were fixed at the post-wartime peak of wages and living cost. Wage rates in nearly every other basic industry have since receded. The increase in the cost of living at the post-wartime peak was 105 per cent over 1914, and it has receded to 64 per cent. Not so anthracite wage scales. Mr. Lewis and his lieutenants have declared that there shall be no backward step, and the step taken in September, 1923, was certainly not to the rear.

The result of all of the foregoing is that the anthracite industry finds itself today in a position that may truly be stated as economically unsound. No one realizes this fact more than the anthracite operators. The



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Governor Gifford Pinchot

The Pennsylvania executive's settlement of the anthracite strike, granting the miners a 10 per cent wage increase, boosted the labor cost to nearly 180 per cent above the 1913 level.

prices of the domestic sizes are too high, and the prices of the small, or steam, sizes, as we have become accustomed to styling them, are too low. The spread between these grades of the same commodity, having practically the same heat-producing quality and differing only in size and in the methods required for their efficient utilization, is absurd. The high prices of the domestic sizes of anthracite unquestionably encourage the use of substitutes, such as bituminous coal, coke, oil and (particularly for coking purposes) gas, all of which, strange to say, this "hard-boiled monopoly" is powerless to prevent.

It is impossible, however, in the face of such high producing costs, to effect any substantial reduction in the prices of the domestic sizes unless a more remunerative market can be obtained for the smaller sizes, which are now by far the larger part sold in competition with bituminous coal. There is no immediate prospect of obtaining any reduction in producing costs.

The anthracite operators cannot depend for long upon what S. D. Warriner has designated as the anthracite-consuming habit, and which, as he says, is the chief asset of the anthracite industry, but it is realized that consumers of anthracite—or at least the large majority of them, who are the people of moderate means—will not continue to indulge that habit when what they have always considered as a commodity, or certainly a comfort, is elevated to a superluxury class of fuel.

REMEDY IS ELEVATION OF SMALL ANTHRACITE

The remedy for the present situation is in elevating the smaller sizes of anthracite from their present degraded position of competing with bituminous coal for power raising—a use for which they are admittedly not so well adapted as is good bituminous coal—and placing them with their larger brothers in the domestic trade. It is entirely practicable; and it is not only practicable, it is economical, as has been demonstrated by elaborate tests carried on not only by fuel engineers employed by the anthracite operators but in university engineering departments, particularly Yale and the University of Pennsylvania.

However, there are now on the market appliances in which the small sizes of anthracite can be used with entirely satisfactory results for domestic heating. Among these may be mentioned the Spencer, the Molby and the Newport heaters, all of which burn buckwheat coal with automatic feed, and, if desired, with thermostatic control, also automatic, and with natural draft. A new device appropriately styled "The Electric Furnace Man," recently put on the market, uses rice and barley or even smaller sizes, automatically feeds the coal and removes the ashes, and can be operated under thermostatic control. It is operated with a blower attachment.

There are other devices which may be applied to the ordinary heating apparatus, which consist chiefly of using a forced draft either with or without automatic regulation by thermostat and with entirely satisfactory results. The people of Harrisburg, Pa., who are not responsible for the conduct of the occupant of the Governor's mansion, have for a number of years been using small sizes of anthracite, recovered from the bed of the Susquehanna River, in ordinary furnaces with a simple blower attachment. I am informed that there are more than 3,000 installations of this kind in Harrisburg and vicinity.

The steam sizes can be used with economy not only in the price of the coal but in the use of the fuel itself

by mixing these sizes with the customary fuels. For banking the fires at night the small sizes are much to be preferred to the ordinary fuel, as they make a more compact covering to the fuel bed and materially quicken the regeneration of the fire in the morning. The mixing of these fuels should never be done in the coal bin. Separate bins should be maintained for the small sizes and the regular fuel. One of the chief objections, it has been found, to the use of these small sizes in this way has been the necessity for an extra bin in the cellar, and in small houses the building of another bin sometimes proves a real inconvenience.

PREJUDICE AGAINST SMALL SIZES UNFOUNDED

There has existed an unreasonable prejudice against the use of the steam sizes for domestic purposes, one reason probably being the fact that they are sold at prices much below the domestic sizes, and it is considered, therefore, that they must necessarily be of an inferior quality. Where they have been given an intelligent trial, however, they have proved their value, and it is gratifying to state that the prejudice is gradually disappearing. The use of the steam sizes will be found more satisfactory than the use of either retort, beehive or gas-house coke. These are safe and smokeless fuels, but they are porous, consequently bulky, occupy a much larger space than the same quantity of anthracite, are difficult to handle, and unless great care is taken in the draft control they burn out much more rapidly than does anthracite. There is no other solid fuel that will maintain the uniform temperature for the length of time that anthracite will.

The anthracite operators are now taking active steps to educate the public in the use of these small sizes, and in co-operation with the manufacturers of the equipment I have mentioned and of others have established "Coal Economy Shows" in several cities where, in addition to the heating appliances shown, there are educational exhibits worthy of attention and moving-picture entertainments are given in which the story of anthracite from the original forest growth to the finished product loaded on the cars for market, is interestingly told.

Testing Coarse-Size Coal

A float-and-sink method and apparatus for testing coarse-size coal, developed by the U. S. Bureau of Mines in co-operation with the College of Mines, University of Washington, at the Northwest Experiment Station of the Bureau, is described in Serial 2570.

Two separate methods and apparatus have been developed for the float-and-sink testing of coal, one for coarse sizes and the other for use with the fine sizes of coal. The practical division between coarse and fine coal for such tests is about 20-mesh. The apparatus and methods described are confined to sizes coarser than 20-mesh for any except rough work.

A float-and-sink test of a coal sample is a means of separating in a heavy liquid the free particles of coal from associated impurities according to differences in their respective specific gravities. When the sample is placed in the liquid, the particles of specific gravity lower than that of the liquid float; those of higher specific gravity sink. This method of separating coal from its impurities is so positive and exact that it is much to be regretted that the cost of suitable solutions now prohibits its use in actual coal beneficiation.



Track, Diamond Mine, Imperial Coal Co.

Making the Application of Electricity Safe Against Hazards to Person and Property

Every 110-Volt Current with Proper Contact May Cause Death and Gas May Be Ignited by 2-Volt 1-Amp. Electric Bulb—Operation of Wireless Mines May Be Not Only Safe But Advantageous

BY L. C. ILSLEY

Electrical Engineer, U. S. Bureau of Mines

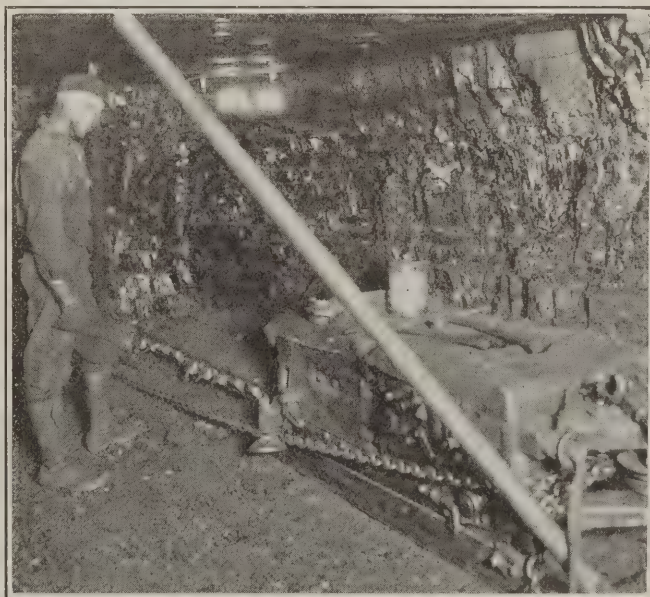
BACK of every safety program stands the industry itself with its precedents, prejudices and traditions. Coal mining, being an old established industry, naturally had many fixed traditions long before electricity and electrical equipment, comparatively new forces, made their appearance.

The electrical engineer, in spite of these traditions, thrust himself and his equipment into this field and insisted, often without invitation, upon taking a prominent part in the future development of coal mines. Therefore, it naturally follows that certain readjustments must be made from time to time to take care of the new problems introduced by electricity. Further, these adjustments will never be permanently or satisfactorily made until the electrical engineer, the mining engineer and the safety engineer thoroughly understand each other's problems and jointly work out a practical solution based upon the needs of industry and the limitations of electrical design.

The safety movement in coal mining had made considerable advance before the advent of electricity. As early as 1869 we find a safety code, covering one county in the anthracite field of Pennsylvania, and by 1888 there were at least 12 states having safety regulations for bituminous coal mines. These early safety codes, made previous to the introduction of electricity, naturally had no reference to it or to the installation and operation of electrical apparatus, and in some states, even after successive revisions of the safety code, there are still no adequate rules covering electrical equipment. For instance, a chief mine inspector or his deputy, is not, as a rule, legally required to have a

knowledge of electricity or an understanding of safety measures concerning the installation of electrical equipment.

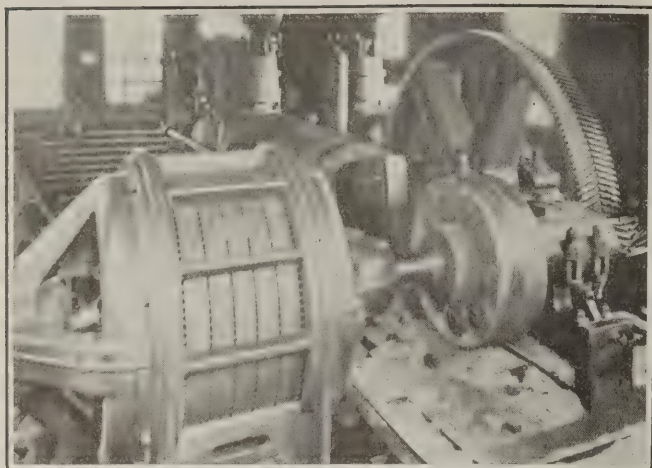
The growth of the coal industry in the United States has been remarkable. Yearly tonnage statistics, published by the Geological Survey for both anthracite and bituminous mines since 1822, not only show the rapid growth of this industry, but also indicate the part



Electric Lights at the Mine Face

Taking a leaf from the practice of other industries which have long ago learned that adequate lighting pays, the mines are now beginning to improve the illumination of their underground workings. Here is an application of electricity which will reduce mining hazards far more than the use of electricity for machinery has increased them.

*Abstract of paper entitled "The Present Trend of Electrical Safety in Coal Mines," presented before American Institute of Electrical Engineers, Birmingham, Ala., April, 1924.



New Drives Replace Old

Where the equipment to be operated is still in good condition it often has been found advisable and economical to replace the old drive with an electric motor. Such changes are usually difficult to make because of the many special conditions to be met.

which electricity has played in bringing the total output of coal to the present figures.

Beginning with 58,583 tons in 1822, there is almost an unbroken yearly increase until we reach the maximum of 678,211,904 tons in 1918. An increase of 10,000 per cent in a little less than 100 years.

The increase in bituminous production during each decade for the last 50 years is shown in Table I.

Table I—Increase in U. S. Bituminous Coal Production

Decades	Average Yearly Production—Short Tons	Decades	Average Yearly Production—Short Tons
1871 to 1881	32,600,000	1901 to 1911	323,000,000
1881 to 1891	82,800,000	1911 to 1921	486,800,000
1891 to 1901	148,500,000		

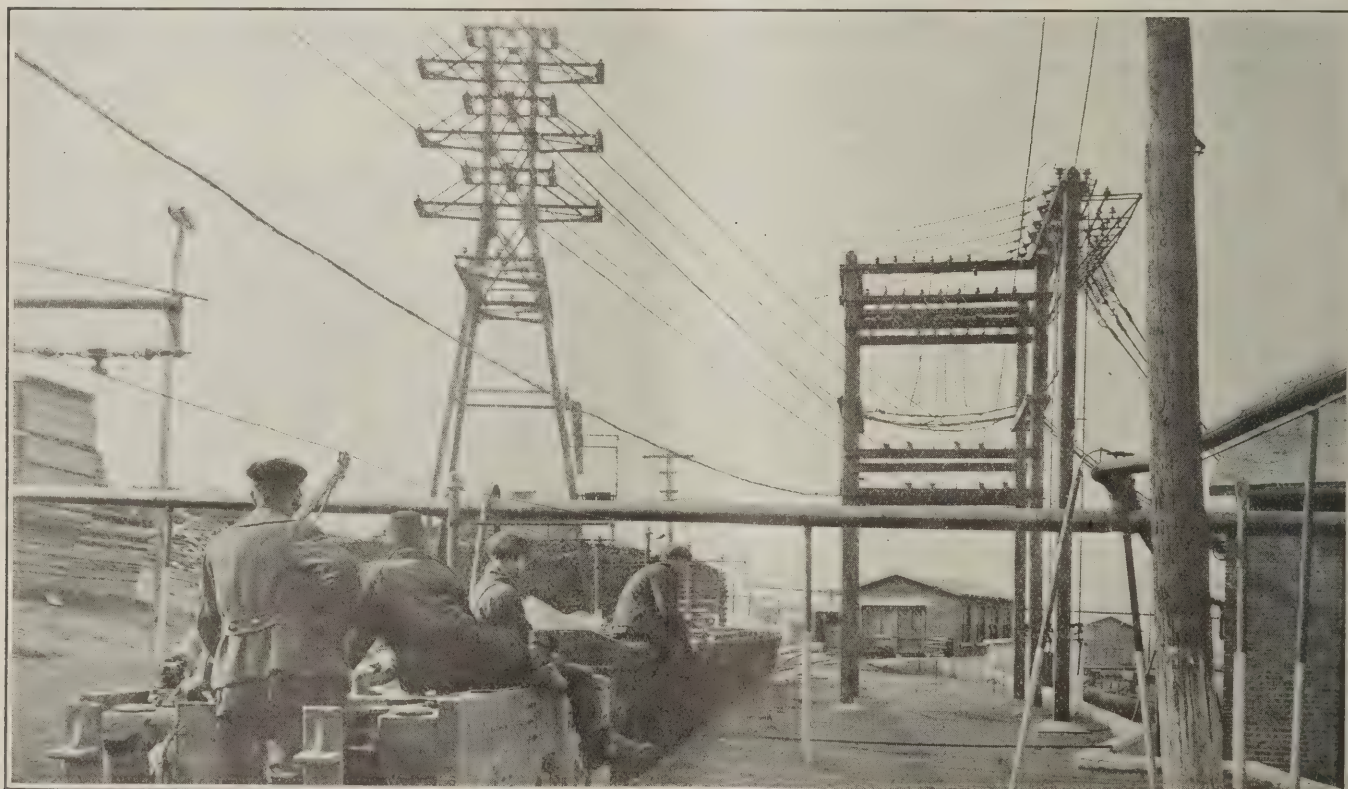
The increase in coal output during the last 25 years has been augmented by the introduction of electrical equipment which, owing to both economy of operation and flexibility, has found a real place in the industry. It was impossible to find suitable statistics showing the growth in the use of electrical equipment in coal mines. However, Table II has been compiled from such data as could be found. This table gives an indication of increases during the last two decades.

The first electric hazard is shock. No person can be sure that he will not be killed, even from a 110-volt circuit, if his body makes such contact with it that the maximum current passes through his body. As the voltage is increased to 250 volts, 500 volts, or 2,300 volts, the danger from contact with the electric circuit is increased. Alternating current of the same nominal voltage is possibly more dangerous than direct current. Experience has taught us that both will cause death, and if the fatalities from this source are to be kept low, certain precautions in the guarding of circuits must be observed.

A second hazard is in the use of explosives in conjunction with electric current. It seems unnecessary to advise against the placing of any electric wiring in a powder magazine. If a flash or arc from an electric circuit comes in contact with black powder, an explosion results. Therefore, all boxes and cars should be so constructed that current from the trolley or from the rail cannot possibly pass through the sides of boxes,

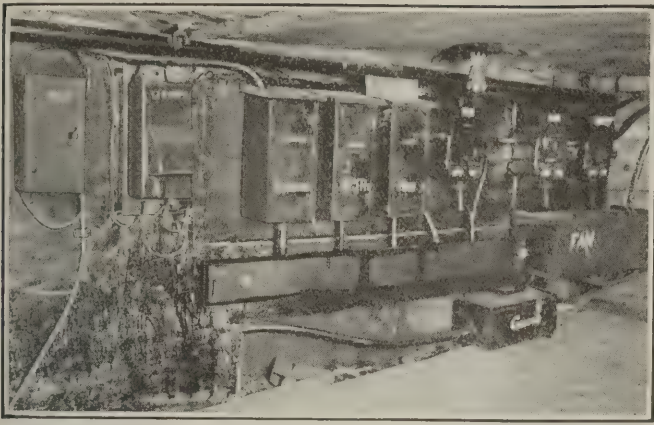
Table II—Increase in Use of Electrical Equipment in Bituminous Mines

Year	No. of Motors	Total Hp. of Motors
1902	1,322	65,927
1909	10,557	402,090
1919	42,230	1,578,474



Old and Modern Power Transmission Lines Keep Company at Coal-Mining Properties

The rapid strides made in the electrification of the mines have brought about interesting associations of old and new equipment. Original power distributing lines look much out of place when compared with the latest installations. At many mines the old must stand with the new because of the urgent demands to electrify and mechanize both obsolete and modern equipment.



Switchroom Where Circuits Are Controlled and Supervised by Definitely Appointed Workmen

To make sure that no switch may be wrongly closed or left open each enclosing cabinet is marked with wording indicating its circuit. Many such switches now used are arranged so that they may be locked open when men are working on the lines.

and so that it is impossible for the metal powder cans to form a path for the electric current.

Electric current is very useful for electric shotfiring, and undoubtedly safer than fuse and squib firing, but great care must be taken lest the shot is prematurely fired by an accidental current passing through the electric detonator. Detonators and explosives should always be kept apart until used, also great care should be taken to keep shotfiring from other electric wires, and finally, detonator leads should be prevented from contact with electrical circuits or apparatus, as less than 1 ampere of electric current will fire an electric detonator.

A third source of danger is the ignition of gas from electric flashes or heated wires. It takes but a tiny current of 250 volts to ignite gas. It has been found that the current required to operate the motor of an electric drill under no load is sufficient to ignite gas. Again, the incandescent filament of a 2-volt, 1-amp. bulb will ignite gas very readily.

A fourth hazard is the ignition of coal dust by electric arcs or flashes. Some bad coal mine disasters have undoubtedly been caused in this way. Tests made by W. Thornton in England and by H. H. Clark of the U. S. Bureau of Mines proved that ignition of clouds of coal dust by electric flashes could readily take place. The greatest danger occurs, in case of a wreck of a trip of cars, which wreck may tear down or damage an electric circuit and at the same time stir up a heavy dust cloud.

A fifth danger is from fires of electric origin. These may be caused by short-circuited cables, by grounded feeder or trolley circuits, by grounded lighting circuits, by overheated motors or starting devices, by heating from incandescent lamps improperly placed with reference to flammable material, or by short-circuited transformers or defective switches.

The operator should be given credit for what is perhaps the most forward step in regard to electrical safety in coal mines, namely, the introduction of the "wireless mine." The possible hazards of extensive electric wiring in gaseous and dusty coal mines are so great that at least two large coal mine operators, one in West Virginia and one in New Mexico, are laying their plans for an electrically operated mine without permanent electric wiring. Why does one install wires? The answer is, for transmitting energy from the power plant to the place where energy is used. If the power

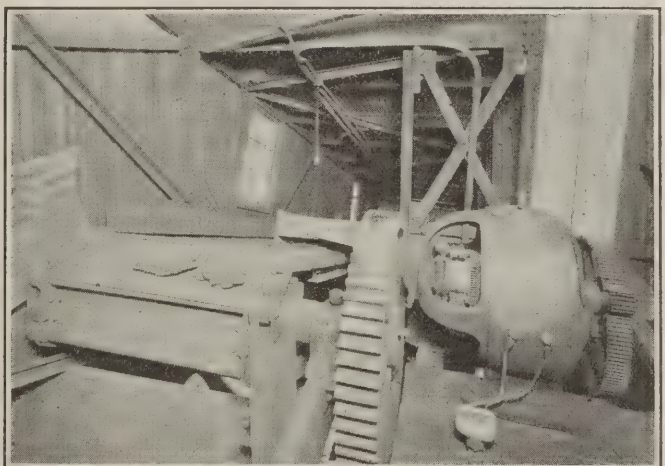
plant could be located at the coal face, no permanent wires would be needed. Then, if wires are potential danger, let us do away with them and place the power plant on wheels, taking it to the point where energy is needed. Any piece of work can be done better by energy obtained from a constant source of potential, such as would be delivered by a storage battery, provided the battery is large enough for the job. Having no wires to install, no tracks to bond, no voltage drop over long feed lines to consider, one can afford to invest heavily in a portable power plant. When the advantages from a safety standpoint are considered, the venture is certainly worth a thorough tryout.

Imagine the security the operator of a "firey" mine could feel at the end of the shift, knowing that there are no feeder or trolley circuits to become grounded over night, no switches to be left closed when they should have been left open, that when the mine stopped its work all its electrical equipment came out of the mine or at least was brought to a fresh air base to remain there until the next day's work begins.

The wireless mine has the advantage of having the equipment that carries the live electric current always under close supervision and also in that such equipment will only be in the gaseous portion of the mine during the working shift, whereas in a wired mine, the wires are there all the time, a large portion of which time they may be without close supervision.

The operator is demanding safe electrical equipment. One manufacturer of approved equipment reports 300 per cent increase in sales during 1923 as compared with the sales of any previous year. The operator is not only demanding more approved equipment, but is asking for new lines of approved equipment such as hoists, air compressors, pumps, and loading machines.

In the future, as far as is feasible, it is understood that manufacturers intend to carry only two lines of equipment, the open type for non-gaseous mines, and the permissible type approved by the U. S. Bureau of Mines for use in gaseous and dusty mines, thus eliminating the so-called "flame-proof" type, built along the same lines but not having the careful factory inspection or the additional inspection and test given by the Bureau to permissible equipment.



Drive with Exposed Commutator Is Unsafe

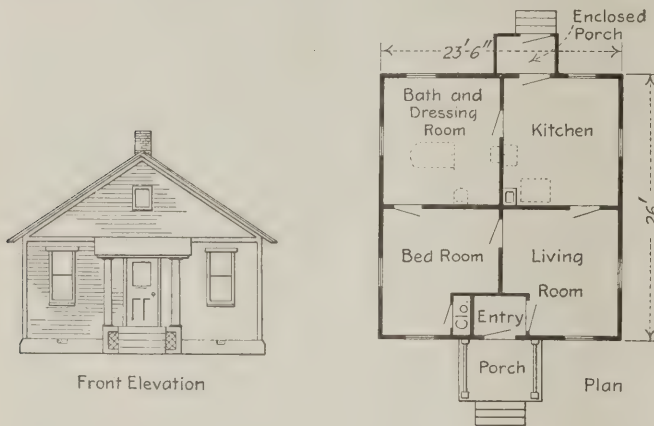
Most of the first electric drives were by means of direct-current motors. Unless carefully protected and housed they may, in the class of service shown in the illustration, give serious trouble. Note the unprotected terminals which might cause a bad fire if a piece of metal were to fall on them. The open motor with exposed commutator is liable to flash and thus fire the oil-soaked coal dust.

A Few Changes in Usual House Plans Afford Miner Comfort

Enclosed Porch and Entry Protect the Interior, and Notably the Dressing Room, from Drafts—Clothes Closets, Cellar and Bath Add Convenience

BY PHILIP A. ARNOLD
Shawmut Mining Co., St. Marys, Pa.

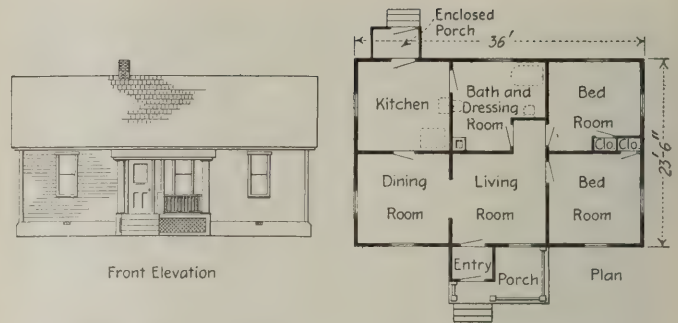
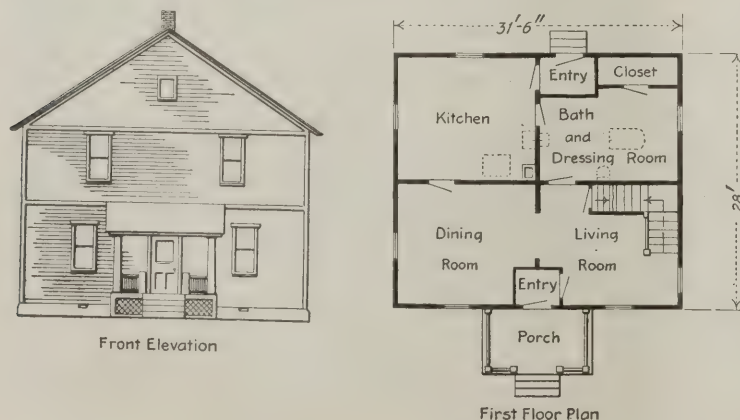
ENDEAVORING to view the miner's house from the point of view of the man who has to live in it, and not so much from other considerations, I have prepared some house designs in which comfort and inexpensiveness have been the paramount idea and not exterior decoration. Briefly stated, my general plan has been to adopt a square or rectangular form of house as being the most economical type to build. There are no wings or ells, which materially increase the cost of erection and involve expense for repairs and maintenance, par-



Four-Room House for Man and Wife

House is almost square thus saving on cost of construction. Note how the dressing room is protected from drafts by both doors of the enclosed porch and the kitchen door.

ticularly in the roof construction. I am giving, here, three plans of eight-, six- and four-room houses designed for practical low-cost building, as well as desirability from the tenant's point of view. The dimensions given on these plans are only suggestive and can be changed to suit local conditions. A foundation of concrete, tile or brick is absolutely necessary, in most coal regions, if the house is to be kept warm and comfortable. Observation shows that a too common practice has been to set these miners' houses on posts, elevating them a foot or more above the ground and leaving it to the option of the tenant to inclose this space if he cares to do so. The



House Has Six Rooms, Two of Which Are Bedrooms

In this house are two clothes closets. The same "air locks" protect the interior from rushes of cold air through open door ways. The bathroom is a little smaller than some of the other rooms but large as a bathroom should be where it has to be used for removal of dirty clothes.

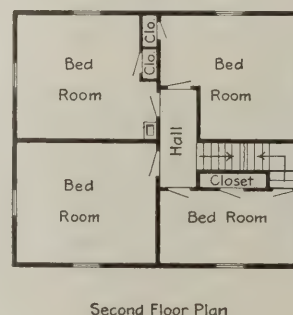
result is that often old boards, barrel staves or anything else that may come to hand have been used for the purpose. While this is better than nothing for keeping out the snow and, to some extent, the wind it is needless to say that it makes the house extremely unsightly.

EVERY HOUSE SHOULD HAVE A CELLAR

For general utility, every house should have a cellar provided with an outside entrance. It may not be necessary to excavate the entire space within the foundation of the building; but the cellar should be large enough to afford room for keeping tools, vegetables and a small supply of coal. It is far better to have the coal under cover than to have it piled against the side of the house or at the back, where it is exposed to the weather which tends to disintegrate it and render it unfit for use.

Outside coal-houses and wash-houses do not add to the comfort of the miner's home, or the attractiveness of the property and the town. These can all be avoided when the house is properly designed and a small cellar provided. Make the house a home and afford ample room for a small yard and garden surrounding the building. With a little encouragement, most of the miners' families occupying these houses can be readily induced to plant trees, bushes, vines and a garden that will make the place attractive and give it a homelike appearance.

The main feature in these houses is a bath and dressing room opening out of the kitchen. This is a prime necessity in most miners' homes. With a bath on the first floor there will be no tracking through the house when the miner comes home from his work. The bath or washroom should be so arranged that the man can wash and dress with ease and comfort, on his return from work. Place should be provided where he can



Two-Story House

The stairway cuts into the living room but the ground plan is larger than with the four-room house making all the rooms of adequate size.

hang his working clothes to dry in readiness for the following day.

Many may prefer a washroom in an outside shed, because when that is provided the dirt and coal dust incident to mining is not brought into the house. In any event, it would seem that, with an outlay that is not prohibitive, each house could be provided with running water that would relieve the occupants from the steady grind of carrying water from the nearest street hydrant. In mining towns this is not an infrequent living condition.

One feature that is worthy of mention is the provision made in two of the plans, here presented, for an inclosed entry. This is always desirable and will be

appreciated by most tenants where the front door of the house opens directly into the living room. A third plan shows an inclosed entry built out on the porch, which is often done in case the house is small or the size of the rooms limited. In the eight-room house, it will be observed that a space for a stairway leading to the attic above the second floor has been provided. In this plan and also in the six-room house some closet room is also arranged. One never realizes how useful closets are until one lives in a house built without them.

It is not to be supposed that these plans will meet the needs and requirements in all cases. Everyone has his likes and dislikes and what is suitable for one family may not meet the needs of another.

The Miner's Torch

Things Are Not Always as They Seem

A MAJORITY of the companies that own and operate coal mines own and operate commissaries in connection therewith; the average coal-mine manager and likewise the average coal-mine superintendent although not responsible for the operation of the commissary at his operation has been in such close contact with the institution all through his mining career that he assumes as a matter of course that he could add the management of a commissary to his other duties without any trouble whatsoever. Fortunately the average manager and the average superintendent is not called upon to take over the actual management of a commissary, so no harm comes to the superintendent or his company from the assumption.

Some years ago (at the time I considered myself an average mine manager) I was offered a lease on a complete coal-mining property, and included in the deal was a well-stocked commissary. By the terms of my lease I was required to take over the commissary stock and pay the inventory price for same. Before agreeing to the purchase of the merchandise I decided to have the stock passed upon by men who were posted in the various lines and only after discussing the matter with them did I sign the papers that put me in possession. The stock judged by inventory value was about equally divided between groceries, dry goods and shoes.

The man who passed on the shoes for me was an employee of a shoe jobbing house and he reported that the stock was in good condition and there was a fair assortment of sizes, except that most of the larger sizes were missing. There was the joker but he didn't know it and I didn't know it.

I owned that stock of goods exactly one year and in that length of time the commissary manager that I employed was only able to dispose of two or three pairs of the shoes that I had acquired in the original purchase. All of the miners in that camp had large feet and they had purchased all of the shoes from the stock that were salable in that community before my ownership. Do miners everywhere have large feet? Not having been everywhere I hesitate to answer.

The commissary manager who had originally purchased the stock had had no previous experience in mining camps and in buying the shoes he simply

ordered a complete assortment of sizes. That was before the days of questionnaires; I suppose the procedure today would be to send out a blank to each male citizen and get full details relative to sizes and preferences before stocking up the commissary shelves.

Where did I fall down as a commissary manager?

First: I showed bad judgment in my choice of appraisers.

Second: I showed bad judgment in my choice of commissary manager. A little advertising in near-by communities would have allowed me to realize on the shoes that we could not move, but I did not realize that until my successor's commissary manager turned the trick.

There was probably a third, fourth and fifth but there is a limit to the information one can acquire in one year.

HYDROGEN AS A CAUSE OF EXPLOSION IN COAL DUST.—T. G. Fear, general superintendent, Inland Collieries Co., in discussing J. W. Paul's paper on "The Explosion Hazard Investigations of the U. S. Bureau of Mines," at a recent safety conference said he had been disposed to believe that the hydrogen content of the coal affected its degree of explosibility, for in the Southern states most of the explosions occur in mines working coals containing much hydrogen. This suggestion met with no support, Mr. Paul stating that the higher the ratio of volatile to combustible matter the greater the explosibility of the dust. For Pittsburgh coal the ratio is 0.4 but for coals further east the ratio is less. Mr. Fear said that coals high in hydrogen contain more waxey material and it is this material which, when in the form of dust, tends readily to explode. Mr. Allison, of the U. S. Bureau of Mines, said that the ratio of volatile to combustible matter was a more important indication than the hydrogen content.

BULLETIN 84 OF THE STATE TOPOGRAPHIC and Geologic Survey, on "Coal Reserves in Clarion County," by James D. Sisler, has been published by the Pennsylvania Department of Forests and Waters. According to the bulletin, 1,262,000,000 tons are recoverable. There are twelve coal beds in the county, the bulletin shows, four of which are now being mined for shipping coal, five others being mined for local fuel and the remainder having little commercial importance at present. The Lower Kittanning coal is the most persistent and largest producing bed in Clarion County. The Clarion Lower coal contains the largest quantity of recoverable coal but is variable in thickness everywhere except in the southwestern part of the county.



News Of the Industry



Utah Adopts "100-per Cent" Safety Code Following Castlegate Blast

Requires Permissible Explosives, Electric Cap Lamps, Careful Rock Dusting, Thorough Wetting of Working Faces and All Dusty Places and Most Careful Reporting and Handling of Gas Pockets

Utah is going to make its coal mines as safe as men know how to make them. A new and drastic safety code and a fresh determination to stop mine accidents have risen out of the public shock caused by the March 8 explosion at Castlegate No. 2 mine of the Utah Fuel Co. in which 171 men were killed. The new code, adopted by the State Industrial Commission after it had been written in a conference between state mine inspectors and operating men, requires the use of permissible explosives only, the use of nothing but approved electric cap lamps, calls for all shots to be fired electrically when men are out of the mines, and lays down some strict requirements for wetting every mine. It is said to be the most rigid safety mining code in America.

Investigators of the Castlegate explosion finally concluded that without doubt the blast was started by the attempt of a fireboss to relight his flame safety lamp. A pocket of gas was ignited and coal dust throughout the mine that was improperly sprinkled did the rest. Laxity in reporting gas accumulations and failure to sprinkle abandoned workings were condemned in the report of B. W. Dyer, chief mine inspector; John Crawford, state coal-mine inspector, and H. E. Munn, coal-mine engineer for the Industrial Commission.

Recommendations Now in Effect

This report was considered in a long conference between the three state mining men and a committee representing the operating interests of the state. It was approved almost in entirety and the new code of safety came out of the conference. Not only is the Castlegate report accepted as correct by the Utah Fuel Co. but Frank N. Cameron, vice-president of the company, said most of the recommendations of the investigators have already been put into effect by that company.

The company men who helped frame the new safety code were L. F. Rains, Columbia Steel Corporation; A. C. Watts, William Littlejohn, Utah Fuel Co.; R. M. Magraw, J. B. Forrester, U. S. Fuel Co.; P. H. Burnell, Lion Coal Co.; Charles Ledger, Royal Coal Co.; J. R. Loaf, Independent Coal & Coke Co.; Thomas R. Stockett, Spring Canyon Coal Co.; William Money, Kin-

HERE'S THE GIST OF IT

Utah's new "100-per cent" safety code, more drastic than that of any other state in many particulars, requires:

- 1—Permissible explosives only.
- 2—Shotfiring by electricity.
- 3—Approved electric head lamps.
- 4—Rock dusting in all mines.
- 5—Use of water for cutting and loading machines to reduce dust.
- 6—Sprinkling at every face.
- 7—Daily reports on sprinkling.
- 8—Sprinkling to be done by men employed for no other duty.
- 9—Shutdowns during removal of gas accumulations.
- 10—Cleaning up of all abandoned workings.

ney Coal Co.; B. P. Manley, Carbon Fuel Co.; R. W. Van Derck, American Fuel Co.; George A. Schultz, Liberty Fuel Co.; Robert Howard, Peerless Coal Co.; B. Newren, Scofield Coal Co., Union Pacific mine; A. Shaw, Mutual Coal Co.; H. E. Lewis, Standard Coal Co.; H. Tomlinson, MacLean Coal Co.; J. H. Roberts, Weber Coal Co. and Grass Creek Fuel Co.; William Littlejohn, Blue Seal Coal Co.

The safety code, by which Utah leads all other states in the requirements laid down in the first seven sections, follows:

"(1) Permissible Explosives.—Only 'permissible explosives' shall be used for blasting coal in any mine, and the amount of such explosive used in any one hole shall not exceed the permissible limit of 1½ lb. A permissible explosive shall be considered as one which has been classed as permissible by the U. S. Bureau of Mines, and then only used in such quantities and under such conditions as have been approved by the U. S. Bureau of Mines.

"(2) Shotfiring.—In all coal mines in Utah in which three or more men are employed on any one shift, all shots shall be fired electrically by authorized shotfirers, when all men, except the shotfirers, are out of the mine.

"(3) Lighting.—All men entering coal mines in Utah in which more than five men are employed on any one shift shall be equipped with electric lamps approved by the U. S. Bureau of Mines and no flame lamps shall be permitted in the mine, except for testing purposes. All lamps used for testing purposes shall bear the approval of the U. S. Bureau of Mines and shall be magnetically locked and the igniters shall be maintained in a serviceable condition. Mines employing five men or less on any one shift may be required to comply with the above regulation at the discretion of the Industrial Commission of Utah.

"(4) Rock Dusting.—All main entries and slopes of coal mines in Utah shall be rock dusted from the mine opening into a point designated by the state mine inspector. Intake air courses shall be rock dusted at least into the most distant points where freezing takes place in the coldest weather. Whenever, by analysis, the rock dust material in any part of a mine so treated shows a total incombustible content lower than that determined as necessary to render the coal dust inert, the section in question shall be fenced off, or the mine closed until sufficient inert material has been added to allow of safe operation.

To Prevent Spread of Blasts

"(5) At every opening from each working panel or level connecting to any other level or panel, entry or slope, there shall be installed rock-dust barriers so placed that an explosion originating in that level or panel cannot extend to other parts of the mine. These rock-dust barriers shall be of a type which has been tested and approved by the U. S. Bureau of Mines, and shall be correctly installed.

"(6) Water on Mining Machines and Mechanical Loaders.—Coal-cutting machines and mechanical loading machines shall not be operated in coal mines in Utah unless equipped with a supply of water applied in a manner to wet down and prevent the raising of fine coal dust into suspension in the air.

"(7) Sprinkling.—Every owner, agent, manager or lessee of coal mines within the State of Utah shall provide and maintain water lines in all working places of sufficient size and pressure to furnish water in sufficient quantities for sprinkling purposes to wet down all coal dust that may arise and accumulate in and around the working face. And each worker shall be kept supplied with a sufficient quantity of

Rescue Team at Castlegate

But the word "rescue" is a misnomer, for all the men in the mine perished.



water hose to enable all parts of the face region to be thoroughly sprinkled, this to be used by the workers in each working place.

"(8) Men employed for sprinkling shall make a signed daily report, in a book kept for that purpose, of the sprinkling work done, condition of working places, pipe lines, and any difficulty arising from the lack of pressure, pipeline shortage, breakage, lack of hose, etc., this report to be countersigned by the mine foreman.

"(9) Men employed for sprinkling shall not be used on work other than sprinkling without first having the permission of the superintendent for such transfer, it being understood that in case of such a transfer the vacancy shall be filled by a man qualified to do that work.

"(10) Ventilation.—Moving of gas (methane) accumulations while the shift is in the mine is absolutely prohibited even when all miners are on a closed-light basis, and the entry in which the accumulated gas is found, together with all workings on the return side of the same split in which the accumulated gas is found, shall be closed down until the gas is removed by approved methods of ventilation.

"(11) General Orderliness.—Before the track is pulled out of the air courses, abandoned rooms and other places, all coal and coal dust must be cleaned up and loaded out. This, however, does not apply to rock and bone gobs in rooms and other places that have been adequately rock dusted.

"That the orders herein made (except order No. 4, relating to rock dusting, and order No. 6, relating to water on mining machines and mechanical

loaders, these orders to be effective as provided hereafter) shall and they are hereby made effective on and after July 1, 1924; provided that in the case of order No. 4, relating to rock dusting, additional time may be granted by the Industrial Commission to any operator who, by written application, applies to the commission for an extension of time, provided in the opinion of the chief mine inspector said operator has exercised due diligence in an effort to comply with said order; said additional time, however, to not extend beyond Sept. 30, 1924; and be it further provided that in case of order No. 6, same shall be effective on and after June 1, 1924; and,

"That all orders and parts of orders contained in the general coal-mine safety orders of the Industrial Commission effective Sept. 1, 1920, which are in conflict with the orders herein made are hereby rescinded, vacated and set aside."

F. L. Burns Named President Of Burns Coal Co.

The resignation of Michael F. Burns as president of Burns Bros., New York City, was accepted at a meeting of the directors April 8, and F. L. Burns, his son, was elected president of the company. Michael F. Burns was elected chairman of the newly created advisory committee, the other members of which have not been chosen.

The directors declared the regular quarterly dividends of \$2.50 on the Class A stock and 50c. on the Class B stock, both payable May 15 to stockholders of record May 1.

West Kentucky Parley Off; Miners Refuse Wage Cut

Special Dispatch to Coal Age

Louisville, Ky., April 14.—Negotiations were broken off between the Western Kentucky Coal Operators Association and District No. 23, United Mine Workers, this morning when on reopening the conference on a new wage agreement, the miners issued an ultimatum to the effect that they would accept nothing other than the so-called Jacksonville agreement, or a three-year contract at the 1919 scale as adopted by the Central Competitive Field, of which western Kentucky is not a part. The operators wanted a return to the 1917 scale, due to non-union competition and disadvantage in freight rates in competing with the Central Competitive Field. The ultimatum stated that the miners could not accept any reduction, not having the authority to do so. This is taken to mean that John L. Lewis, International president, is responsible for the refusal, as the men had previously shown a disposition to accept a reduction agreement. The operators issued a statement and the conference was abandoned, the men returning to their homes.

It is predicted that some of the mines will soon open on a non-union basis, while others will make no attempt to operate for the time being. The original expiration date of the contract was April 1, but this was extended to April 15, in order to give the miners time for conference with Lewis. The operators will now offer the reduced scale, and operate if enough miners report.

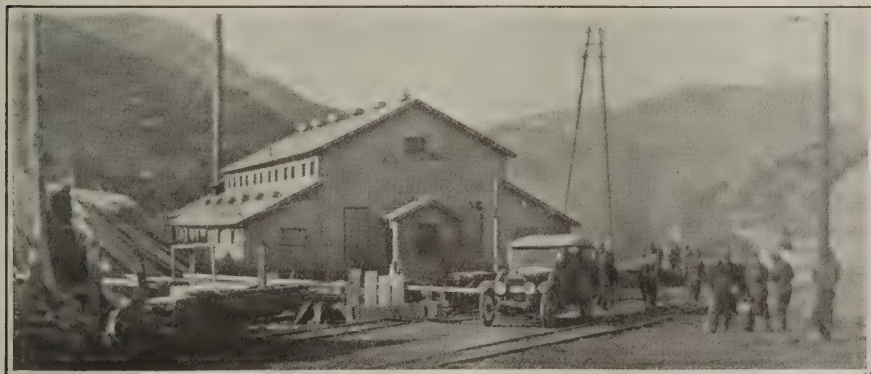
President Lewis at Indianapolis definitely refused, several days ago, to sanction any sort of wage reduction in western Kentucky. He is reported to have hurled some strong language at District President Jackson and the committee of union men from Kentucky. Thus it was left for Jackson to go back and do the best he could. The impression got abroad that if Jackson agreed to the 25 per cent cut the operators demanded, Lewis would promptly make an example of him in an effort to hold the other wobbling outlying districts in line.

These negotiations cover only the east half of the western Kentucky field, comprising Muhlenberg County mainly. There is a union contract called the Madisonville agreement outstanding another year in the western half of the field, but few indeed are the companies operating under it, for there is little union strength left there.

Freeport Vein Operators Sign

A wage agreement has been signed by the wage scale committee of district No. 5, United Mine Workers, and officers of the Freeport Thick Vein Steam Coal Operators' Association, P. T. Fagan, president of the district mine workers, announces. The pact affects about 10,000 mine workers in the Pittsburgh district.

The agreement is based on the Jacksonville settlement and will run for three years.



Bath and Change House at Castlegate

In this house, 100 ft. from the main entrance of the mine, every window was broken. The drift mouth itself was demolished by the explosion and caved in.



P. & A. Photos.

Hugo Stinnes, Jr.

Comes into control of vast industrial enterprises through the death of his father.

Two Lives Lost in Flood of Four Glen Alden Mines

Four mines of the Glen Alden Coal Co., near Scranton, Pa., were flooded and three others seriously threatened April 7 by the swollen waters of the Lackawanna River, which broke through on the westerly side, below the National colliery, in Taylor. Company officials and employees labored tirelessly in an effort to halt the flood. Two miners employed in the Sloan mine lost their lives. The bottom workings of the Bellevue, Dodge, Hyde Park and Sloan mines were inundated and the Taylor, Pine and Archbald workings were menaced.

After thirty-six hours of work by nearly 800 miners, who dropped ten steel cars, 100 tons of steel rails, 50 tons of baled hay and several thousand bags of sand into the opening, the course of the river was diverted from the opening. It will take several weeks to clear the workings of water.

Senate to Pass Johnson Bill

Passage of the Johnson immigration bill by the U. S. Senate by an overwhelming majority is indicated as *Coal Age* goes to press, an attempt to amend its provisions to continue the "gentlemen's agreement" under which the Japanese Government is pledged to refuse permission to coolie laborers to emigrate to the United States having been defeated April 14 by a vote of 76 to 2. The House passed the bill April 12 by a vote of 326 to 71.

As the Johnson bill goes to the Senate, it provides that immigration in the future shall be based upon the census of 1910 instead of 1890.

It permits immigration from each nationalistic group to the amount of 2 per cent. of the number of such nationals resident in the United States as recorded in the census of 1910. It is estimated that under its provisions immigration would approximate 161,990 a year, as compared with an average of 357,801, under the present law, which fixes immigration on a 3 per cent quota.

Stinnes, Industrial Czar Of Germany, Dies

Hugo Stinnes, industrial and financial leader of Germany and one of the wealthiest men in Europe, died in Berlin April 10. He had been operated on twice for gallstones, after which his condition was complicated by peritonitis and pneumonia. It is believed that his fatal illness was brought on by the Ruhr occupation, chagrin, worry and overwork.

Hugo Stinnes was born in Mullheim in 1870, of Jewish parentage and belonged to a wealthy family that long had been prominent in commerce. He received a common school education in his native town and then worked as a miner and in a business office to gain practical experience. He started business for himself as a coal dealer, bought several coal mines and then branched into transportation, buying river steamers and barges and ocean-going vessels. He became a director in many corporations in Germany and Luxemburg, especially those engaged in supplying electric power and lighting.

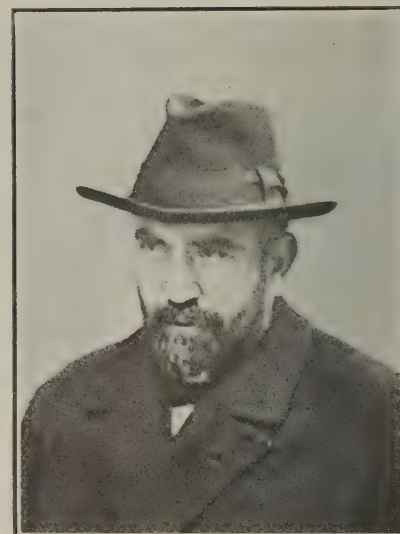
Stinnes was the foremost profiteer of the World War; was intrusted by Ludendorff with the industrial looting of Belgium and had charge of the production of munitions. He bought many newspapers in Germany which he used for the promotion of his profiteering schemes. He was elected a member of the Reichstag in June, 1920, as a member of the German People's party, and later sought to organize a supertrust to control every industrial and commercial enterprise in his country.

Governor Fields Intervenes To End Mine Warfare

In an effort to arbitrate the differences which brought about warfare in the mining camp on Straight Creek, Governor Fields, of Kentucky, held conferences April 12 with R. R. Atkins, general manager of the Liberty Coal & Coke Co.'s mine at Straight Creek, and William Turnblazer, president of District No. 19, United Mine Workers; Sanford Snyder, International union representative, and two miners from Pineville, representing the local union involved. The Governor held separate interviews with the representatives of both sides of the controversy, but no announcement has been made as we go to press.

All last week the armed conflict between state troops and mountain snipers kept up around the plant of the Liberty Coal & Coke Co. on Straight Creek, near Pineville, Ky. A good many shots were fired from various points around the hills toward the company's property under protection of the troops, but no hits were reported. The mountaineer dead shots among the union miners who refused to work at the 1917 scale and were consequently evicted, hit nobody except the three men shot down April 3.

It is supposed that numerous unemployed union miners from other fields have come in to help in this struggle to regain the union's foothold at the Liberty property, which is in the center of a hotbed of unionism in and about Pineville.



P. & A. Photos.

Hugo Stinnes

Germany's industrial and financial leader, who died in Berlin April 10.

A. J. Cook Elected Secretary Of British Miners Union

A. J. Cook, leader of the South Wales coal miners, has been elected secretary of the Miners' Federation of Great Britain, succeeding Frank Hodges, who resigned the post upon his appointment as Civil Lord of the Admiralty in the labor government. When interviewed by the Associated Press on his appointment, Cook, who is an avowed extremist and devoted to the Marxian theories, said he interpreted the miners' choice as a desire for an aggressive policy.

"I am in favor of a real live national and international miners' organization," he said, "and am convinced that the miners cannot retain even their present bad conditions without it. I am still a Red with all that means, and I will not rest satisfied until private enterprise in the mining industry is abolished."

Upper Kanawha Wage Parley Broken Off

Negotiations between the operators to the north of the Kanawha River and on the Kanawha & Michigan R. R. in the Kanawha fields and the scale committee of District No. 17 of the United Mine Workers were broken off, April 8, at a meeting held in the Sinton Hotel, Cincinnati, after conferences lasting several weeks. Operators of about twenty mines with an annual output of 5,000,000 tons were represented.

Attempts were made to have the union recede from its demand for the Jacksonville scale of \$7.12 a day, it being pointed out that the open-shop mines to the south of the river were working on a scale calling for \$4.68 a day. It is understood that the union operators were willing to go as high as \$5.50 a day in order that an agreement might be effected, but the miners were obdurate in holding out for the scale. It was announced that this precluded getting business in competition with the surrounding mines and rather than enter into an agreement, all of the mines affected would be closed down.

Coal Destined to Play Prominent Role In Reparation Settlement

Report of Dawes Committee Fraught with Deep Significance in Eyes of Washington—British and American Coal to Meet Competition from Large Volume Produced by German Mines

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Directly, or indirectly, every individual in the world, from the naked savage in an African jungle to the richest industrialist in America, is affected by the existing reparations situation and will be benefited by the settlement which is expected to follow the reports of the committees of experts. Coal is destined to play a major part in any plan of settlement, since it is one of the few commodities that Germany can export in quantity.

The report of the Dawes committee is regarded in Washington as a decisive document. Sight should not be lost of the fact, however, that it is only a plan for settlement and not a settlement in itself.

A few think this report will mark only another weary milestone along the road from the armistice to normalcy, but the great majority believe that a plan has been devised that will be the basis for successful negotiations.

The great difficulty in the reparations tangle is to find means of payment whereby wealth from Germany may be translated into credit outside of Germany. There are some stocks of gold and silver in that country, but far less than is needed for essential reserves for its own financial structure. Liquidation of German assets in other countries has gone as far as it can. No means yet has been devised to lay hands on the much-discussed German bank credits abroad.

Germany Now Without Ships

Before the war Germany furnished a large service to other nations with its merchant marine, but it no longer is operating ships. As a result, the only way that Germany can pay is by exporting goods. The amount that can be paid must come from the difference between the value of these exports and the cost of the foodstuffs and the raw materials that Germany must import. The public, particularly the French public, has failed to appreciate that there can be no transfer of wealth to the Allies which can be made immediately available except as surpluses of goods are transferred.

There will be no great enthusiasm in the Allied countries for the throwing open of their markets to goods manufactured in Germany. It is evident, however, that if the German machine is to be set running again means must be found to absorb a large amount of German manufactured products. This means the displacing of a like amount of these goods which now are being furnished by other countries. As it would be highly unpopular to assist in the building up of German assets by that method, it is certain that a forced draft will be used in endeavoring to crowd out of Germany the maximum amount of coal and potash. Germany

has almost inexhaustible reserves of both of these commodities.

France particularly will be interested in encouraging large exports of coal. Her domestic coal industry is relatively small. The French realize that they could afford to seal up their mines and keep that resource in the ground for one hundred years, if necessary, while Germany would be building up credit abroad by the export of its excellent coal. The coal fields of the Ruhr are among the richest of the world. The seams are thick and occur, one above the other, in formation particularly easy to mine. Production in that region was growing at a very rapid rate. In all the demoralization and uncertainty of 1920 Germany, had she really wished, could have furnished to France the 2,000,000 tons per month provided for under the Spa agreement.

More Ruhr Coal Than France Needs

The Ruhr, however, is capable of furnishing much more coal for export than France can take, which will mean, it is predicted, that a great effort will be made to force this coal into other markets. This means the displacing of a large tonnage now being furnished by the British. Such export markets as the United States has retained will be subjected to double pressure as a consequence. France particularly must begin to receive reparation payments. The whole situation seems to indicate that a large volume of German coal is to be pressed upon the market, almost regardless of price.

It frequently is said facetiously in this country that the hazards of the coal business are so great, and the profits so uncertain, that no Jew is found in the trade. Evidently this is not the case in Germany, as Hugo Stinnes was the outstanding figure in its production and distribution. Being an industrialist, he opposed any great levy on German coal resources for the payment of reparations in kind. He would have burned the coal under German boilers and would have forced the world to absorb a flood of German manufactured goods. The hand of Death has swept Stinnes from the stage just at a time that plans are laid to make coal the chief factor in the transference of German wealth to the outside. Had Stinnes lived, he might not have been able to block this plan. His passing certainly will make the task an easier one.

Three-Year Pact in Wyoming

Mine workers and operators of the south and north Wyoming coal fields have ratified the Jacksonville agreement, effective for three years from April 1.

British Miners Reject Offer of Mine Owners But Will Not Strike

In a heavy ballot the British coal miners rejected by 16,258 votes the offer made by the operators in reply to the demand for better working conditions. The decision against acceptance was accompanied by a demand that the government institute an inquiry into wages in the mining industry, and it was officially announced that the Minister of Labor had agreed to appoint a court of inquiry to meet after Easter.

The agreement regulating wages and conditions in the coal fields expires April 17, but there is no question of a strike, and arrangements are to be discussed next week under which work can be carried on while the court conducts its inquiry.

Hoover Sees Key to Rate Cut In Consolidation

Testifying at Washington April 9 before the House Commerce Committee, which has been considering the Hoch resolution to direct the Interstate Commerce Commission to undertake a general rate revision, Herbert Hoover, Secretary of Commerce, said he believed an exhaustive study should be made by the commission to lay the foundation for a general readjustment of railroad freight rates.

"Simplification of the rate structure," he declared, "might be difficult under present conditions, but it probably would be shown that it could be done easily if there were consolidations of railroads. A thorough study of the rate structure undoubtedly would become one of the strong arguments for consolidation."

Mr. Hoover declared there was pressing necessity for a revision downward of rates upon such primary commodities as farm products, coal, iron and steel and lumber, but expressed the view that reductions might work a hardship on roads whose revenues come chiefly from carrying such commodities. Consolidation, he said, would tend to equalize the loss in revenue instead of making certain carriers stand the brunt of the reduction.

Before consolidation can be carried out on a wide scale, Mr. Hoover said, legislation will be needed, particularly to confine the power and attitude of the Interstate Commerce Commission toward them. If a definite policy as to grouping of roads is translated into law, the committee was told, there will be a marked tendency toward efficient consolidation.

Horizontal increases and reductions of freight rates, in the opinion of the Secretary of Commerce, have thrown the entire freight structure out of adjustment. He estimated that the cost of operating railroads and their revenues are 70 per cent above pre-war levels.

New York to Save Money on Coal This Year

Twenty-eight coal companies submitted bids on April 8 for furnishing and delivering between April 1, 1924, and March 31, 1925, more than 500,000 net tons of coal to thirteen municipal departments of the City of New York. When all bids had been tabulated Edward W. Buckley, Commissioner of Purchase, announced that the prices were from 50c. to \$1 per ton below last year's figures and that the coal bill for these departments for 1924 would be approximately \$250,000 lower.

The largest quantity called for in any one lot was for 160,760 tons of No. 1 buckwheat for barge delivery, for which there were seven bids ranging from \$4.51 to \$5.25 per ton. For delivering 43,980 tons of bituminous run of mine coal to the same points, the prices submitted ranged from \$4.29 to \$5.48. The schedules called for various tonnages to be delivered by truck in the various boroughs of Greater New York. Prices submitted for supplying No. 1 buckwheat ranged as follows: Manhattan, \$5.29 to \$6.21; Brooklyn, \$5.38 to \$6.03; Queens, \$5.21 to \$6.48; Bronx, \$5.48 to \$6.21, and Richmond, \$5.48 to \$6.24.

Tenders for furnishing and delivering soft coal, mine run, to various points in the boroughs ranged from \$5.69 to \$6.39 in Manhattan; \$5.24 to \$6.48 in Brooklyn, and \$5.22 to \$5.75 in Bronx.

For delivering 12,000 tons of bituminous coal to the Fire and Police Department boats the prices ranged from \$5.29 to \$5.97.

Stove and chestnut sizes of hard coal when delivered by truck to designated points will cost the city from \$11.49 to \$13.75 per ton and pea coal from \$8.21 to \$10.47, while barge delivery of stove coal will cost from \$10.47 to \$12.25 per ton.

For delivering coal in carload lots to the city institutions in Orange County the bids ranged from \$9.97 to \$12.09 for stove coal; \$7.38 to \$7.50 for pea coal; \$3.59 to \$3.74 for barley coal and \$4.86 to \$5.39 for bituminous mine run.

Bids received for delivering in carload lots 23,680 tons of bituminous mine run to pumping stations on Long Island ranged from \$4.86 to \$5.38, and for 15,800 tons of No. 1 buckwheat from \$4.81 to \$5.87.

May Defer Effective Date of Section 28

Chairman Hall, of the Interstate Commerce Commission, appearing before the Committee on Merchant Marine of the House of Representatives on April 11, urged that legislation be provided so as to defer until June 1, 1925, the effective date of Sec. 28 of the Merchant Marine Act. He made it clear that great confusion in transportation will result if the law is made effective May 20, next, as proposed by the Shipping Board.

Since it is practically impossible to obtain the necessary legislation prior to May 20, the prospects seem to favor the coming of the period of confusion which Chairman Hall pictures. The

Essen Miners' Band Plays At Stinnes Funeral

The famous coal miners' band of Essen took part in the funeral of Hugo Stinnes, at Berlin, Monday, playing dirges and Westphalian folksongs. When the news of his death reached the home town of the famous industrialist the leader of the band asked permission of the family to honor their dead chief by playing the miners' "taps" at the obsequies.

Some of the members of the band worked with Stinnes during his active apprenticeship in his father's mines and all learned to respect him as an employer. Stinnes was always a generous patron of the band and was especially fond of its rendition of his favorite native tunes.

Interstate Commerce Commission will not hesitate, it has been indicated, to postpone the effective date for a short period on the ground that it is physically impossible for the railroads to prepare their tariffs by that time.

The oral arguments which will begin before the Interstate Commerce Commission April 17, will be confined entirely to the extent to which the commission's authority goes in the matter of postponing the date on which Sec. 28 will become effective. It seems entirely improbable that the commission will be convinced that it has any latitude in the matter beyond a comparatively few days.

Coal has not come into the discussion before the Merchant Marine Committee. The railroads are firm in their decision to contend that low rates to tidewater are in no sense export rates. Their position is that the reduction is made primarily because of the lower cost in handling coal in wholesale quantities to dumping points at piers. The rates are held to have been made in the interest of the intracoastal movement and that the small percentage of this coal which moves to foreign countries is simply an incident.

The traffic executives of the railroads serving the Eastern territory have very carefully considered the interpretation and application of Sec. 28, and have decided that rates on coal and coke to the North Atlantic Ports, which are lower than track delivery rates on the same commodity to the same port for transshipment, are not included within the operation of Sec. 28, because such rates are not based upon contemplated exportation, but are based primarily on the incident of coastwise transportation to other ports of the United States. This will, of course, continue the present rate arrangement on traffic which moves coastwise and export from these ports and there will be no change as a result of the Shipping Board's action.

A bill has been introduced by Senator Curtis amending No. Sec. 28 of the Act so that it will not become effective until July 1, 1925. It is doubtful if this can be passed before the date set for Sec. 28 to become operative as it now stands.

Blame for Yukon Explosion Not Placed

In investigating the cause of the explosion at the No. 2 mine of the Yukon Pocahontas Coal Co., at Yukon, late in March, in which 26 men were killed, the coroner's jury did not fix the responsibility for the explosion on any particular individual or individuals. After visiting the mine and then examining fifteen or more witnesses, the jury brought in a verdict stating that it found from the evidence that the explosion started in Rooms Nos. 5 and 6 in what is known as parallel entry in No. 2 mine. In the opinion of the jury gas was ignited either by powder or an electric detonator, and an accumulation of coal dust extended the explosion.

T. J. Dawson, general superintendent of the Yukon-Pocahontas company, expresses the belief that the explosion was caused not by gas but by the explosion of powder, planted in two abandoned rooms of the mine. It has been stated by Mr. Dawson that electric detonators and fragments of a powder box were found in rooms Nos. 5 and 6, with a wire extending from the "planted mine" to a main entry switch.

The caps, found in a section of the mine where no work had been done for six months, were new.

It is now stated that the bodies of dead miners were found so far away from the center of the explosion that a volume of gas sufficient to blow the bodies for such a distance would have wrecked the entire mine.

Northwest Retailers Charged With Unfair Competition

The Northwestern Traffic & Service Bureau, its officers, directors and subscribers and the Northwestern Publishing Co., of Minneapolis, Minn., are cited in a complaint issued by the Federal Trade Commission charging unfair methods of competition in the marketing of coal. The subscribers of the Bureau, numbering approximately 1,800, are in large part retail coal dealers doing business in Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Missouri and Kansas.

The complaint alleges that the respondents by co-operative means and methods prevent wholesalers of coal from selling in the territory served by respondents direct to consumers or to any other persons not retail dealers in coal qualified under the designations of "legitimate" or "regular" dealers as defined by the respondent organization. It is also alleged that the purpose and effect of respondents' co-operative methods were to control the price of coal to the consumer without interference from outside competition.

The following are officers and directors of the Northwestern Traffic & Service Bureau, and are named individually in the complaint: A. L. Havens, president; C. A. Cruikshank, vice-president; H. L. Laird, secretary-treasurer; H. T. Folsom, William Hardman, J. A. Young, F. N. Furber, C. F. Rourke, F. C. Potter, directors. I. C. Cuvelier, president of the Northwestern Publishing Co., also is named individually.



Problems In Underground Management



Suggestion for Regulating Flow of Air at Foot of Intake Shaft

Movable Triangular Framework Will Split Air Current Equally
or in the Proportion Desired—Current in Either
Direction Can Be Shut Off

BY HARVEY DABNEY
Harrisburg, Ill.

MANY air shafts are in bad condition, especially at the bottom. Here, in many cases old timbers, rock, etc., are piled, not infrequently obstructing the air and causing serious eddy currents and an inevitable loss of power. The device illustrated herewith is intended to take the place of a pile of rubbish in directing the air and at the same time to furnish an easy and effective means of regulating it in case the current divides at the foot of the shaft.

As may be seen in the accompanying illustration, this regulator is simple and can be built by almost any mine carpenter. It consists of an A-frame of heavy timber, say 6 x 6 in., resting

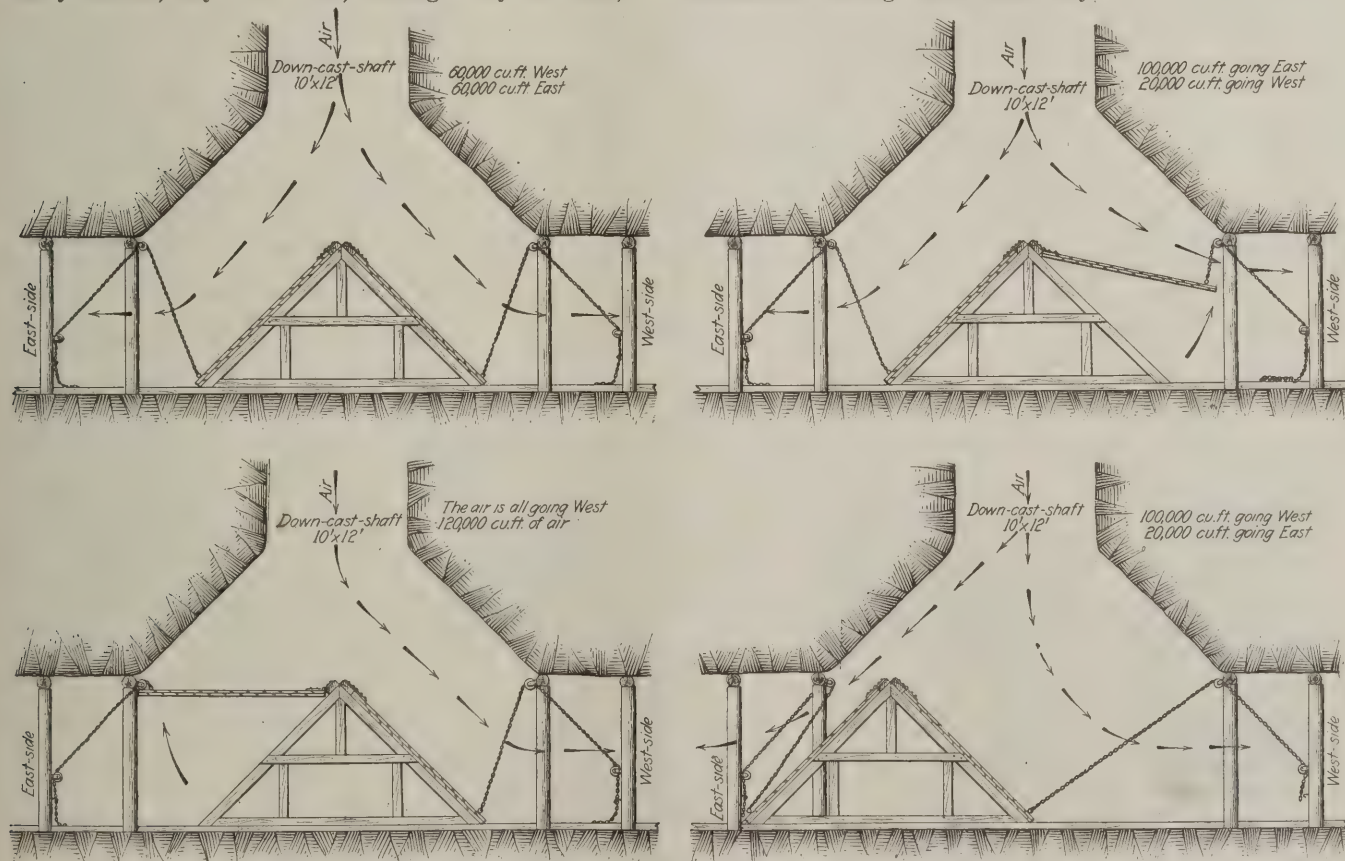
upon, but not attached to a set of sills. The frame may thus be moved from side to side of the air shaft or secured in any intermediate position. At the top of the movable frame two doors are hinged. These are made airtight and completely cover both sides of the A-frame. From their lower edges ropes or chains pass over pulleys attached to the cross timbers in the air courses extending on either side of the shaft bottom.

It will be seen that two means of regulating the flow of air to either side of the shaft are available. Thus a door upon one side of the A-frame may be lifted, in this manner choking

or throttling the air upon that side and allowing less of it to pass through. That same movement increases the quantity of air delivered to the other side. Again the whole A-frame may be shifted to one side of the air shaft, with the result that any desired volume of air may be made to take a path upon either side of the shaft, the limit of course being the total output of the fan.

In case a quick change in the regulation of the ventilating current is desired, the door should be raised, whereas if the division of the incoming current is to be more or less permanent, the position of the A-frame itself should be changed. Either means would be highly effective, but probably by shifting the frame the change would not be accompanied with so great a loss of power.

It would appear that this device offers a ready means of quickly regulating the flow of air to either side of the shaft bottom. It is simple in construction, inexpensive and would be easy to build and install. Once in place it should require little upkeep and should last indefinitely.

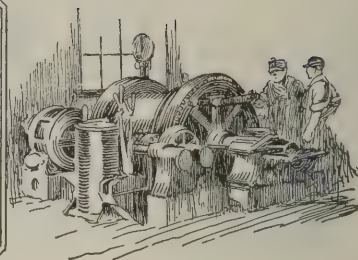


Easily Constructed Regulator for Installation at the Foot of Air Shaft

Raising one of the doors throttles the air going to that side and forces a larger proportion of it to the other airway.
Moving the A-frame to the side accomplishes the same result.



Practical Pointers For Electrical And Mechanical Men



Care and Adjustment of Cam-Type Controllers for Electric Motors

Operation Similar to That of Drum-Type Equipment—Circuits
Made and Opened by Small Contactors—Lubricant
Applied Where Air Is Not Too Dusty

THE general appearance of cam-type controllers and their method of mounting and operating are much the same as for controllers of the drum type. The latter have rotating cylinders with segments which make contact with fingers, whereas the cam-type controller consists of a shaft which carries a series of cams that in turn cause the closing of one or many contactors. Fig. 2 illustrates a contactor in the open position. It consists of a stationary element A, which may or may not be provided with a blowout coil and a movable element B, held open by a spring S, and closed by a cam C. The action of this contact is exactly the same as that of a magnetic contactor, and the same contacts are used. Figs. 2 to 4 show the three positions of the contact: First, when open; second, when just touching at the tip; third, when it is entirely closed, making contact at the heel. In opening, the process is reversed. This

rolling action from the tip to the heel and back again in closing and opening causes the arc to be broken at the

tip and the current to be carried at the heel. By using a rolling instead of a sliding action, in closing, mechanical wear is eliminated and much heavier contact pressures can be used.

The current is carried from the movable contact to the terminal by means of a flexible shunt. One end of the spring is insulated so that no current can pass through this member. Because the spring is a considerable distance from the contact, it is not directly affected by heat from the contact or arcing, and is, therefore, in no danger of having its temper drawn.

Various combinations of switches can be obtained by changing the number of contactors and the shape of the cams. The length of the frame can be adapted to any desired combination by changing the length of the insulating bars and the sheet-iron cover. The following points should be observed when inspecting a cam controller:

(1) The contacts, when closing, first touch at the tip or upper edge and roll until the current-carrying contact is made and the heels touch. The reverse action should take place when opening. Examine the contacts to see that they act in this manner, and see that they engage throughout their entire width

when they are in their final closing position.

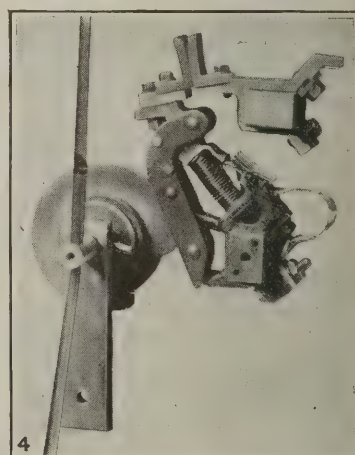
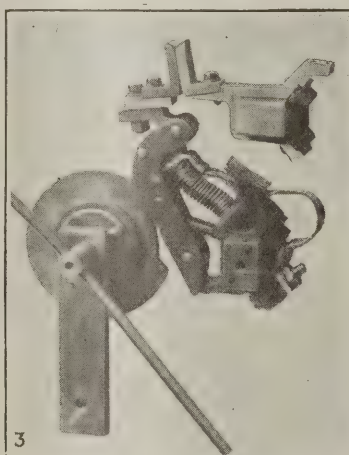
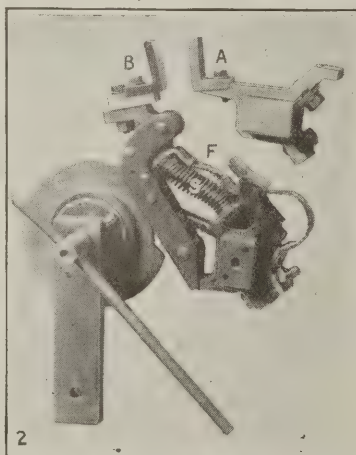
(2) Do not file the contacts, for the wear in operation improves their surfaces by eliminating the minor high spots. Ordinarily, a contact will carry more current after it has been "worn in" than when new. If the action of the contact is correct, the burning should all take place at the tip.

(3) When the contacts have burned back so that the arcing occurs close to the heel, both contacts should be renewed. Do not attempt to use an old contact in combination with a new one.

(4) Do not lubricate the contact surfaces. They are so designed that there is but little rubbing, making lubrication unnecessary. Oiling the contacts would not be well, for dirt always accumulates on lubricated surfaces. The roller pin, hinge pin, and camshaft bearings will operate to better advantage if lubricated a little unless the air is very dirty. Lubrication tends to hold dirt in the bearings, and under some conditions they will operate better if dry.

(5) Measure the contact pressure with a spring balance. For various types and sizes the manufacturer should furnish a table showing the normal contact pressure. This should be maintained if the best operating conditions are to be attained. A low pressure will increase the heating, and a high pressure will make the controller hard to operate.

(6) The controller notches are indicated by a ratchet wheel. In many controllers the pressure of the roller on the ratchet wheel can be adjusted. The operation of the controller often



Figs. 1 to 4—Illustrating Manner in Which Cam-Type Controllers Operate

Fig. 1—Controller with radial handle. Fig. 2—Contactor resting against low radius of cam, contact wide open. Fig. 3—Cam partly turned, toes of copper tips touching together. Fig. 4—Long radius of cam holds contact securely closed. The last three illustrations clearly demonstrate the method of operation and show how smooth action is obtainable by the use of the cams.

can be materially improved by the careful adjustment of the ratchet spring. Where the air is free from grit, the ratchet wheel and roller should be lubricated. Examine all the bolts to see that they are tight. This is particularly necessary on bolts that hold the contacts, shunts and terminals in place. A loosening of any of these bolts may materially increase the heating.

(7) If the controller is exposed to corrosive fumes which discolor the copper parts, it will be necessary to clean the contact with fine emery cloth or sandpaper, and occasionally the current-carrying joints may have to be disconnected and cleaned. Sometimes covering these joints with a thin coating of solder, called tinning, will prevent corrosion.

(8) The controller should be cleaned out from time to time, depending upon the rapidity with which dirt accumulates. A convenient method is to use compressed air at low pressure. Do not subject the controller parts, particularly the insulation, to a high-pressure air jet, as this may injure the insulation.

Both drum-type and cam-type controllers can be provided either with a rotating or with a lever handle. They may also be mounted vertically on the

rear of a panel and operated by a hand-wheel through gears and chains from the front. If the controller is mounted on the back of a panel with the shaft horizontal, it can be extended directly through the panel without the use of gearing.

Cam controllers are frequently built motor-operated. The construction of the controller is the same as for manual operation, the handle being replaced by a reduction gear and pilot motor.

The drum controller is more compact for certain switching combinations, such as reversing. On the other hand, the cam is more easily designed for complicated switching, and new combinations can be more easily made as they can be accomplished by using cams of different shapes, whereas in the drum design new drum castings are usually required. The cam units can be removed individually without dismantling the controller. The same is true of the contact fingers of drum controllers. It is usually necessary to take the drum out of the controller in order to replace any of the drum segments, and after replacement, these segments should be trued up in a lathe.

H. D. JAMES,
Control Engineer.

Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

How Relief Valves Prevent Breakage of Pumps

Opinions differ as to whether a relief valve should be installed on the discharge line of a plunger pump. However, experience has proved that it is undoubtedly necessary where the pump is discharging into a long, high column line which exceeds 50 per cent of the rated foot-head capacity of the pump or where the suction line may collect much air.

Many pumps are broken by momentary high pressures built up in the pump during some abnormal condition which usually exists for but a short time. The most feasible explanation of these high pressures and of the accidents they cause is that the pump takes in air which is compressed with each stroke of the plunger; this causes the water in the column line to stop flowing. Finally, when the pump has built up enough pressure under the discharge valves to equal the weight of the water on top of them, the whole discharge column of water starts moving instantly. Previous to this time, the pump will be operating at its maximum speed and the result is that a high pressure is suddenly built up.

I have known several cases where pump breakages were frequent until a relief valve was installed on the dis-

charge line. The usual practice was to set the relief valve at a pressure about 25 lb. higher than that normally required in the column line, thus relieving abnormal pressures before they became unduly great.

I remember an instance where a pressure gage was installed on a 7x8-in. triplex pump. This pump had a suction line about 700 ft. long and a discharge line about 300 ft. long. Normally the gage showed a pressure of 140-lb. per square inch but occasionally, for some unknown reason, the pressure gage momentarily registered as much as 600 or 700 lb. In this particular installation a tee connection on the suction line led to a short piece of pipe which ran to another sump at the foot of the hoisting shaft.

We noticed that if the gate valve

located on this short suction line was suddenly opened while the pump was operating at full speed on the regular suction line, the pressure on the gage suddenly increased practically as has just been described. We came to the conclusion, therefore, that the pump was ordinarily getting much air with the water in the main suction and that when the short suction line was opened the pump received a full supply of water which caused a sudden increase in pressure. After a 3-in. relief valve was put on the line the pump operated satisfactorily, whereas prior to that time many valve chambers and connecting rods had been broken.

When acidulous mine water is being pumped the relief valve is rapidly destroyed by the corrosive action of the water. This causes the valve to leak and give trouble. In such cases it is advisable that a relief valve be placed as shown in the illustration on the end of a vertical section of pipe connected to the discharge line. If the valve is not allowed to leak, a cushion of air will form directly under it, thus preventing any water from coming in contact with the valve seat, except when the relief valve opens to relieve abnormal pressure.

When the discharge line does not have a check valve, the relief valve will also take care of the back surge when the pump is shut down.

E. E. KENDALL.

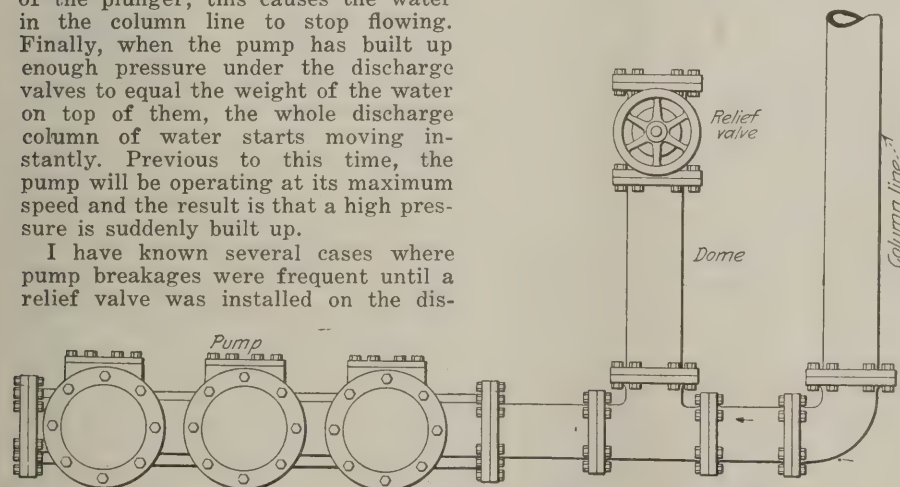
How Thermit Welding Is Done

Thermit welding is primarily a casting process used mostly for repair work where considerable metal is to be deposited. In the electrical repair shop it is frequently used for building up broken motor frames, heavy truck castings, bumpers and side plates. An intense heat is generated by a chemical combination of aluminum filings mixed with oxide of iron and primed by a magnesium powder.

Keep Locomotive Armature Bearings Clean

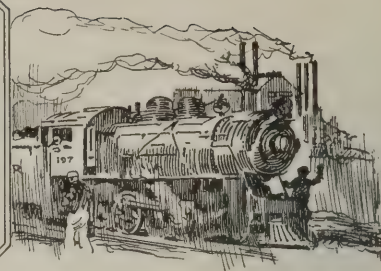
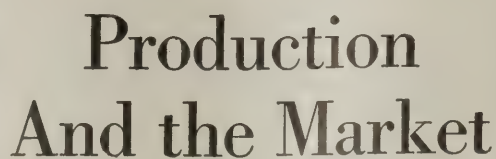
The commutator and armature bearing is ordinarily protected by a dust cap over the end of the shaft. This cap is made of sheet steel or malleable iron and is fastened to the housing or bearing by bolts or screws, thus completely enclosing the bearing. The dust cap should always be kept in place because the position of the bearing with respect to the wheel flange is such as to permit dirt, sand and wheel-wash from the flange to be thrown directly on this part of the motor.

The outer extremity of the pinion end bearing usually extends into the gear case and needs no further protection. The gear case fits over the armature bearing or an extension of the housing snug enough to keep the lubricant in the case. This tends to keep the dirt out of the bearing at this point. There is little possibility of dirt getting into the armature bearing from the inside of the motor because the oil-throwers on the shaft and the oil-catchers on the housings act as guards and give ample protection against the entrance of dirt.



Relief Valve Saves Pump from Abnormal Pressures

Before the pressure can rise to a point where it might throw unusually heavy stresses on any part of the pump or pipe line, the relief valve opens. Such an arrangement will cushion slight surges even during normal operation. The vertical pipe under the relief valve acts as an air dome.



Somnolent Condition Pervades Coal Markets; Contracting and Lake Preparations Tardy

Anxious to think of something pleasant in the midst of the depressing gloom that overhangs the soft-coal markets of the country, many producers are casting a hopeful glance in the direction of the lakes as the navigation season approaches. Hoping, like Micawber, that something eventually will turn up to dispel the prolonged dullness is the daily occupation of the trade—more favorable freight rates are the expectation of some while others look to the lake movement. The rate matter is yet to be threshed out in Washington, beginning next week, and the actual season of lake navigation is still some distance off, but the preliminary activities have been disappointing, bookings and arrangements being meager. Contracting also continues to lag, many large consumers showing a disposition to watch for bargains in the open market rather than tie themselves up to agreements.

Coal Age Index advanced 1 point to 172 as of April 14, the corresponding price being \$2.08. This compares with \$2.07 on April 7.

Small Sizes Stiffen in Midwest

With the general falling off in domestic business and increasing shutdowns of mines in the Middle West fine coals are on the upgrade, screenings showing a slow but steady firming up. Whereas more than 3,000 cars of lump, egg and nut stood at Franklin, Williamson and Saline County mines without bills, every load of screenings was shipped without delay. Even railroad business has slumped in the Carterville field, where the mines still running are getting only about two days a week, and it is worse in the Duquoin and Jackson County field. The Mount Olive and Standard fields also find the going hard.

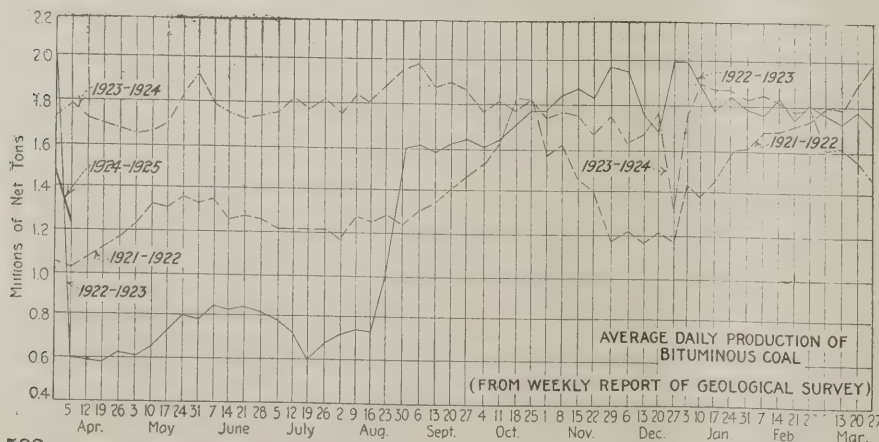
Unsettled labor conditions have put the Kentucky markets in a fretful state. Despite price cuts to encourage early stocking, business has been light in

Louisville. Trade is slow in western Kentucky also, there being practically no production of block or prepared sizes; this has tended, however, to cause prices for nut and screenings to be firmer. The heavy carry-over on the Northwest docks has deadened the market there to such an extent that even price cuts have little effect. Somnolence reigns at Milwaukee. Mines in the Southwest remain idle, the deadlock in wage negotiations at Kansas City being unbroken.

Ohio Markets Scrambled

Conditions in the Ohio markets are somewhat mixed, there being signs that the bottom has been reached in Cincinnati with the placing of railway contracts, though early lake business is lacking. Dullness and pessimism reign at Columbus and Cleveland. Production is very low in the Pittsburgh and central Pennsylvania districts. New England just plugs along at the recent low level. Atlantic seaboard markets show a tendency to steady somewhat, though a feeling of disquiet is evident at Philadelphia.

Production of bituminous coal took a pronounced drop during the week ended April 5, when output, according to the Geological Survey, amounted to 6,814,000 net tons, which was 2,004,000 tons less than was produced during the previous week. This is the lowest output on record for an 8-hour day week, except during the 1921 depression. The decrease was due in part to observance in union districts of the Eight-Hour Day, April 1, and in part to a large number of mines being idle. The total output for the coal year ended March 31 was about 542,000,000 net tons, compared with 427,598,000 tons in 1922-1923. Production of anthracite during the week ended April 5 was 1,548,000 net tons, a decrease of 394,000 tons compared with the preceding week. Total output for the coming year was about 96,000,000 tons, compared with 46,486,000 tons in 1922-1923.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
March 22 (a).....	10,424,000	9,261,000
March 29 (a).....	10,430,000	8,818,000
April 5 (b).....	9,629,000	6,814,000
Daily average.....	1,777,000	1,238,000
Calendar year to date	146,331,000	141,841,000
Daily average to date	1,791,000	1,740,000

ANTHRACITE

March 22.....	2,126,000	1,804,000
March 29.....	2,008,000	1,942,000
April 5.....	1,602,000	1,548,000
Calendar year to date	27,470,000	24,949,000

COKE

March 29 (a).....	388,000	296,000
April 5 (b).....	428,000	281,000
Calendar year to date	5,086,000	3,941,000

(a) Revised from last report. (b) Subject to revision.

Midwest Screenings Stiffen

The one thing that helps relieve gloom in the Midwest these days is the slow but steady firming up of screenings. Fine coals of all central western fields are on the upgrade, due to the general and almost complete collapse of domestic business and the shutdown of more mines. The total volume of coal produced was light indeed during the past week in Illinois and Indiana and practically nothing moved except the smallest sizes. More than 3,000 cars of lump, egg and nut stood without bills at the mines of Franklin, Williamson and Saline counties while every car of screenings left the mines immediately.

Southern Illinois screenings moved up from \$1.90 to an average of \$2.15, with some placed at \$2.25, and the price steadily bracing. Indiana No. 4 followed. Central Illinois screenings touched \$2 before the end of the week although most of it sold at \$1.80@1.90. Practically none was available, however. In another week it is expected the price will reach a point that will start the crushers working on domestic sizes now cluttering the tracks.

Some anthracite is moving to Midwest dealers following the price cut of April 1 because most dealers think it is rock-bottom for this summer and they might as well put in a little to handle the light early-summer trade.

The Illinois mining fields are full of "no bills" and miners' pessimism. In the Carterville region the few mines that are still open are getting only about two days a week. There is a slump in railroad business in this territory. In the DuQuoin and Jackson County fields conditions are worse than in the Carterville field, and prices are lower, with no railroad tonnage at all to speak of. The Mount Olive district is having a hard time. There is practically no domestic coal moving and the mines are not producing steam sizes in volume enough to take care of their customers. The Standard field is plugging along on from one day to three days a week. Railroad tonnage is light. Prices are below cost of production and the situation is an unusually unhealthy one.

Spring weather has put a sudden end to all activity in St. Louis retail coal yards. The dealers are making an effort to get early spring business started, but the public is slow in responding.

There is a little steam wagonload business, and carload steam and screenings from all fields is unusually good, with fairly good demand for the smaller sizes of nut. Country steam business is slowing up a little, but country domestic has dropped off entirely, with the exception of a little demand for chestnut anthracite.

New retail prices in St. Louis effective April 10 are:

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	Apr. 16 1923	Mar. 31 1924	Apr. 7 1924	Apr. 14 1924†
Smokeless lump	Columbus...	\$6.10	\$3.25	\$3.35	\$3.25@	\$3.50
Smokeless mine run	Columbus...	4.25	2.10	2.35	2.15@	2.35
Smokeless screenings	Columbus...	4.00	1.60	1.85	1.75@	2.00
Smokeless lump	Chicago...	6.10	3.25	3.10	3.00@	3.25
Smokeless mine run	Chicago...	3.75	2.10	2.10	2.00@	2.25
Smokeless lump	Cincinnati...	6.35	3.25	3.35	3.00@	3.50
Smokeless mine run	Cincinnati...	4.25	2.10	2.10	2.00@	2.25
Smokeless screenings	Cincinnati...	4.10	1.80	1.85	1.65@	2.00
*Smokeless mine run	Boston...	6.30	4.20	4.20	4.15@	4.25
Clearfield mine run	Boston...	2.95	2.00	2.05	1.65@	2.50
Cambria mine run	Boston...	3.65	2.55	2.45	2.25@	2.85
Somerset mine run	Boston...	3.35	2.10	2.10	2.00@	2.70
Pool 1 (Navy Standard)	New York...	4.00	3.00	2.85	2.50@	3.25
Pool 1 (Navy Standard)	Philadelphia...	4.00	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard)	Baltimore...	...	...	...	...	...
Pool 9 (Super. Low Vol.)	New York...	3.25	2.20	2.20	2.00@	2.40
Pool 9 (Super. Low Vol.)	Philadelphia...	3.25	2.20	2.20	2.00@	2.45
Pool 9 (Super. Low Vol.)	Baltimore...	3.25	2.25	2.00	1.75@	1.85
Pool 10 (H.Gr.Low Vol.)	New York...	2.65	1.85	1.85	1.75@	2.00
Pool 10 (H.Gr.Low Vol.)	Philadelphia...	2.65	1.85	1.85	1.70@	2.00
Pool 10 (H.Gr.Low Vol.)	Baltimore...	2.90	1.90	1.75	1.60@	1.75
Pool 11 (Low Vol.)	New York...	2.30	1.40	1.40	1.50@	1.75
Pool 11 (Low Vol.)	Philadelphia...	2.25	1.50	1.50	1.30@	1.70
Pool 11 (Low Vol.)	Baltimore...	2.25	1.60	1.50	1.50	...
High-Volatile, Eastern		Market Quoted	Apr. 16 1923	Mar. 31 1924	Apr. 7 1924	Apr. 14 1924†
Pool 54-64 (Gas and St.)	New York...	2.05	1.50	1.50	1.40@	1.65
Pool 54-64 (Gas and St.)	Philadelphia...	2.20	1.55	1.55	1.45@	1.70
Pool 54-64 (Gas and St.)	Baltimore...	2.25	1.70	1.60	1.50@	1.70
Pittsburgh sc'd gas	Pittsburgh...	3.10	2.55	2.40	2.30@	2.60
Pittsburgh gas mine run	Pittsburgh...	...	2.30	2.25	2.25	...
Pittsburgh mine run (St.)	Pittsburgh...	2.00	2.10	1.85	1.75@	2.00
Pittsburgh slack (Gas)	Pittsburgh...	2.15	1.25	1.30	1.25@	1.35
Kanawha lump	Columbus...	3.75	2.55	2.55	2.40@	2.70
Kanawha mine run	Columbus...	2.25	1.55	1.65	1.50@	1.75
Kanawha screenings	Columbus...	2.30	1.05	1.30	1.10@	1.30
W. Va. lump	Cincinnati...	3.50	2.25	2.25	2.25@	2.50
W. Va. gas mine run	Cincinnati...	2.35	1.30	1.35	1.15@	1.60
W. Va. steam mine run	Cincinnati...	2.35	1.30	1.35	1.15@	1.60
W. Va. screenings	Cincinnati...	2.15	.85	.90	.85@	1.25
Hocking lump	Columbus...	3.00	2.55	2.55	2.25@	2.65
Hocking mine run	Columbus...	2.10	1.65	1.65	1.60@	1.75
Hocking screenings	Columbus...	1.60	1.05	1.30	1.25@	1.40
Pitts. No. 8 lump	Cleveland...	3.00	2.35	2.35	2.00@	2.75
Pitts. No. 8 mine run	Cleveland...	2.25	1.80	1.80	1.75@	1.85
Pitts. No. 8 screenings	Cleveland...	1.95	1.20	1.30	1.30@	1.35
Midwest		Market Quoted	Apr. 16 1923	Mar. 31 1924	Apr. 7 1924	Apr. 14 1924†
Franklin, Ill. lump	Chicago...	\$3.85	\$2.85	\$2.85	\$2.75@	\$3.00
Franklin, Ill. mine run	Chicago...	3.10	2.35	2.35	2.25@	2.50
Franklin, Ill. screenings	Chicago...	1.95	2.05	2.15	2.10@	2.25
Central, Ill. lump	Chicago...	2.75	2.60	2.60	2.50@	2.75
Central, Ill. mine run	Chicago...	2.10	2.10	2.10	2.00@	2.25
Central, Ill. screenings	Chicago...	1.55	1.65	1.65	1.80@	2.00
Ind. 4th Vein lump	Chicago...	3.35	2.85	2.85	2.75@	3.00
Ind. 4th Vein mine run	Chicago...	2.85	2.35	2.35	2.25@	2.50
Ind. 4th Vein screenings	Chicago...	1.85	1.95	1.95	1.90@	2.00
Ind. 5th Vein lump	Chicago...	2.85	2.60	2.35	2.25@	2.50
Ind. 5th Vein mine run	Chicago...	2.10	2.10	2.10	2.00@	2.25
Ind. 5th Vein screenings	Chicago...	1.55	1.65	1.65	1.75@	1.85
Mt. Olive lump	St. Louis...	...	2.85	2.85	2.75@	3.00
Mt. Olive mine run	St. Louis...	...	2.50	2.50	2.50	...
Mt. Olive screenings	St. Louis...	...	1.50	1.50	1.50	...
Standard lump	St. Louis...	2.50	2.35	2.35	2.25@	2.50
Standard mine run	St. Louis...	1.85	1.95	1.95	1.90@	2.00
Standard screenings	St. Louis...	1.10	1.20	1.20	1.10@	1.30
West Ky. lump	Louisville...	2.50	2.75	2.35	2.00@	2.60
West Ky. mine run	Louisville...	2.10	1.60	1.50	1.50@	1.90
West Ky. screenings	Louisville...	2.00	1.00	1.20	1.50@	1.75
West Ky. lump	Chicago...	2.60	2.60	2.60	2.00@	2.60
West Ky. mine run	Chicago...	1.80	1.10	1.10	1.50@	1.75
South and Southwest		Market Quoted	Apr. 16 1923	Mar. 31 1924	Apr. 7 1924	Apr. 14 1924†
Big Seam lump	Birmingham...	2.50	2.60	2.60	2.50@	2.75
Big Seam mine run	Birmingham...	2.10	2.00	2.00	1.75@	2.25
Big Seam (washed)	Birmingham...	2.35	2.20	2.20	2.00@	2.40
S. E. Ky. lump	Chicago...	3.85	2.60	2.35	2.00@	2.60
S. E. Ky. mine run	Chicago...	2.85	1.60	1.60	1.25@	2.00
S. E. Ky. lump	Louisville...	3.85	3.00	2.60	2.50@	2.75
S. E. Ky. mine run	Louisville...	2.75	1.70	1.50	1.25@	2.00
S. E. Ky. screenings	Louisville...	2.45	.95	1.05	1.15@	1.35
S. E. Ky. lump	Cincinnati...	3.50	2.10	2.35	2.00@	2.60
S. E. Ky. mine run	Cincinnati...	2.25	1.35	1.35	1.00@	1.60
S. E. Ky. screenings	Cincinnati...	2.15	.85	.85	.75@	1.25
Kansas lump	Kansas City...	3.85	4.50	4.50	4.50	...
Kansas mine run	Kansas City...	3.25	3.25	3.25	3.25	...
Kansas screenings	Kansas City...	2.60	2.50	2.50	2.50	...

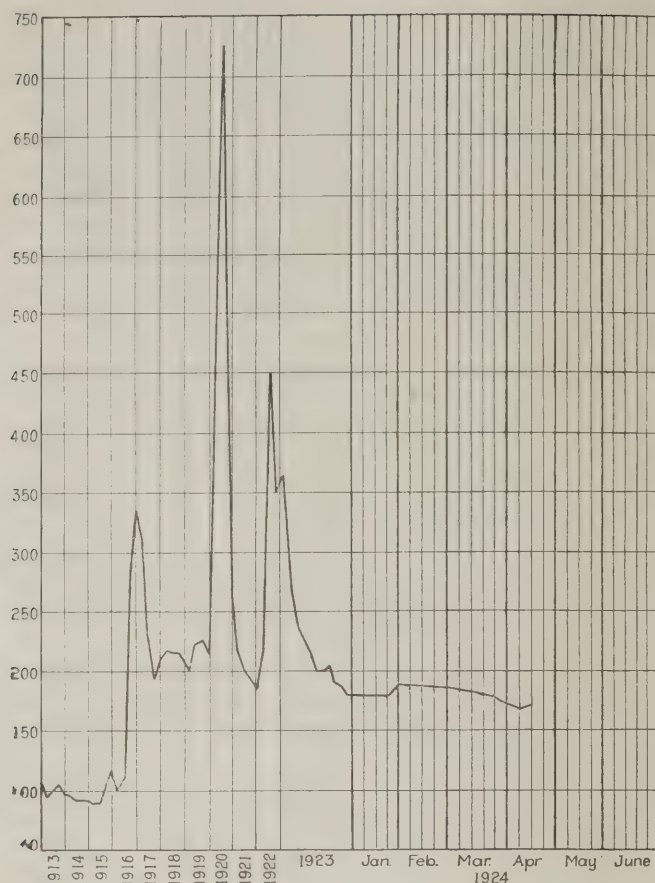
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	April 16, 1923		April 7, 1924		April 14, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken	New York	2.34			\$7.75@		\$8.00@		\$8.00@
Broken	Philadelphia	2.39			8.10@		8.50@		8.50@
Egg	New York	2.34		\$8.50@	10.50	8.00@	8.35	8.25@	8.65
Egg	Philadelphia	2.39		9.25@	9.50	8.10@	8.35	8.60@	8.65
Egg	Chicago*	5.06		12.00@	12.50	7.20@	8.25	7.65@	7.72
Stove	New York	2.34		8.50@	10.50	8.00@	8.35	8.25@	8.85
Stove	Philadelphia	2.39		9.25@	9.50	8.15@	8.35	8.60@	8.85
Stove	Chicago*	5.06		12.00@	12.50	7.35@	8.25	7.90@	8.03
Chestnut	New York	2.34		8.50@	10.50	8.00@	8.35	8.25@	8.75
Chestnut	Philadelphia	2.39		9.25@	9.50	8.15@	8.35	8.65@	8.75
Chestnut	Chicago*	5.06		12.00@	12.50	7.35@	8.35	7.72@	7.95
Range	New York	2.34			8.30		8.50		8.50
Pea	New York	2.22		6.30@	7.50	6.00@	6.30	5.50@	6.00
Pea	Philadelphia	2.14		7.00@	7.25	6.15@	6.20	5.00@	6.75
Pea	Chicago*	4.79		7.00@	8.00	5.49@	6.03	5.36@	5.55
Buckwheat No. 1	New York	2.22		2.50@	3.50	3.50@	4.15	2.25@	3.15
Buckwheat No. 1	Philadelphia	2.14		3.50		2.75@	3.00	2.75@	3.00
Rice	New York	2.22		1.75@	2.50	2.50		2.00@	2.25
Rice	Philadelphia	2.14		2.50		2.00@	2.25	2.25	
Barley	New York	2.22		1.25@	1.50	1.50		1.50	
Barley	Philadelphia	2.14		1.50		1.50		1.50	
Birdseye	New York	2.22				1.60	1.60@	1.60	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924	1923
Index	172	235
Weighted average price	\$2.08	\$2.84

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Standard, \$5; Mount Olive, \$5.50; Carterville, \$6.75; Granite City byproduct coke, \$8.75; Elkhorn byproduct coke, \$10.75; St. Louis gas coke, \$10.25; Anthracite, chestnut, \$16; egg and stove, \$15.75; grate, \$15; Arkansas anthracite, \$13; West Virginia smokeless lump and egg, \$11.

Kentucky Does Little

Coal trade in Kentucky was light indeed during the past week, in spite of price cuts to induce early stocking. The steam trade still has a good deal of coal left over and the domestic business is saturated. This means that nothing will be doing until some real steam demand appears. Thus far it has merely been whispering. However, lack of production has stiffened up steam prices somewhat, as in other fields. The whole producing industry of the state remains in a state of fretfulness over the swing to non-unionism in the eastern end and the likelihood of a strike or open-shop outcome of negotiations in western Kentucky.

In an effort to interest domestic consumers in early stocking, prices in Louisville have been dropped from 50c. to \$1 a ton, putting the price of best West Virginia coal, delivered at retail, to \$7.25 a ton, with eastern Kentucky lump \$7; western Kentucky lump \$6; smokeless \$9; coke \$12; anthracite \$18.50; cannel \$10; blacksmith \$8.

The western Kentucky market is very slow with practically no production of block coal or prepared sizes. This results in screenings as well as nut coal being much firmer in price.

Between bad weather, clay slides, standing water, and low prices, it is reported that only the larger strip mines are operating.

Northwest Trade Remains Flat

Nothing livened up the trade of the Northwest during the week. The carry-over coal on the docks—estimated by the Northwest Dock Operators' Association to be 1,400,000 tons as compared to only a few thousand tons last year—has a deadening effect on business and cuts in prices do not revive it. Industries and inland consumers are not buying anything to speak of and the domestic trade is satisfied. The main interest among dock men nowadays is: Will there be any change in freight rates off the docks to make it possible for the docks to do business this year. Very little coal seems to have been contracted for movement up the Lakes yet, though the opening of navigation is at hand.

The Milwaukee coal market continues in a state of somnolence. The cut of 50c. per ton in hard coal met with little response in the way of increased demand, as the weather continues mild. Soft coal is lifeless, prospective buyers holding off for the promised May reduction. Screenings and the cheaper steam coals are in fair demand for immediate use.

The mines through Kansas, Oklahoma, Arkansas and Missouri remain idle while the deadlock continues in the joint conference of scale committees in Kansas City. The small surplus of screenings which had accumulated when work was suspended April 1, is exhausted, and the surplus of domestic grades is rapidly melting.

The coal market in Colorado slowed down considerably last week due to warm weather, which has been prevailing throughout the mountains and eastern slope region. Mines worked on an average of three days last week and a number of unconsigned loads were reported on track. Prices are unchanged.

In Utah domestic consumption has fallen off, due to weather conditions. Industrials are demanding less slack, which is enabling operators to catch up on their orders for this grade. Retailers are buying little and stocks in Salt Lake City are lower than they ever were. Utah working time is around two days a week. Labor conditions are satisfactory.

Cincinnati Begins to Look Up

Many signs at Cincinnati point to the fact that consumers are beginning to realize that the market has about hit bottom. One is found in the letting of railway contracts. The price list of the past week showed such a tremendous spread that the sales offices have been panicky and the buyer completely up in the air. Lake people are not venturing on this market, preferring to lay off as long as possible so that any buying orders that they might have will not favor an upward or stabilizing movement. Local offices are holding well to the circular on Pocahontas and the mines are holding down production to make the condition fit. New River and the off grades are a bit lower, some of these making \$3@3.25 price on lump and egg and \$2 on run of mine. Specialized coals are quoted as follows: Egg, \$2.25@2.75; block, \$3@3.50. Quotations and concessions do not interest the buyer, however, for he cannot digest more than is being put on the market. River business is booming along at a better rate than for some time.

Unrelieved dullness prevails in the Columbus market. Trade in both domestic and steam is quiet, only a minimum tonnage moving. Producers and distributors expect the quietude to continue until lake trade is under way. Little demand for Pocahontas or other smokeless grades is reported and splints also are quiet. Production in Ohio fields shows that domestic lump demand is almost nil. Contracting for steam tonnage is quiet. Many of the larger consumers are content to buy in the open market while prices are low in preference to entering into agreements. Public utilities are buying slightly more, while the railroad demand is steady. Little is doing in the Lake trade.

Pessimism is the keynote of the coal trade at Cleveland. Consumption is at a minimum and stocks continue to be sufficient to take care of present needs. Mines continue to close down, nearly half those in eastern Ohio now being idle, and those still running are lucky to get half time. Lake boats are doing some shifting to take on coal cargoes, but it probably will be some time before any coal carriers leave for the upper Lakes. Loading in this trade is not as heavy as it was last April, and there has been a steady increase in stocks.

The coal market at Buffalo is unchanged. Operators and jobbers alike are steeped in gloom.

Production in the Pittsburgh district is down to about 30 per cent of rated capacity. Prices in the spot market are unchanged. Expiration of contracts has brought little if any increased inquiry in the spot market. There do not seem to be even any negotiations for lake coal.

Production in central Pennsylvania is at the lowest ebb for a number of years and prices are below the point of profitable production.

New England Just Slogs Along

In New England the steam-coal market shows no improvement. There is enough tonnage being forced on reluctant buyers to keep reserves about on the level of a month ago, and only in few instances is there anything approaching comprehensive buying. Factors with rehandling plants of their own keep their stocks large to relieve pressure on Hampton Roads, and both on contract and on spot sales they are leaving no stone unturned to place enough coal to make room for weekly arrivals. Receipts all-rail as well as by water have diminished since April 1, and the number of contracts in force, especially by the rail route, has been materially reduced.

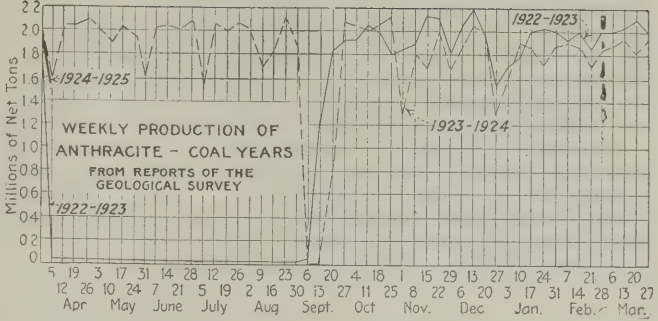
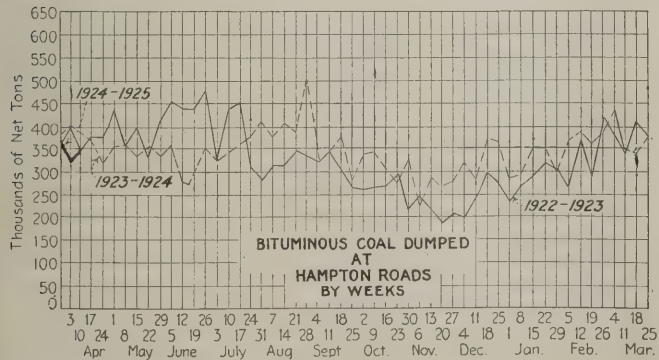
In certain cases the smokeless interests have curtailed output, but there remain enough in the open market to continue lively competition for what business offers. Prices f.o.b. vessel at Newport News and Norfolk therefore are in no wise improved; several agencies apparently are keen for orders at from \$4.15 to \$4.25 for Pool 1. Navy standard grades. There have been reports of distress coal sold much lower than this, but no one in the trade expects to pick up any considerable quantity even of No. 2 coal at less than \$4. Similarly, prices on cars at Boston have gone to \$5.25 under pressure, but the bulk of what is being sold on the spot market returns \$5.50, and in some cases a little more.

All-rail the situation is rather different. Aside from a few operators who are striving to keep their mines running the industry as a whole is proceeding cautiously with respect to future deliveries. In other words, there is a disposition to keep coal in the ground unless mines can be operated at a profit, and while perhaps under current conditions it will take some time to derive any benefit from this policy it is certain to result in improved conditions, at least in some markets. A shortage of output in central Pennsylvania would hardly affect trade in this territory except in a restricted sense, but somewhat higher prices than now prevail would give distinctly a better tone and permit firmer quotations on Pocahontas and New River.

Atlantic Seaboard Markets Steadying

The market at New York is gradually getting down to a steady basis. Demand is about the same on both line and at tidewater. Buyers want bargains when they want coal. With less coal mined, producers look for a steadier demand and possibly firmer prices. Continued inroads are being made in the large reserve piles, but this reduction depends largely on industrial conditions. Conditions at tidewater are slightly better than last week. Receipts were curtailed and there is not so much distress coal available at low prices. A few contracts are being signed, but at low prices.

Disquiet is evident at Philadelphia, as business displays little improvement. The labor question is far from settled, the union fields feeling that they are practically out of the trade, for most of the coal going to market is non-union. The general consumer is making no move to replace stock, many buyers holding off in the hope of saving some money on the price if they delay until midsummer.



Business at Baltimore has been demoralized by an output far in excess of consumption and demand, sales prices being below the actual cost of bringing the coal to the surface.

Production in West Virginia is greatly restricted in both high- and low-volatile territory, owing to extremely sluggish demand. Kanawha production is not over 30 per cent and Coal River production about the same but Logan mines are keeping up to about 60 per cent. New River, Pocahontas and Winding Gulf mines all have cut down operations, with the bulk of the tonnage moving being applied on contract.

Steam coal continues to be in scant demand in the Birmingham market, inquiry being light for spot coal and no great amount of interest being manifested in contract renewals among industrial consumers. The Louisville & Nashville R.R. is understood to have closed for its requirements from this field for the next twelve months, aggregating approximately 1,000,000 tons.

Anthracite Trade Settles to Even Basis

The spurt in the hard-coal market at New York following the announcement of the new prices, which are for the month of April only, is about over and demand has settled down to an even basis. Producers have enough business booked to assure them of a steady output for some weeks to come while the smaller independents are able to move their product without much trouble. Heavy buying by city departments during this and next month will provide an outlet for a heavy tonnage of the large sizes, especially broken, which is used extensively in the school houses and for which bids were opened on April 14. For the regular trade stove coal continues to head the list, with egg following. Pea coal moves steadily but at low figures for independent product. The steam coals are in fair demand. Rice and barley move steadily and without much trouble, some of the smaller producers having none to offer. Buckwheat is not so easily moved.

The anthracite trade at Philadelphia lacks the snap that was expected. Of course on the side of the producers conditions are better than during the last days of March, but no shipper has orders very far ahead. Stove is most in demand and most shippers are behind on it, but chestnut is quite plentiful and some independents have it in surplus, Pea has taken quite a turn for the better and there is very little free coal offering. Egg also is an easy size, but is moving fairly well. Steam trade is quiet, and even barley is in surplus with some of the independents. Buckwheat is particularly heavy and it is not unusual for this size, as well as rice, to be standing in cars at the mines awaiting consignees. The companies are putting both buckwheat and rice in the storage yards.

Coke Demand at Low Ebb

Coke demand in Connellsville is extremely slack, but prices show no further decline. Production of beehive coke during the week ended April 5 was 281,000 net tons, according to the Geological Survey, a decline of 15,000 tons from the preceding week. This is the fourth successive week that output has declined.

Car Loadings, Surpluses and Shortages

	Cars Loaded			
	All Cars	Coal Cars	Surplus Cars	Car Shortage
Week ended March 29, 1924	907,548	154,680		
Previous week	908,651	161,149		
Same week in 1923	938,725	182,668		
March 31, 1924	248,301	135,976		364
Previous week	213,093	115,361		361
Same date in 1923	14,196	3,785		68,986

Foreign Market And Export News

British Market Quieter with Firm Undertone; Output Drops

The Welsh coal market has quieted down somewhat but is still notably firm. The recent agitation among buyers, both foreign and domestic, seems to have run its course, and this, coupled with the fact that in many quarters it is believed that the miners will not strike, has relieved the pressure. Aside from long-term contracts, all current business extends only over the next two weeks, beyond which period there is very little activity. German demand has sunk to a negligible quantity, but French business has improved with the recovery of the franc. There is a little business with Belgium and Holland, but not enough to make the operators anxious about fulfilment. Large quantities are ready for shipment to Italy, South America and coaling depots as soon as shipping is available.

The demand for anthracite is steady, though some kinds are very irregular.

The inquiry at Newcastle both from domestic and foreign consumers is heavy, especially for steam and gas coals. French, Swedish and Norwegian railways have bought over long periods and at prices which are very little below those now current. A fact which has perturbed British operators is that the Swedish railways have bought from Germany at lower prices.

The Egyptian Government is inviting tenders due May 14 on 150,000 tons of coal for delivery beginning June. It also has requested offers for 40,000 tons of American coal.

The miners' ballot is believed to be against acceptance of the operators' terms, but a substantial minority is favorable. The national executive committee of the Scottish Coal Miners' Union is recommending all Scottish members to reject the offers of the mine owners. The union leaders declare no intention of striking on April 17, when the present agreement expires, but may hold another ballot on the question of strike.

Brisk Trade at Hampton Roads; Market Tone Firm

Business at Hampton Roads is more brisk, with all unusual surplus removed from tide and prices slightly on the incline. Absence of contracts was one of the features of the market, the general run of consumers and retailers preferring to depend upon the spot market for supplies.

Coastwise trade is fairly active and overseas shipments are holding their own, with bunkers good and all piers reporting normal movement. The outlook is somewhat better, shippers predicting normal conditions during the next few months.

The tone of the market is firm, with reports from the coal fields that fully one-third of the operations serving this port have closed down temporarily, due to a rather uncertain market and a tendency to overproduction.

French Coal Market Notes Slackened Demand

Demands for industrial coals in French markets has slackened. As the difference in price between British and French coals is still very large, there has been a revival in the consumption of the latter and the Nord and Pas-de-Calais output is sold for several months ahead. Activity in household fuel has relaxed but is still higher than usual at this time of the year.

At a meeting of French and Belgian producers of house coals, to discuss summer prices, the French collieries decided that the present prices would be maintained up to Oct. 1, providing the summer premiums would be progressively deducted on the following basis: 5 fr. from April 1 to the end of May, 3 fr. in June and July, 2 fr. in August, the tonnage premiums to be unchanged. The Belgians, on the other hand, decided to leave prices as they actually stand up to the end of April,

in anticipation of a change in the position of the coal market in the event that the British miners strike.

Imports of British coals have been rather heavy of late and prices have gone up 1 to 2s. at the shipping docks.

Receipts of indemnity fuels in March are believed to have totaled between 850,000 and 900,000 tons for the month. The Office de Répartition des Cokes Allemands received coke from the Ruhr at the rate of 12,310 tons per day during March, which is about on the level of before the occupation.

Export Clearances Week Ended

April 12, 1924

FROM BALTIMORE

For Argentina:	Tons
Br. Str. Thamesmede.....	4,800
For Italy:	
Amer. Str. Winding Gulf.....	7,36
For Ecuador:	
Br. Str. Arana.....	1,000

FROM HAMPTON ROADS

For Argentina:	
Ital. Str. Stromboli for Buenos Aires.....	6,751
Ital. Str. Adige for Buenos Aires.....	8,406
For Brazil:	
Br. Str. Glenfinlas for Rio de Janeiro.....	4,593
Braz. Str. Joazeiro for Pernambuco.....	3,842
For Canada:	
Nor. Str. Haraldshaug for St. Georges.....	2,185
Nor. Str. Besseggen for Kingston.....	4,338
For Cuba:	
Nor. Str. Lonstakken for Havana.....	3,353
Amer. Schr. Dewitt Brown for Cienfuegos.....	1,881
For Mexico:	
Amer. Str. C-rozal for San Juan.....	4,015
Swed. Str. Adolf for Tampico.....	2,818
For Italy:	
Ital. Str. Cerea for Genoa.....	4,874
Dan. Str. Fie Jensen for Naples.....	1,110
Ital. Str. Concordia for Porto Ferrajo.....	9,233
For West Indies:	
Ger. Str. Osterndorf for Barbados.....	3,948

Hampton Roads Pier Situation

	April 3	April 10
N. & W. piers, Lamberts Pt.:		
Cars on hand.....	2,040	1,546
Tons on hand.....	118,498	91,081
Tons dumped for week.....	133,323	126,711
Tonnage waiting.....	12,100	18,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,853	1,366
Tons on hand.....	125,850	105,800
Tons dumped for week.....	67,573	106,452
Tonnage waiting.....	2,200	962
C. & O. Piers, Newport News:		
Cars on hand.....	1,967	1,450
Tons on hand.....	99,190	72,865
Tons dumped for week.....	88,863	70,670
Tonnage waiting.....	5,025	1,390

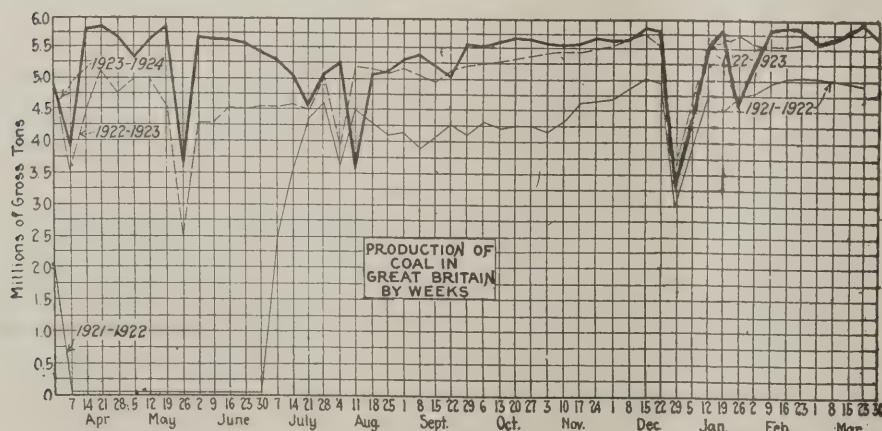
Pier and Bunker Prices, Gross Tons

	PIERS	
	April 5	April 12†
Pool 9, New York.....	\$4.75@ \$5.00	\$4.50@ \$5.00
Pool 10, New York.....	4.50@ 4.75	4.25@ 4.75
Pool 11, New York.....	4.25@ 4.50	4.00@ 4.50
Pool 9, Philadelphia.....	4.80@ 5.20	4.80@ 5.20
Pool 10, Philadelphia.....	4.55@ 4.90	4.55@ 4.90
Pool 11, Philadelphia.....	4.35@ 4.65	4.35@ 4.65
Pool 1, Hamp. Roads.....	4.15@ 4.25	4.25@ 4.35
Pool 2, Hamp. Roads.....	3.85@ 4.00	4.00@ 4.15
Pools 5-6-7 Hamp. Rds.....	3.75@ 3.85	4.00@ 4.10
BUNKERS		
Pool 9, New York.....	5.05@ 5.30	4.80@ 5.30
Pool 10, New York.....	4.80@ 5.05	4.55@ 5.05
Pool 11, New York.....	4.55@ 4.80	4.30@ 4.80
Pool 9, Philadelphia.....	5.10@ 5.55	5.10@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 5.00	4.65@ 5.00
Pool 1, Hamp. Roads.....	4.15@ 4.25	4.25@ 4.35
Pool 2, Hamp. Roads.....	3.85@ 4.00	4.00@ 4.15
Pools 5-6-7 Hamp. Rds.....	3.75@ 3.85	4.00@ 4.10

Current Quotations British Coal f.o.b. Port, Gross Tons

	Quotations by Cable to Coal Age	
	April 5	April 12†
Cardiff:		
Admiralty, large.....	32s. @ 33s.	31s.
Steam smalls.....	22s. 6d.	22s. 6d. @ 23s. 6d.
Newcastle:		
Best steams.....	26s. 6d. @ 27s.	27s. @ 27s. 6d.
Best gas.....	25s. 6d.	25s. 6d.
Best bunkers.....	24s. 6d.	24s. 6d. @ 25s.

† Advances over previous week shown in heavy type, declines in italics.





News Items From Field and Trade



ARKANSAS

Several of the mines in the Spadra coal fields opened again the last week in April after having shut down, presumably until June 1. A protracted coal spell in the north created more demand than was anticipated.

CALIFORNIA

California coal development is reported on the increase. One of the recent activities is that of the Calcoal & Iron Co., of which H. C. Haas is president and W. Warner Thayer secretary, on 2,300 acres of coal land in southeastern Monterey County between Paso Robles and Coalinga.

ILLINOIS

Fifteen men were more or less seriously injured April 10, when a double-deck cage dropped 50 ft. to the bottom of the shaft at the Kathleen mine, at Dowell. The failure of the safety dogs on the hoisting drum to function when the fuse blew out on the electric man hoist caused the drop. The fact that a miners' train bringing additional men to the shaft was late probably saved a greater number from being injured. Several of the injured suffered broken legs and other hurts, but none is considered in danger of losing his life. The mine is operated by the Union Colliery Co., of St. Louis.

INDIANA

Indiana's state institution coal bill will not be as high this year as it was last, it is indicated by bids now being tabulated by Fred B. Robinson, secretary of the state purchasing committee, but the question is whether the bids on about 170,000 tons are low enough even if they are lower than last year. The committee will meet soon to determine this. In 1923 the state bought mine run coal for \$2.40 a ton; egg size, \$2.60, and screenings, \$2.05. Most of the coal bought came from the Fourth Vein.

James D. Sisson, owning the Dixburg hills, near Hazelton, has leased coal rights on part of the property to William Dempsey. It is understood that Mr. Dempsey has decided to begin operations within thirty days.

Committees are preparing for the mine-rescue and first aid meet of District No. 11, which will be held in Princeton June 28. The meeting will be similar to that held at Sullivan last year. It is understood that all the Indiana mines will close on that date, the first time such action has been taken by the Indiana mine operators.

Work of mines in the Terre Haute-Clinton field, gradually decreasing for the past few weeks, took a decided slump last week with the closing down of five mines in subdistrict No. 4. The Submarine, Talleydale, Clovally, Pine Ridge and Grasselli mines closed for an indefinite period, Talleydale closing to make extensive repairs. While many of the mines are closing down, a few are reopening, but the per cent of the latter is vastly less than of the former. Blackhawk mine, which was down for several weeks, was scheduled to resume work last week. Talleydale is closing down for repairs, for a period of about six weeks, it is said. The Fort Harrison Mining Co., which owns the mine, is expected to improve the Badyke mine in the same manner after the improvements in Talleydale are completed.

KANSAS

Directors of the Central Coal & Coke Co., at a meeting in Kansas City, March 20, voted to suspend the regular quarterly dividend due April 15 on both preferred and common stock. The suspension was attributed to the heavy cost of preparing for new lumber production in the West and to conditions in the coal industry throughout the Southwest.

KENTUCKY

A suit has been filed in the U. S. District Court at Covington by the Harvey Coal Co., of Perry County, against the Hazard-Jellico Coal Co., asking that a receiver be appointed to take charge of the defendant company's business. The Harvey Coal Co. leased coal land near Lost Creek to the Hazard-Jellico Coal Co. on May 27, 1919, at an annual rental of \$36,900 for a period of ten years. The petition charges that the provisions of the lease have not been met.

MARYLAND

Operations at the Big Vein mine of the Maryland Coal Co., which has been closed down for nearly a year, were resumed on April 10 with a force of about 75 men. According to an announcement made by Elkins Read, general manager of the company, the scale of wages will be about on a par with that generally prevailing in the Georges Creek region, the rate for pick mining to be 90c. and that for day labor \$4.64 per day. This company has one of the larger operations in the Georges Creek field but has not been operating regularly in the immediate vicinity of Lonaconing for several years. Still the mines are in fair condition notwithstanding such idleness.

MINNESOTA

F. G. Prest, director of purchases for the Northern Pacific Ry., Railroad Building, St. Paul, is taking bids until April 18, for furnishing fuel for that railroad, one set of bids for the section between Mandan, N. D., and Helena and Butte, Mont., and the other from Helena to the Pacific Coast. The first section calls for from 600,000 tons to 1,200,000 tons of lump and from 95,000 tons to 220,000 tons of sized washed nut, 2, 3, 4 and 5. The section to the west requires from 1,400,000 tons to 2,000,000 tons of mine run.

NEW YORK

Plans have been made for the retirement of all outstanding prior preference stock of the Burns Bros. Coal Co., New York City. The company is offering 120 for the stock and is taking it as fast as it can be acquired either in the open market or from individual owners. Last year plans for a readjustment of the company's capital structure were frustrated by opposition from holders of the prior preference stock. Officials are quoted as saying that rumors that the prior preference stock is being retired for the purpose of paving the way to readjust the capital structure are premature.

On May 1 the National Industrial Conference Board will move from 10 East Thirty-ninth St. to the fourth floor of the Park-Lexington Building, New York City. The board, which acts as the research organization for more than 30 of the largest associations of manufacturers in the country, was organized in Boston, in May, 1916, and for four years occupied quarters in Beacon Street with a small staff. Its New York offices were occupied in 1920, and at present it has more than 100 persons actively engaged in industrial research work in its headquarters, its branch offices in Washington, and in the field.

The report of the Pennsylvania Coal & Coke Corporation for the year ended Dec. 31, 1923, shows consolidated net income of \$741,704 after depletion, depreciation, federal taxes, etc., equivalent to \$4.29 a share earned on \$8,630,300 capital stock, par \$50. This compares with \$510,807, or \$4.14 a share, earned on \$6,164,500 stock outstanding in 1922.

OHIO

The coal-mining properties of the Blackburn Coal Co. located in Springfield Township, Jefferson County, will be sold at public auction by the receiver, James R. Hinchliffe, 1026 Guardian Building, Cleveland, on April 22. The properties consist of nine parcels of coal-mining lands, complete machinery and equipment, electrical railways and trackage etc.

The Vincent Coal Mining Co. has taken over the offices of the Blue Ash Coal Co. at 1820 First National Bank Building, Cincinnati, with George S. Payne in charge. The headquarters of the company is in Portsmouth and the move is the result of the acquisition of certain properties of the Doeppke interests.

The McMyler-Interstate Co. has been awarded a contract to install car-dumping machine for the New York Central R.R. for its projected \$1,000,000 coal handling pier at Ashtabula. The machine will cost approximately \$500,000 and will be of the most modern type.

John J. Moore, long connected with the Thomas Elevator Co., Chicago, has resigned his position to go with the Day & Maddock Co., Cleveland, Ohio.

PENNSYLVANIA

Seventy-five members of the Knickerbocker company's safety personnel were entertained at a banquet in the Fort Stanwix Hotel, Johnstown, April 10, as the guests of Superintendent R. A. Suppes. The Knickerbocker mines embrace the Telford, Jasahill and Wilbur operations. Warren Shumaker acted as toastmaster and safety addresses were made by Sheriff Martin Markle, of Somerset County; George Playez, superintendent of Jasahill and Telford No. 1 mines; D. Q. Williams, superintendent of Wilbur Mines Nos. 5, 6 and 2; Gordon Francis, superintendent of Wilbur mines Nos. 1, 3 and 4, and William Beahm, foreman of Jasahill mine No. 1. The host, General Superintendent R. A. Suppes also delivered a fine address.

A state charter has been issued at Harrisburg to the Bridgeville Coal Co., mining and producing coal and buying and selling coal, Bridgeville; capital \$25,000; President, Charles F. Brozier, Findley Avenue, Scott Township, Allegheny County. Incorporators: Charles F. Brozier, William F. Findley, and August Brozier.

C. J. Goodyear has been elected commissioner of the Pittsburgh Coal Producers' Association, succeeding Richard W. Gardiner, who resigned last June. Mr. Goodyear since that time had been acting commissioner. The newly elected official has been associated with the organization for more than four years and for three and a half years was the association's traffic manager. He was identified with the Pittsburgh & Lake Erie R.R. in various capacities for 16 years and for two years was connected with the Ore & Coal Exchange at Cleveland. He left the Cleveland organization to accept the traffic manager position with the coal producers' organization.

The Pittsburgh Coal Washer Co. is erecting a modern steel tippie with a capacity of 300 tons of coal per hour at the old Sample Run mine of the Clearfield Bituminous Coal Corporation. The headhouse is being erected on the site of an old slate dump, necessitating excavation to solid rock. The equipment to be installed includes shaker screens, a picking table and a loading boom. A rock disposal plant also is under construction.

Fire recently destroyed fourteen houses in the mining town of Arden, about two miles north of Washington. Dynamite was used to check the progress of the fire, seven houses being destroyed by that method. The houses destroyed were owned by the Meadow Lands Coal Co., of which James Cock is superintendent. The loss will aggregate about \$35,000.

The **Cosgrove-Meehan Coal Co.** has purchased the stock of the Harco Coal Co., the merger being effective as of April 1. The capital stock of the Harco company is \$500,000, while that of the purchasing company is \$3,000,000. Payment will be made in stock of the Cosgrove company at the rate of \$15,000 annually at a price not to exceed \$105 per share. This preference stock is a 7 per cent issue, dividends being cumulative and payable quarterly. By the terms of the agreement the Harco company will surrender its charter.

Sealed Proposals will be opened by the Superintendent of Lighthouses, Philadelphia, 2 p.m., May 20, 1924, for **anthracite and bituminous coal**, gasoline, acetylene and acetone for fiscal year 1925. Information upon application.

The annual report of the **Jefferson & Clearfield Coal & Iron Co.** for 1923 shows gross earnings of \$3,989,840; expenses and ordinary taxes, \$3,253,602; depreciation, depletion, interest and federal taxes, \$324,063; profit, \$412,175; dividends, \$4,695,000; deficit, \$4,282,825. Profit and loss surplus on Dec. 31, 1923, totaled \$1,584,729.

A new mine is being opened up by the **Hale Coal Co.** at Phillipsburg. Two shafts have been sunk to the Miller seam. Erection of a steel tippie has started. Its capacity will be 250 tons per hour, hoisted in self-dumping cages. Sundry equipment includes weigh baskets, shaker screens, a picking table and a loading boom, and the necessary conveyors.

WASHINGTON

A new effort is to be made this summer to operate the old **Cherry Coal Co.** mine, four miles west of Castle Rock. H. Simon and N. Anches, both of Seattle, have taken over the property and will make the attempt. They hope eventually to have the mine connected by spur to the line of the Longview, Portland & Northern Ry.

E. P. Lucas, of Bellingham, head of the **Bellingham Coal Mines**, recently announced that his company is **rehabilitating its property**. A new 18-per cent slope is being driven to increase the output of the operation. Heavy steel is to be laid on the slope. A rotary dump has been ordered but some other new equipment will be necessary both top and bottom.

WEST VIRGINIA

Since operations were begun in 1883 there has been produced in Pocahontas territory a total of 283,558,779 gross tons of coal, according to W. E. E. Koepfer, secretary of the Pocahontas Operators Association. A chart he has prepared also discloses that the year of largest production was 1916, when the output was 16,161,782 gross tons. Since the Pocahontas field was opened a total of 35,753,191 gross tons of coke has been shipped. Coke production in the Pocahontas region has been comparatively small in the last three years, the output for 1923 being 136,136 tons, as compared with only 80,900 tons the year before.

The **Wilbur Fuel Co.**, D. J. Carter, president, has purchased the **Vulcan Coal Co.** and the **Eastern Utilities Coal Co.**, with lands and mining plants for about \$1,000,000 and will undertake extensive additional developments. Its purchase includes 1,198 acres in fee, 468 acres with a mining town of 115 houses, mining machinery, etc., producing the Red Stone vein coal.

Lee J. Sandridge, general manager of the **Meriden Smokeless Coal Co.**, with headquarters at Philippi, has been undergoing treatment at the Davis Memorial Hospital, at Elkins.

W. Kirby Schaefer, assistant labor commissioner of the Northern West Virginia Coal Operators Association, has resigned, his resignation taking effect early in April.

It is shown in statistics compiled by the **Winding Gulf Operators Association** of West Virginia that a total of **35,778,101 tons of smokeless coal** was produced during the calendar year ending Dec. 31, 1923, which was not far short of the maximum reached in 1916, when 36,000,000 tons was produced. The increased tonnage in 1923 over 1922 amounts to 2,009,335 tons, states the **Winding Gulf report**. The Pocahontas district, producing a little over sixteen million tons, was still short of 1922 production by more than 500,000 tons. The **Winding Gulf district** in 1923 also was short approximately 57,000 tons of 1922 production and the **Tug River field** was short some 32,000 tons as compared with the previous year. To the New River field must go the great increase in tonnage in 1923, having produced over eight million tons, an increase over 1922 of 2,634,049 tons. As

usual, the bulk of the smokeless tonnage came from the mines on the **Norfolk & Western Ry.** The **Pocahontas** and **Tug River** fields produced over one-half the year's output. Over five and a half million tons of the year's production was "captive coal," or coal consumed by those interests producing it. Of this tonnage, the **United States Steel Corporation** consumed slightly over four million tons, all produced by its mines in the Pocahontas district. The year 1923 registered a high-water mark in coal tonnage hauled by the three railroads serving the smokeless fields of West Virginia, the **Chesapeake & Ohio** leading with nearly 33,000,000 tons, followed by the **Norfolk & Western** with nearly 31,000,000 tons. The **Virginian** experienced its largest year, with nearly 8,000,000 tons to its credit.

The **Hunter Crucible Steel Co.**, of Cleveland, has consummated negotiations for the purchase of 4,064 acres of coal land and three mines in Upshur, Webster and Nicholas Counties, the deal involving something like \$1,800,000. Included in the purchase were the **Excello** mine of the **Hesper Coal & Coke Co.** and 764 acres of **Kitanning** coal land; **Pittsburgh** mines Nos. 1 and 2 of the **Philmont Coal Co.**, together with 600 acres of **Pittsburgh** in Upshur County, near **Buckhannon**, and a tract of 2,700 acres of coal in the **Kanawha** series, so far undeveloped, in **Nicholas** and **Webster** Counties, owned by the **Stanfield Coal Co.** The same people are interested in all three of the selling companies, **L. O. Knipp**, of Philadelphia, being president, and **George H. Grone**, of Philadelphia, secretary and treasurer. The mines purchased have an aggregate production of 45 cars of coal per day. This, it is proposed to increase to about 2,500 tons a day through additional openings and the installation of additional equipment. The output of the mines acquired and to be opened will be used by the steel company to supply its mills at **Pittsburgh** and **Cleveland** with fuel.

The **Killarney Smokeless Coal Co.**, chartered under the laws of Virginia, has been authorized to transact business in West Virginia.

ALASKA

The **Evan Jones Coal Co.**, operating in the **Matanuska** field of Alaska, is about to install a complete washery, according to "Jack" Collins, of Anchorage, Alaska, one of the principal stockholders. **Oscar Anderson** of Anchorage, president of the company, has just returned from the States where he went to purchase a steamer and make other arrangements for an attempt at marketing coal from the **Evan Jones** mine in the **Alaskan** coast country.

CANADA

By a vote of 24 to 4 the **Nova Scotia** Legislature has passed a resolution stating that "in any readjustment of the federal tariff to be considered by the federal Parliament at its present session, this House is of the opinion that proper consideration be given. (a) To so increase the tariff on **American slack coal** as to preclude it from entering into this country in unfair competition with slack coal from the **Nova Scotia** mines; (b) to so readjust the tariff that this slack coal will not be sold as run-of-mine coal without paying the customs duty which run-of-mine coal is subject to; (c) to place some duty upon the importation of **American coke** with a view to encouraging the manufacture of **Nova Scotia** coal into coke for the purpose of supplying the **Quebec** and **Ontario** markets, and as a substitute for **anthracite**."

Roy M. Wolvin, president of the **British Empire Steel Corporation**, speaking at a recent luncheon, declared that his corporation would continue to pay the coal miners of **Nova Scotia** the 1924 rate of pay agreed upon at **Montreal** between representatives of the miners and the company. He said that large quantities of **American coal** were being used in **Quebec**, and that it was the intention of his corporation to displace some of that this year. Some sales will have to be made at much less than the average cost of coal delivered, but "we will do our part."

The **Clear Mountain Coal Co.**, which has been developing a property in the **Lillooet** mining division of **British Columbia**, has sunk two prospecting shafts through a seam of coal ranging from 8 to 10 ft. thick and at a depth of about 30 ft. below the surface. The company announces that it will erect coal bunkers at **Pavilion**, on the **Pacific Great Eastern Ry.**, and will convey the coal from the mine to railway in five-ton motor trucks. The general

manager expects to be able to maintain an output of 200 tons per day, which, it is thought, easily will be absorbed by towns situated on the railway.

Hillcrest Collieries, Ltd., reports net profits for 1923 at \$117,958, as compared with \$91,960 in the preceding year. Miscellaneous revenue amounted to \$37,704, which brought the total net revenue to \$155,662, as compared with \$126,730 in 1922. After deductions of bond interest at \$16,250 and preferred dividends \$49,399, there remained \$90,013 applicable to the common stock, which was equal to 9 per cent and compares with \$61,081 in the previous year. Surplus for the year after deduction of \$15,000 for contingent reserve was shown at \$15,013, which, added to the previous balance of \$269,174, brings the total profit and loss balance to \$284,187. An increase of about \$100,000 is shown in the net working capital of the company, which is placed at \$580,877.

A new 7-ft. seam of semi-anthracite recently was uncovered at **Coal Canyon**, in the **Peace River** region. So far, this is the largest seam of coal that has been found in this field. The principal owners of coal areas in this district are negotiating with the **Canadian Pacific Ry.** for the extension of the **Edmonton, Dunvegan & British Columbia** branch from **Spirit River**, the present end of the line, to the property. The distance is only 125 miles through a country offering few engineering difficulties, and the construction of the line would make available what undoubtedly is the highest grade of coal so far discovered in western Canada.

William Wilson has been appointed manager of the **South Wellington** mine of the **Canadian Collieries (D) Ltd.**

Robert Laird, who was manager at **No. 1 Mine**, **Western Fuel Corporation** of Canada, now is the manager of the **Wakesiah Mine** of the same corporation. His place at **No. 1 Mine** has been taken by **Arthur Newberry**.

According to a recent statement the supposed hard-coal area at **Sudbury** is to be definitely tested this year by **United States** interests, under whose auspices leasing for drilling tests was now under way.

The **Okonite Co.** of **Passaic**, manufacturers of "Okonite" insulated wires and cables, splicing tapes, etc., recently appointed the **Engineering Materials, Ltd.**, **McGill Building**, **Montreal**, **P. C.**, as their **Canadian** representatives.

The new 5 ft. seam opened some weeks ago by the **Princeton Coal & Land Co.** is developing well and is adding appreciably to the company's output.

Industrial Notes

H. H. Valiquet, for the past eighteen years chief engineer of the **B. F. Sturtevant Co.** (Chicago division), has joined the organization of the **Kirk & Blum Mfg. Co.**, **Cincinnati**, Ohio, as chief engineer, specializing in the designing of dust-collecting and pneumatic conveying systems, drying, heating, ventilating, cooling and fume removal systems, air-conditioning systems including humidifying, dehumidifying, and automatic temperature- and humidity-control systems.

Within the last few weeks the **Spring Canyon Coal Co.**, of **Storrs**, **Utah**, placed a contract with the **Link-Belt Co.**, of **Chicago**, for a large capacity tippie. This tippie will include an extensive dry cleaning plant for fine sizes. Erection and construction work on this tippie will start as soon as conditions permit.

The **Haridan East Brady Coal Co.**, **Logansport**, Pa., is installing complete shaker screen equipment furnished by the **Fairmington Mining Machinery Co.**, **Fairmont**, W. Va.

The **Crozer Coal & Coke Co.**, of **Elkhorn**, has contracted with the **Roberts & Schaefer Co.** for a new steel tippie and screening bins. The tippie will be complete with the latest improved **Marcus** screen, shaker loading booms and latest devices for re-screening fine sizes of coal. This will be one of the most modern tipples in the **Pocahontas** field.

The **Sterling Anthracite Coal Co.**, at **Clarksville**, Ark., is equipping its mines with new and up-to-date handling and preparation machinery, including automatic weighing pan, feeder, breaker, shaker screens, picking tables, loading booms, boilers and engines. The **United Iron Works, Inc.**, of **Kansas City**, Mo., is doing the engineering work, furnishing and installing the equipment.

Traffic News

Indiana Rate Cut May Be Postponed Again

Following a preliminary hearing on a petition of twenty-one railroads in Indiana to set aside a recent order of the Public Service Commission that rearranged and reduced intrastate coal rates, an agreement was reached April 6 in Superior Court, Indianapolis, to ask the commission to defer the date of taking effect until June 1. May 19 was set as the date to hear evidence on the petition. The original order of the commission, that was written by Oscar Ratts, of the commission, provided that the rates would go into effect April 1. The date later was changed to May 1. Judge Hay said that in case the commission did not extend the time limit of the order to June 1, as requested, a temporary injunction would be granted.

In the petition asking that an injunction be granted setting aside the order of the commission, the railroads allege that the order will decrease their revenue more than \$1,000,000 a year. The order provides for a decrease of about 10 per cent in coal rates to dealers and large consumers. The rates on some roads, however, are slightly increased.

Hearing in Mine-Rating Case Postponed by I.C.C.

Hearings in the mine-rating case, set for April 23, will be postponed until some future date, according to an announcement by the Interstate Commerce Commission. Owing to those most vitally interested in this case being involved in the Lake Cargo Coal Case, which is set for hearing April 22, it was felt by the majority of those interested that justice could not be done the mine-rating case at this time. It is probable that the hearing will be set for some time in June.

Illinois Central Builds Branch

The Illinois Central R.R. is contemplating construction of a branch of several miles to connect the Eldorado-St. Louis branch with the new proposed Edgewood-Metropolis cutoff. The new branch will shorten the route of the output of the Williamson and Franklin county mines. Right of way has been procured for this new branch and work probably will begin at an early date.

Obituary

George W. Hill, Western sales manager of the Chesapeake & Virginian Coal Co. and member of the Executive Committee of the American Wholesale Coal Association, died April 10 at Asheville, N. C., where he had gone to regain his health following an attack of pneumonia last winter. His death was unexpected.

Earl A. Henry, chief of the West Virginia Department of Mines under former Governor Henry D. Hatfield and general superintendent of the Liverpool Salt & Coal Co., of Hartford, W. Va., died suddenly on March 31 while at work in the mine of the company. Heart failure is said to have been the cause of his

death. Before becoming chief of the department of mines Mr. Henry served for a number of years as a district mine inspector and also had been a deputy sheriff of Mason County. Mr. Henry is survived by his widow, his father, Darius Henry; a brother and two sons.

H. D. Megary, managing director of the Consolidated Pneumatic Tool Co., London, England, died suddenly March 20. Mr. Megary was born in Philadelphia, April 21, 1888, and was graduated from the University of Pennsylvania in 1909. Following his graduation he became affiliated with the Bethlehem Steel Co., remaining with that company until June, 1918, when he became connected with the Chicago Pneumatic Tool Co. as assistant to the president, later being made secretary of the company. In 1921 he was transferred to London to assume the duties of managing director of the English company. He also was director of European sales.

Charles Tedrow, of Nelsonville, Ohio, who had been in charge of the land department of the New York Coal Co. for a number of years, died recently at the age of 67 years. The funeral was held March 20, and was attended by officers and department managers of the New York Coal Co.

D. D. Christie, died in Guelph, Ont., recently, at the age of 85 years. The late Mr. Christie was president of the Winnipeg Fuel & Supply Co., Winnipeg, Man., and also was a director of the Drumheller mines, in Alberta.

Coming Meetings

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

Chamber of Commerce of the United States. Twelfth annual meeting at Cleveland, Ohio, May 6-8. Secretary, D. A. Skinner, Mills Bldg., Washington, D. C.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

West Virginia Coal Association. Annual meeting May 13-17, Cincinnati, Ohio. Secretary, W. H. Cunningham, First National Bank Building, Huntington, W. Va.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

Retail Coal Dealers Association of Texas. Nineteenth annual convention, May 20 and 21, Vernon, Texas. Secretary, C. R. Goldman, Dallas, Texas.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

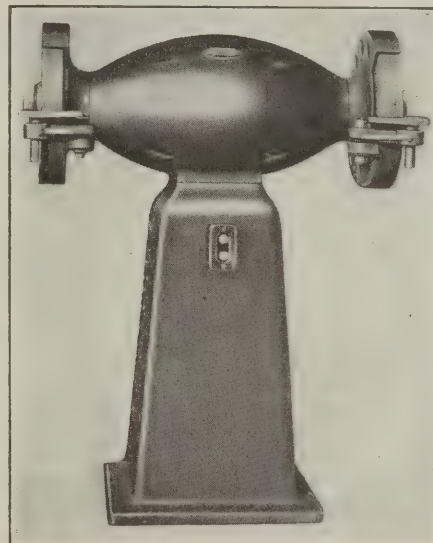
Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

New Equipment

Totally Inclosed Grinders For Mine Shops

For use in coal-mine shops where it is necessary to contend with more or less fine dust, the Glow Electric Co., of Cincinnati, Ohio, have developed a totally inclosed grinder. The inclosing case of this device completely shuts out any dirt or dust flying from the grinding wheels. Suitable guards are mounted over each of the two grinding



Inclosed Grinding Wheel

This motor-driven outfit is totally inclosed so that no dust or dirt can get into the motor or the bearings. The grinding wheels are shielded by means of guards, thus the dust, and fragments are prevented from flying in a direction where they may cause serious danger to the eyes of the operative.

wheels. The grinders are mounted on pedestals which are designed to give a large clearance with a short spindle extension. The outfit is driven by an electric motor, controlled by means of either a push button or snap switch located so that it may be within easy reach of the operator.

Paint-Spraying Gun

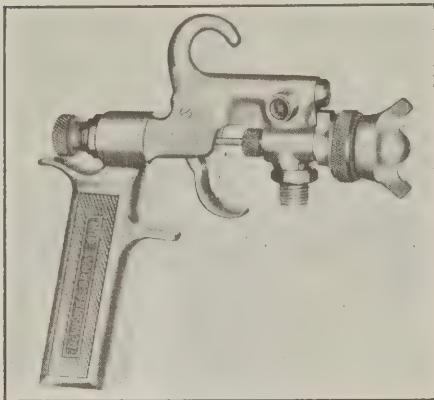
Important improvements have been made by the DeVilbiss Manufacturing Co. of Toledo, Ohio in the gun they have been manufacturing for the purpose of spraying paints and varnishes.

All nozzle parts are self-centering, thus making it impossible for the nozzle to get out of alignment even when parts are interchanged. When the gun is used in a horizontal or vertical position the revolving air cap produces a wide fan spray and when the gun is placed in any intermediate position a round concentrated spray is obtained. It is claimed that this gun produces a truly atomized and uniform spray under all conditions.

Another important feature is that all parts requiring any cleaning can be easily disassembled and can always be

kept in condition ready for operation. The gun-shaped handle is well balanced, and rests easily in the hand. The trigger which regulates the flow of paint operates freely.

In mine service when used around electrical equipment the gun has several points of advantage, for the paint or varnish may be made to flow in and around insulating material which could not be reached with a paint brush. Its use for finishing the work on newly installed switchboards, located adjacent to panels and switching equipment carrying power, will result in greater safety to the operator.



Paint Gun Easily Used and Cleaned

This complete little gun weighs only 10½ oz. and can be used with great ease for spraying paint or varnish on any kind of surface. Its use around electrical equipment will make the work much safer than is possible by any other means.

Track Tie Made in One Piece Easily Attached to Rails

A new steel cross-tie to be known as the Bethlehem mine tie has recently been developed and placed on the market by the Bethlehem Steel Co. This tie succeeds the Cambria mine tie manufactured at the Cambria plant of the company.

The tie has fastenings permitting it to be added to or taken from the track without the rails being disassembled. The stationary and movable fastenings are arranged in such a manner that the tie can be slipped under the rails, brought into position and fastened while the rails remain in place.

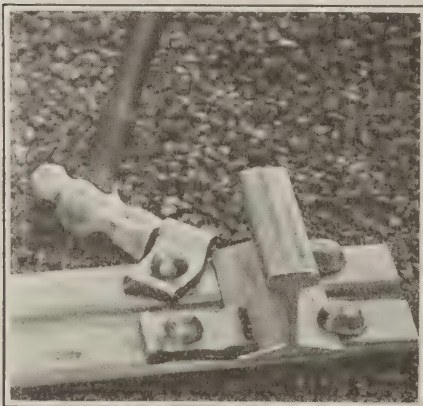


Fig. 1—Shows How Easily Tie May Be Installed

No special wedges or tools are required to attach this tie to the rails. The larger size ties have two clips which make the joint more rigid and prolong its life.

The rail is fastened to the tie by turning the rotating clips to their clamping positions, using for that purpose a hammer, axe, or any tool available, as shown in the illustration, a feature of the device being that no special wrench or other equipment is necessary for its use.

These ties are made in three sizes, Nos. 1, 2, and 3. Each end of the latter two types of tie is equipped with two fastenings, doubling the holding power. Only one clip is necessary for the holding of the rail, and should this clip become damaged or worn, the reserve clip may then be brought into use by turning it to the clamping position. This feature has the effect of greatly lengthening the life of the tie.

The rotating clips are made of heavy rolled steel with reinforcing ribs back and front, offering a large section on which to hammer them in and out of position.

The tie is one-piece construction and is complete in itself, requiring no extra wedges, loose parts or special tools. These ties are shipped complete ready to install in bundles of convenient size. One man can easily carry fifteen No. 1 ties or ten No. 2 ties.

Shovel Driven by Ford Engine

A new shovel suitable for light stripping and coal loading has been developed by the Glasgow Engineering Co., 3720 N. Newstead Ave., St. Louis, Mo. The machine consists of a bucket or dipper mounted on a pair of dipper sticks, which are carried on a heavy structural steel framework mounted on a Fordson Tractor. The action of the



Fig. 2—One-Piece Steel Mine Tie

With this tie, track laying is made easy. There are no loose parts to get lost and delay the work. This feature is important in mine service, for the supply room is usually a long way from the working face.

machine is similar to that of a baby shovel, except that it is preferable to back the tractor about 4 ft. from the pile of material to be handled and then run it forward into the pile before hoisting the dipper.

This dipper is raised by a cable which runs back to the main hoisting drum and is made to dig into the ground or crowd into a pile by the action of the hoisting cable looped over a sheave on the upper end of the dipper sticks. The side-swinging motion is controlled through two cables which run from each side of the bull wheel back to two small drums on the main power shaft. The whole machine is heavily built to withstand severe usage.

Power is taken from the main power shaft gear of the tractor and is transmitted through a worm and worm gears to a shaft which carries both the hoisting and the swinging drums. The driving gear, worm, worm gear, and ball bearings, are adaptations of standard Ford parts which make replacement in case of emergency easy. The main hoisting drum is 4 in. diameter and 8 in. long, with high flanges and is controlled by a large expanding clutch and a 10-in. hand brake fitted with standard brake lining.

The dipper is built of ¼-in. plate with a renewable cutting lip ½ in. thick. The back is hinged on top and held at the bottom by a latch.



Shovel Relocated as Easily as Truck

Mounted on a Fordson tractor, this shovel can be used to dig, hoist or shovel. The ¼-yd. dipper is elevated and swung by means of power taken from the main drive shaft of the engine.

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, *President*
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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

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Why Leave Field to Central Power Companies?

MOST coal companies have been willing to ship coal by rail or by water. Few indeed have sought to send their power to market by wire and none through pipes. Surely the invasions of the power companies should awaken the desire in the minds of mine owners to put their power in such form that the demand would be steady and not fluctuating. The power companies are now going into the coal field, opening new mines and thus stripping the mine owner of a large part of the demand for his product, adding to the number of mines at a time when it is generally acknowledged that there are altogether too many mines for the well-being of anybody.

This would not be so bad if it were not for the fact that the power companies accepted what few consumers want, especially in the Middle West, namely fine coal. The market that is thus lost is the most desirable market of all. Without sale for slack, the coal operator is at his wits' end. Slack nearly always has faced a glutted market. The power companies crush their coal and with a few mines can supply what many mines were required to produce under the old conditions when a mine made not only fine coal but a large percentage of lump.

It is time to wake up, for it is now or never. The choice will not long remain open. Soon the power companies will have enough mines and enough power plants to take care of all requirements and then only distant markets can be supplied with fine coal. The mine owner should think over this matter seriously and get into the power-distributing business before all the opportunities are taken up. He has been thinking of the subject for years, but thinking does not consume fine coal nor does it give a steady market—unless that thinking leads to action.

Telling the World

SOME coal company executives do not care to write for publicity; others will not write, but allow their engineers to contribute to technical papers; while still others will not permit any of their employees to write or even speak for publicity. Strange as it may seem, if it is strange at all, the public and men of the industry invariably have a better opinion of a company that tells what it is doing than one that hides every move; in fact, there is a close relation between employee loyalty to the company and freedom of expression.

When the public knows little or nothing about an industry and realizes that its leaders are adverse to any publicity, it quickly comes to the conclusion that there must be something to hide. Similarly, when an employee is denied the privilege of exchanging ideas

among his associates, he soon resents his company's close-mouthed policy.

Frequently we are astonished with the lack of correlated effort on the part of employees of the same company, and this condition is even more acute among engineers of different coal companies. Some companies and some engineers know very little about what other companies and engineers are doing. This condition does not promote rapid progress and is expensive and backward. Often a mining or engineering problem is solved and re-solved at great expense and even danger by individual companies and engineers which cost might have been entirely avoided had interchange of ideas been more general.

Director Bain, of the U. S. Bureau of Mines, has well said that if the twenty-six principal mining states had tried to establish, each for itself, separate experimental stations, the waste would have been enormous. Almost everything would have had to be tested twenty-six distinct times. The Bureau does the work once and for all.

Five thousand coal companies are each trying methods of saving in cost of mining and of developing better and safer ways of performing mining operations. What a waste if their effort is not correlated! What a loss to them all! This the technical press is endeavoring to save—is actually saving for the country.

The old-fashioned policy of hiding everything should be abandoned. Many engineers have been too silently doing their work and should now add to their training the art of self-expression, if they are to be of greatest value both to their companies and themselves.

Is This the Way at Your Mine?

AT SOME mining plants the electrical equipment is fully abreast with the times. The boilers are stoker-fired, the power house is equipped with modern turbines, the power is distributed at high potential to substations near the face where it is stepped down to mine voltage. Every modern electrical device is installed and the electrical engineers in charge have obtained kilowatt-hour costs comparable with the best.

But—and here comes in the mining engineer and the superintendent—no one has taken care of the bonding. That falls to the man who calls himself a mining man, and he, not caring about the electrical equipment, lets this important matter drift. The power so cheaply made, so efficiently distributed, is wasted in the roadways of the mine. No matter how energetically the electrical engineer may fill the barrel, the mining superintendent can empty it with his open spigot.

He can waste it at bonds, he can squander it over excessive grades, he can destroy the locomotives by his bad tracks, he can overload his machines by dull bits, he can overtax the electric system by carelessness in

distributing his loads over the day. There never was an electrical engineer but could be queered by a mining superintendent who would not co-operate with him.

A few conferences might correct this difficulty, but of the calling of conferences, there is no end. They tend eventually to "drivel," especially if not skilfully led and made a matter of careful study. But they do give hints of saving, at least when first started, and they do bring pressure to bear on those parts of the mechanism that oppose themselves to other parts, to those gears which do not mesh. And then there is turnover in officials. There are new elements to bring into line. There is forgetfulness also and a tendency of men to fall out of line if not continually faced with the necessity for co-ordination. The conference is well worth the time expended on it. Try it.

Furthermore, it might be well to give the electrical engineer authority over the bonding of the tracks on which he must rely to obtain his return, and a sympathetic hearing as to the tracks themselves, for upon them he must run his electrical equipment and as to the bits and the cutters from which he must get results without motor burnouts.

Dangerous, some one will say, this duplication of authority in a mine, but dangerous also, where there is no co-ordination, is division of authority regarding what are truly electrical matters. It is this division of authority that makes conferences essential.

Why Should They Complain?

BY THE provision of Section 28 of the "Jones," or Merchant Marine, Act only freight carried in American vessels is permitted to get the advantage of the railroad rates set for exported merchandise. Section 28 by its own provisions was held in abeyance till the U. S. Shipping Board should notify the Interstate Commerce Commission that American vessels can handle all the freight of any given kind to certain harbors. By the terms of the section the commission is obliged then to declare that Section 28 shall come into operation in regard to those ports.

As foreign ships can under their present wage scales underbid American ships and are doing so, this enforcement of Section 28 will raise the aggregate cost of exporting, for if the merchandise goes in American bottoms it will have to pay American shipping rates, which are higher than foreign, and if it goes in foreign bottoms it will have to pay, at least in many cases, higher railroad freights to American ports.

All this seems likely to cause retaliation from such foreign countries as are greatly interested in shipping, though such discrimination is not new. It already has been practiced by at least one other nation—Germany. However, foreign countries may not be opposed to this discrimination, for it raises export rates and tends to keep American goods from being exported and helps foreign goods to replace American goods, and thus does America, perhaps, more harm than Europe. Even the foreign shipping firms are not much injured, for they can engage more profitably than in European trade than they can today because that trade will be bettered by the exclusion of American goods. By our action we have raised a virtual tariff wall against our merchandize. In so far as any nation consumes our goods that nation finds the prices raised but its own mer-

chants more active. In so much as that nation exports goods—and nations with merchant marines are most greatly interested in the differential treatment—it provides that they will do more business in the Eastern Hemisphere and less Transatlantic business. So the conditions partly, if not entirely, correct themselves.

It is our merchants who, by being shut out of European markets, bear the loss. But certain railroads and seaport towns will share it. The railroads leading to ports where there is now no differential or only a small one will charge under the law no more, or but little more, as the case may be, to foreign ships and so will take traffic from those where the differential is high. Those ports with no or low differential also will gain. Other railroads and ports will lose. Consequently interests in this country will conflict. This matter, which is in a sense a tariff issue, like the tariff will be a matter of local interest. One section of the country and one group of interests will be pitted against another. Which will win is not at present apparent.

This matter might be of interest to the coal industry should there be a British coal strike, which now, however, appears unlikely. But the railroads have decided, after a conference, that we never have had a differential on export coal. True we have a tidewater rate, but it was made for shipments to New England, not for foreign trade. The foreign trade simply availed itself of it.

Consequently, say the railroads, we have never had an export differential, and accordingly it cannot be legislated out of existence by making Section 28 operative. Whether the railroads are correct in that conclusion the Interstate Commerce Commission must decide. If the commission declares that there is an export differential in favor of coal, that decision might hinder the shipment of coal if, owing to a British or other coal strike, there should be a demand for it.

Certainly this arrangement, by excluding American goods from Europe, will help that continent to restore its balances and aid it to pay its debts. European nations, within themselves, have conflicting interests such as are found here. Hence nothing is likely to be done. Several countries, including Holland and Japan, have protested, but protest probably will not avail. The matter will be regarded as an internal matter by the American people. It offends foreign countries, which do not like interference with their merchant marines. This is unfortunate to be sure.

Second thoughts, however, may make these nations less critical as second thoughts are making the American people question the validity of the judgment which caused the enactment of Section 28. It is too early to tell whether the section will stand or fall. This, however, is sure, we can no longer feel our former enmity toward foreign discrimination. We always have had our restrictions against merchandise being carried coastwise in foreign bottoms. Now we have this further restriction, so we no longer are able to wonder at the ship subsidies that foreign nations have been disposed to provide to the disadvantage of the American merchant marine and at the expense of their own national budgets.

THE KENTUCKY COAL "BARRENS" ought to be happy. They have defeated the tonnage tax bill and had no 1923 taxable income worthy of note. Now all they have to do is fight for life.



Control House for Substations

Motor-Generator Sets in Two Substations Operated In Parallel and Controlled from Surface

To Keep Controls from Dust They Are Installed in Colliery Yard—
Two Generators of Unequal Capacity Successfully Worked in Parallel
—Method of Lowering Cables—Use Unarmored Cable in Borehole

BY E. B. WAGNER

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Wilkes-Barre, Pa.

AT THE Dorrance Colliery of the Lehigh Valley Coal Co., at Wilkes-Barre, Pa., two substations have been equipped with semi-automatic substation equipment to supply direct-current energy for a typical mine load but in a way somewhat unusual. One of the unusual features is the placing of the greater part of the control equipment in a separate building on the surface, the two motor-generator sets being located about 2,500 ft. from the control house on two separate levels inside the mine. About two-thirds of the mine output comes from the 650-ft. level where one of the machines is located, and the other third from the 1,150-ft. level where the other machine supplies the necessary energy.

The power for this colliery was originally supplied from a 300-kw. generator directly connected to a tandem compound engine and a 175-kw. generator directly connected to a simple engine. Both generators were compound-wound and delivered 250 volts. The former unit has been in service 15 years and the latter 20 years, running from 12 to 18 hours daily. Both units are still in good operating condition.

It might be of interest to note here that these two generators were successfully paralleled, in spite of their widely different design, by connecting the series field of one machine in series with the other. A cast grid rheostat shunt was connected across the terminals of

the field so as to shunt enough current to compensate for the difference in the capacities of the generators.

Owing to the rapid advance of the mining face, some of the inside power feeders had been extended nearly 5,000 ft. This, of course, caused excessive line drop, and a pressure at the locomotives as low as 150 volts was not uncommon.

At the locations selected for the converting substations there was no one who could attend to the stations in connection with his other duties, so it was decided to make the control semi-automatic. That is, the equipment would be started by pushing a button, but further operation would be automatic unless a short circuit on the alternating-current system or some other trouble of a similar nature shut down the machinery. The mine, served by these substations, is exceptionally dry and the air very dusty. For this reason, and to facilitate inspection, as much of the control equipment as possible was placed outside the mine. As finally planned, the only equipment that had to be installed inside the mines was: A 200-hp. alternating-current motor with control for a hoist, formerly driven by a direct-current motor; and two synchronous motor-generator sets with complete direct-current control but only one alternating-current control relay for each unit. All the other equipment for the motor-generator sets was to be installed in the outside control house.

That the power lines and control wires from the outside to the substations might be made as short as possible, the control house was located as directly over the substations as the surface conditions would permit. An 8-in. borehole was drilled to the 1,150-ft., or Red Ash, level and was so located as to cut the 650-ft., or Hillman, level in an opening in the coal. The hole was lined with a 6-in. casing pipe down to the solid rock. Through this hole the distance from the control house to each substation was about 2,500 ft. The station in the 650-ft. level was nearly 1,900 ft. from the place where the borehole cut through the bed.

Power is supplied through an outdoor transformer substation controlling a bank of three 200-kva. transformers. Here the voltage is reduced from 11,000 to 2,300 volts. The secondary wires run in conduit to the incoming line panel of the switchboard which is located in a brick control house erected adjacent to the transformer substation. Fig. 1 shows the general arrangement of the substation and control house and the headpiece the interior of the latter. The disconnecting switches of the incoming line are located well above the 2,300-volt busbars so that when they are opened there is little risk of accidental contact with any live parts. The switchboard panels are located on one side of the room, and the starting and running contactors for the motor-generator sets are along the opposite wall.

The switchboard arrangement is shown in Fig. 3. Starting at left, the panels are as follows: Alternating-current feeder panel (not shown); incoming line panel; control panel of No. 1, or Hillman bed, station; relay panel of No. 1 station; control panel of No. 2, or Red Ash bed, station; and relay panel of No. 2 station. The method of control of the mine substation was made as simple as possible, and, in the sequence of starting, each operation completes the circuit for the next following.

Speed acceleration of the two motor-generator sets is controlled by two timing relays. These may be distinguished readily in Fig. 3 as the small metal-covered devices on panels 3 and 5. They are set by experiment to have a slightly longer time delay than the machine which they control requires to reach synchronous speed. The other round metal-covered relay on the third panel is a delay relay, used after an alternating-current power failure, to delay the starting of No. 1 set until No. 2 is again on the line. The oil circuit breakers on the alternating-current substation feeders are set for about 300-per cent load. These open only in case of unusual trouble.

Protection against overloads is afforded by the direct-current breakers located inside the mines on the control panels of the motor-generator. The four large, round metal covered devices on the sub-bases of the panels shown in Fig. 3, are long-time thermal relays. These relays are not required for the usual mine load. The direct-current distributing system being sufficiently split up by several adequately protected feeders. A one-line diagram of the power system is shown in Fig. 7.

The machines can be started or stopped from three points, namely, the main shaft engine house, the control house and the inside station. The scheme of wiring is the familiar four-way electric-light control. To prevent unexpected starting from any of the other control points, the control buttons in the engine house at the shaft and in the inside stations are provided with normally closed contacts which can be locked in the open position. In the control house, this provision is not necessary, the double-pole double-throw control switch being left open when required.

The alternating-current feeders in the borehole consist of three-conductor 1/0 varnished cambric cables with 5,000-volt insulation and a double weatherproof braid over all. The Lehigh Valley Coal Co. has found

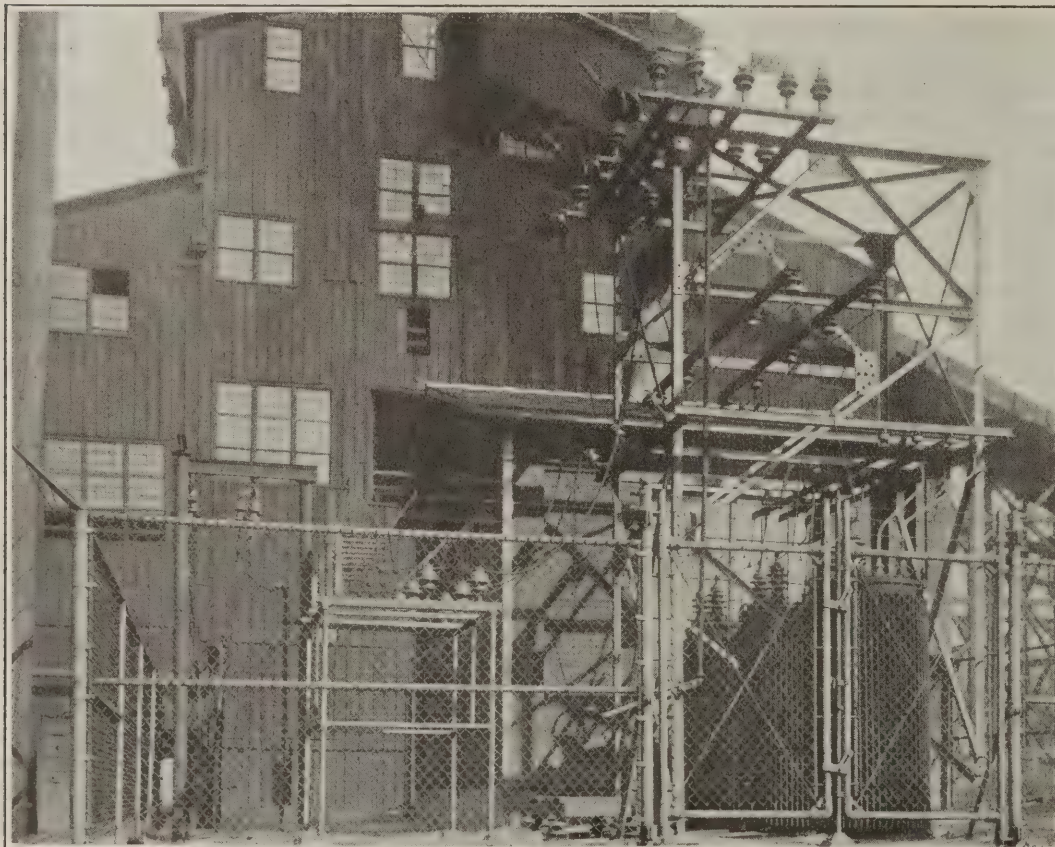


FIG. 1

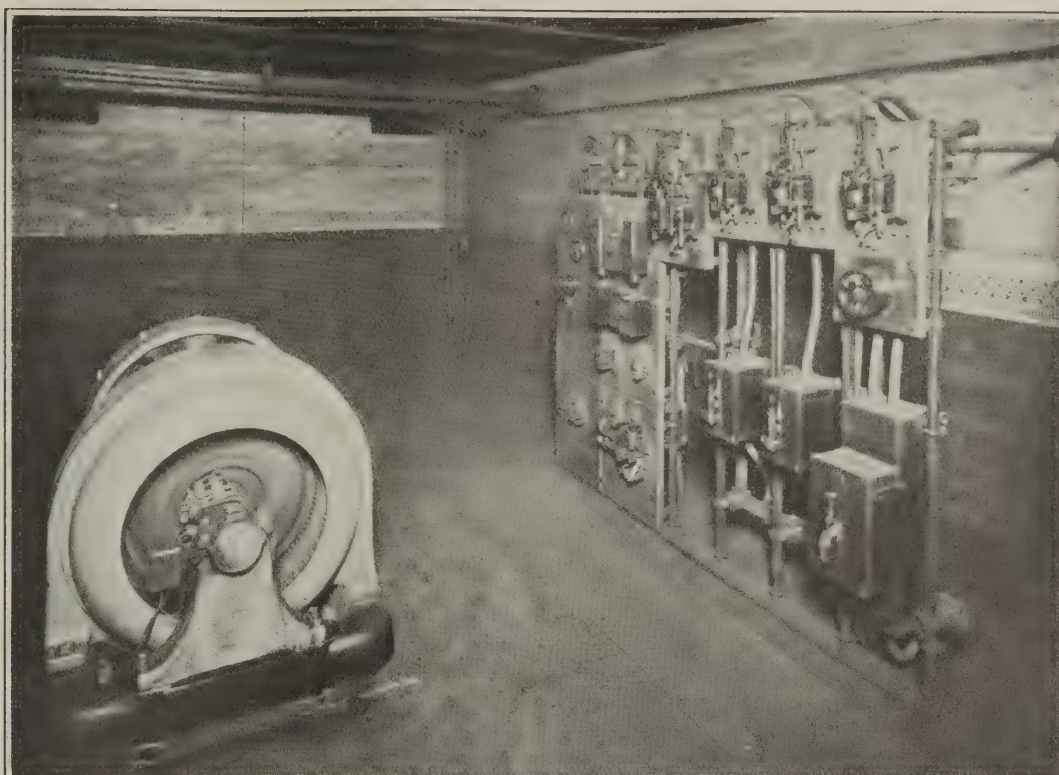
Substation and Control House

Power is delivered to a bank of transformers located adjacent to the control house. Wires to the inside substations are suspended in the borehole. A wire fence encloses the high-voltage switching equipment and extends around the borehole structure and cable supports.

FIG. 2

Red Ash Bed Substation

Flexible conduit was used in many places. The wires pass through conduits with long-sweep bends. Most of the wiring is concealed and protected against dirt and moisture. Auxiliary relays on the main generator breaker trip out independent feeders before the load reaches a point necessitating the complete shut-down of the direct-current mining equipment.



that this type of cable gives excellent service in boreholes and that it does not need to be protected with lead covering, which would add greatly to its weight and make it more difficult to provide support. Where the tensile strength of the copper conductor is insufficient to support the weight, a steel armor is provided for suspension purposes. In this case the 1/0 conductor was of ample strength to sustain its 650-ft. of length, that being the distance to the first level.

The cable support is shown at the left in Fig. 1 between the frame of the lightning arrester and the fence. This was made of three 6-in. iron pipes 18 ft. long, set in concrete to form an equilateral triangle. The top of each pipe was fitted with a flange upon which was bolted an 8-in. 25-lb. I-beam. Under these beams was clamped one unit of a strain yoke. From each arm of the yoke was suspended two suspension-type insulators and a strain clamp. The cable was opened and each conductor fastened to one of these strain clamps. The yokes equalize the load of the cable upon the three conductors. This method of support has been used for the past seven years with no failures to date. At the 650-ft. level, eye bolts in the roof sustain the strain yokes to which are attached the feeders running to the 1,150-ft. level.

Before preparing to lower the cables, the exact cable lengths were obtained from the drillers' log and sufficient cable was stretched across the colliery yard. The cable was then opened and a strain clamp fastened to each conductor.

Over the top of the hole, on wooden supports, was mounted a 4-ft. diameter sheave wheel with an especially large groove. One end of the cable was started over the sheave, and the clamps on the other end were fastened to a piece of 3-in. wire rope. Fortunately the colliery locomotive track was so located that it could be used for the lowering of the cable.

One end of the wire rope was attached to a 5-ton battery locomotive. Then the cable was lowered down

the borehole by hand until its weight was sufficient to keep it moving, after which it was lowered by the locomotive, until just enough cable projected to fasten the clamps into the insulators of the yoke.

A split wooden clamp, about 15 in. long was clamped around cable and rested on top of the casing pipe. With the clamp in place the wire rope was removed and the strain clamps attached to the insulators, after which the wooden clamp was removed. The cables for the

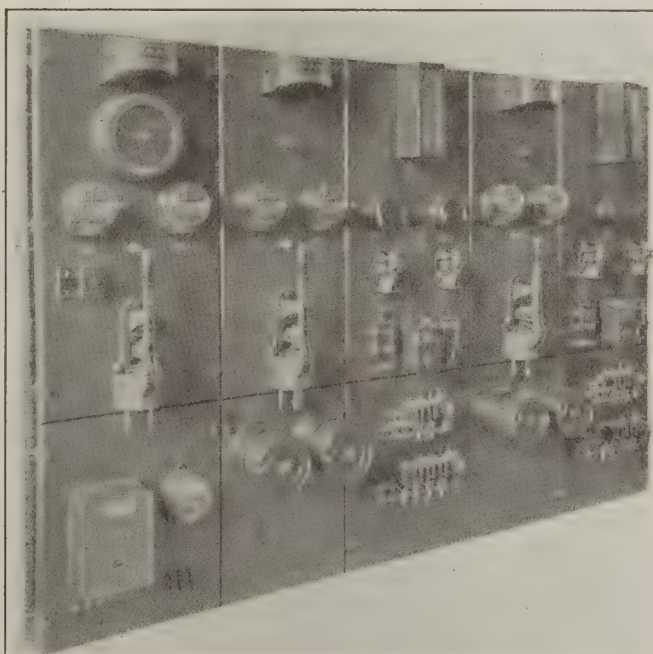


Fig. 3—View of Remote Control Apparatus For Two Automatic Substations

The apparatus mounted on and behind these panels controls the operation of each motor-generator set located in the mines. From left to right they are: incoming line panel; control panel for No. 1, Hillman bed, station; relay panel of No. 1 station; control panel for No. 2, Red Ash bed, station; and relay panel of No. 2 station.

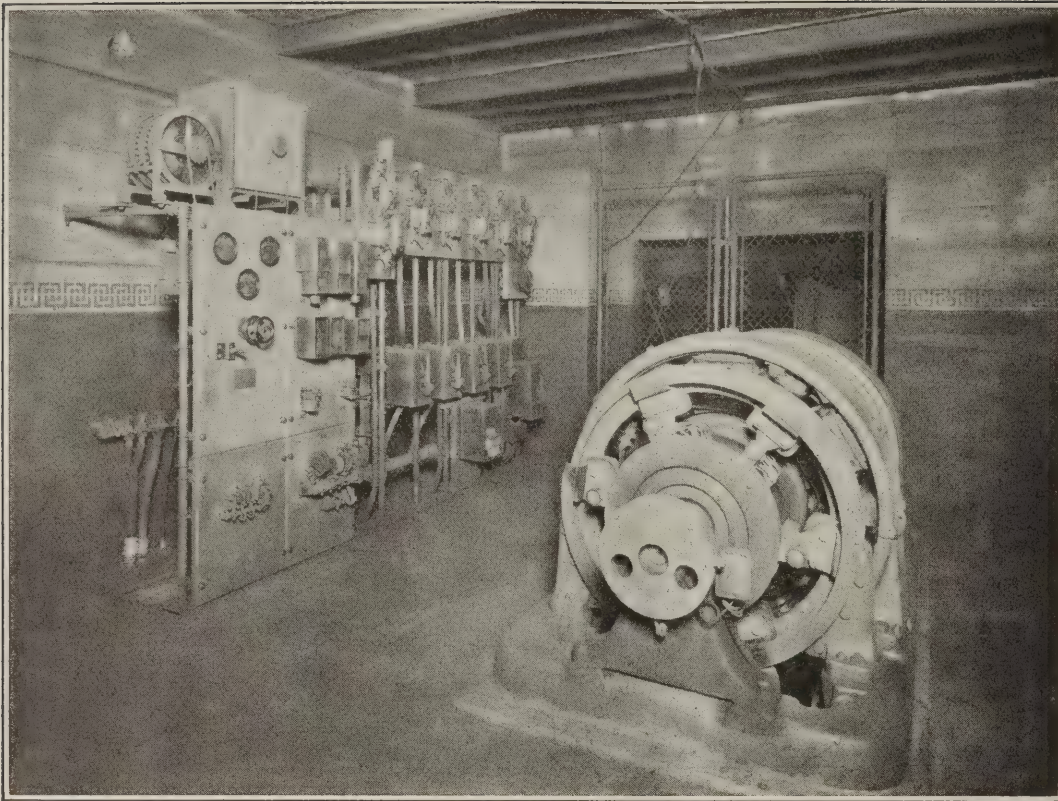


FIG. 4

Hillman Bed Substation

Both substation rooms are almost alike, each being made of concrete. A 3-ton hand-operated traveling crane is provided for moving any heavy parts of the motor-generator set. The entrance to the room is closed by a wire fence and gate thus the equipment is safe and no adjustments can be tampered with by an authorized person.

lower section of the borehole—between the 650- and 1,150-ft. levels—were installed first, the wire rope attached to the battery locomotive being long enough to reach from the surface to the 650-ft. level.

By this method the five pieces of cable were placed in the borehole with the assistance of only a few men and yet the cable while being lowered was at all times under full control. The station control wires, eight in number, four for each motor-generator set, are standard No. 6 D.B.R.C. stranded wires with 600-volt new code rubber insulation. These are dead-ended on a 6x6-in. wood cross-piece supported on iron brackets from the pipe poles. A telephone cable also forms part of the installation. This support can be seen in Fig. 1, just above the middle rail of the fence.

The interiors of the substation rooms are practically alike, except for the number of direct-current feeders, so that a description of the station on the 650-ft. level will suffice. A view looking toward the entrance is shown in Fig. 4. The room is 30 ft. long, 17 ft. wide and 10 ft. 6 in. high with concrete side walls and floor. A 3-ton hand-operated traveling crane forms a relatively inexpensive part of the equipment and is of great service in handling parts of the motor-generator sets during cleaning, inspection or repair.

Unfortunately these machines are so designed that the frames can not be slid off the base, for the motor and generator frames project below the base plate. The entrance to the station is closed by a double-wire screen gate, which is normally locked, to keep unauthorized persons out of the room. Fig. 5, shows the gate closed. In the vestibule outside the station is a pipe frame on which is mounted a non-automatic oil switch and a small panel. In the center of this panel can be seen the start and stop push buttons and the lockout button on the left.

The three knobs mounted above and below the push buttons are the control switches for each direct-current

automatic breaker in the station. Thus, in case of emergency, any one can cut off any direct-current feeder by opening the proper control switch, or cut off the entire direct-current supply and shut down the machine by opening the oil switch. As all current-carrying parts are enclosed, these operations can be performed with perfect safety.

The automatic equipment in the station is mounted on the two 24x76-in. slate panels shown in Fig. 6. The panel on the left has a direct-current voltmeter with plug and receptacle, so that machine or feeder voltage can be read; a direct-current motor-field ammeter; a direct-current main ammeter; concentric hand wheels for field rheostats and a direct-current contactor on the sub-base. The latter controls the circuit breaker of the direct-current generator.

On the top of the other panel is mounted a direct-current voltage relay, which picks up when the direct-current voltage is 70 per cent of normal; a motor field relay which picks up when normal field current is established; a generator field-building relay which short-circuits a portion of the field rheostat, allowing the generator to build up its voltage quickly when started with the machine at normal operating temperature.

In the second row is a polarity relay, a direct-current relay, which disconnects the station in case the direct-current voltage coming from the other station is higher than the voltage of the generator in this station, and a reverse-power relay. This relay is not really necessary when there is only one set in the station, as the direct-current relay just mentioned makes provision against power reversal. The next row has a contactor for the reverse-power relay and an alternating-current contactor forming an interlock between the alternating- and direct-current control circuits. On the switchboard sub-base is a motor-field contactor.

To the right of the slate panels are the direct-

current feeder controls consisting of reclosing circuit breakers and safety-type disconnecting knife switches. The first breaker is in the generator lead, and its overload trip setting is about 225 per cent of the full load on the generator. The next several breakers control direct-current feeders, the one on the extreme right controlling a tie feeder between the two converting stations.

The oil switch located outside the substation is provided with a shunt trip coil and a circuit-opening switch. The former is energized through machine-bearing thermostats or, in case of field failure, by a motor field relay. The circuit-opening switch opens the main control circuit thus dropping out the running contactor in the control house, making a complete restart necessary. This prevents closing the oil switch with full voltage on the supply leads to the motor.

Each machine was placed as near as possible to the center of load on its particular level and, to take advantage of the diversity factor, a feeder was installed to tie the two direct-current station buses together. The generator breaker was set to trip at a rather high overload, so that it would act only under excessive load. This was done to prevent the high starting current taken by locomotives from opening the breaker too frequently after a complete interruption of direct-current power.

To take further care of this condition, two overload relays were installed in the generator lead each with its auxiliary contact in series with the operating coil of one of the feeder breakers. The overload setting of one relay was about 10 per cent and the other 20 per cent below the setting of the generator breaker. When peaks combine on the main breaker, one overload relay opens its contacts and trips out the feeder breaker to which it is connected. If the load continues to increase, the other relay trips out its feeder. This

usually reduces the station load to a safe value. As the load falls off, one relay and then the other drops and recloses the respective breakers. This arrangement, by preventing the generator breaker opening repeatedly on peak loads, has prevented much lost time.

Figs. 5 and 8, showing the two substations give a better idea of the outside control features, the gates and the arrangement of the direct-current circuit breakers. The light streaks on each device are metal name plates, showing the purpose of each switch or push button. The direct-current feeders are run in conduits placed in the side wall of the room, so that the station is remarkably free from visible wiring. The ammeter in Fig. 2 shows that at the time the picture was taken No. 2 station generator was delivering 300 amp. over the tie feeder to No. 1 station bus.

As the greater part of the total mine load was near No. 1 station it was planned at first to have the generator in No. 1 station flat-compounded and the generator in No. 2 station over-compounded. It was hoped that by this arrangement energy could be supplied to busbars of No. 1 station from No. 2 station; the overcompounding of the one generator being sufficient to make up for the voltage drop through the tie feeder.

A few weeks of operation demonstrated that this would not give the result desired, as a heavy load on No. 2 station when No. 1 station was lightly loaded would raise the potential of the tie feeder, due to compounding of No. 2 station generator, sufficiently to force No. 1 station generator off the bus by the functioning of the reverse-power relay. A heavy demand for power near No. 1 station would then trip the main breaker at No. 2 station.

After experimenting a while it was found that each machine must be given a slightly drooping characteristic, in order to get the desired results from the tie feeder. The reverse-power relay was disconnected from

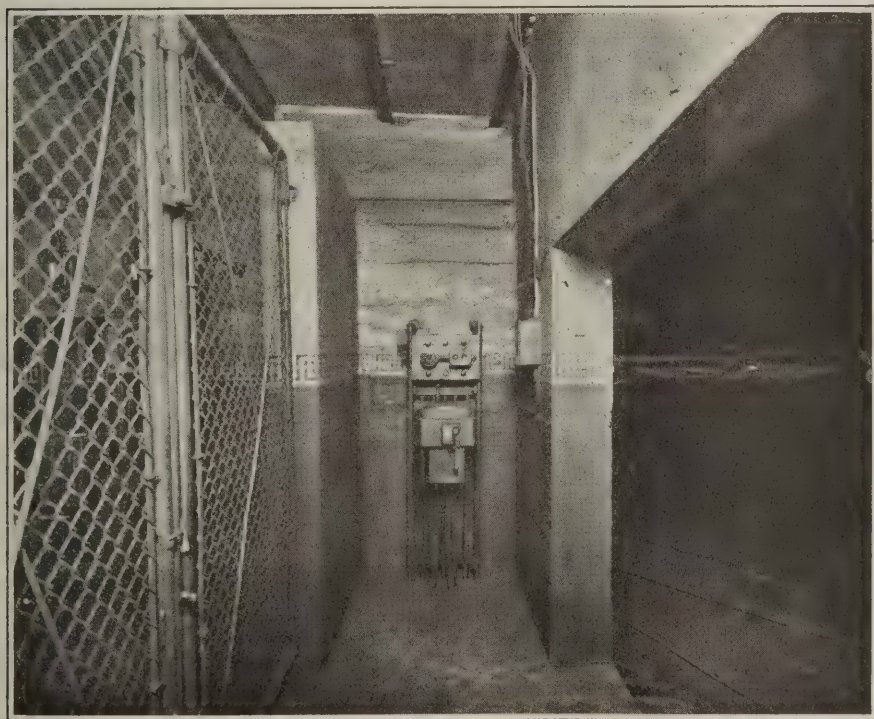


Fig. 5—Motor-Generator Set Stopped from Ante-Room

The oil switch located outside of the substation may be used to stop the motor-generator set in case of emergency. Each direct-current feeder circuit may be closed or opened by means of the control switches located on the slate panel above the oil switch.

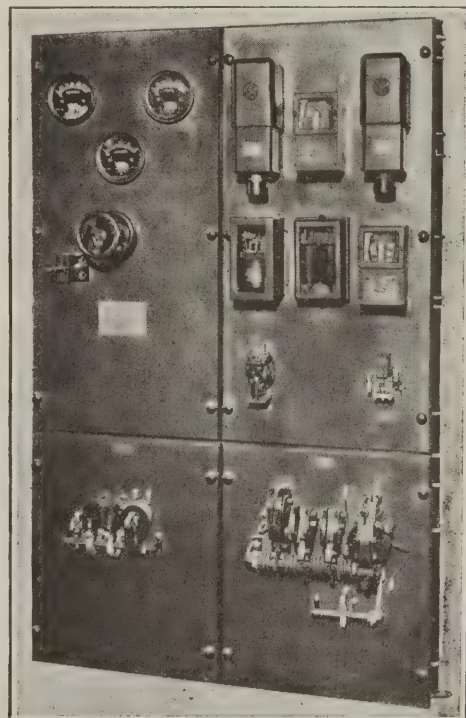


Fig. 6—Instrument and Relay Panels

These two panels are located inside the mine with the motor-generator set. All other starting and control apparatus is located in the outside control house.

Table I—Equipment Driven by Power from Motor-Generator Sets

Twenty-one 8-ton locomotives totaling.....	1,596 hp.
One 13-ton locomotive.....	134 hp.
Two hoists totaling.....	90 hp.
Four pumps totaling.....	65 hp.
One box-car loader.....	15 hp.
One empty-car haul.....	15 hp.
Lighting.....	5 hp.
Total direct-current equipment.....	1,920 hp.

the generator breaker and connected so as to control the tie feeder breaker at No. 1 station. This allowed No. 1 station generator always to be connected to its station bus ready for any power demands that might be made.

After several months operation of the equipment, it was found desirable to have some means of indicating at the control station in the engine house at the shaft when each station was in operation. As there was an

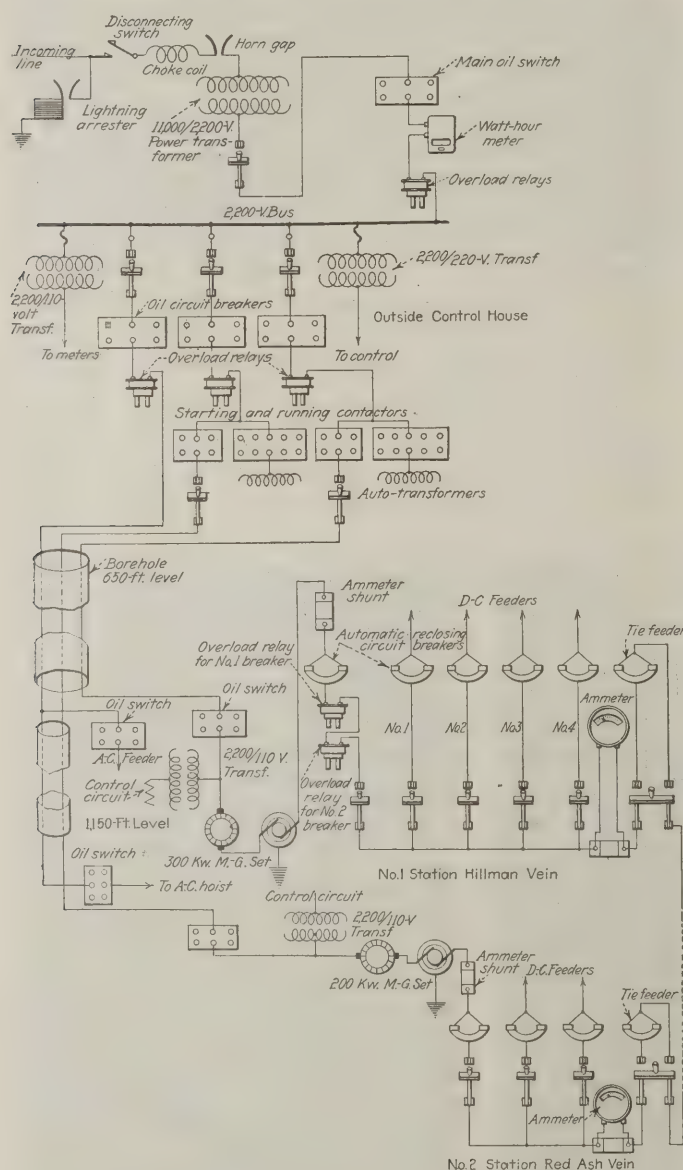


Fig. 7—One-Line Diagram of Power System

The power system divides itself into four parts; the power transformers, control house and two inside substations. Only 2,300-volt energy goes into the control house. There it is distributed to an alternating-current motor-driven hoist and the Hillman and Red Ash bed substations. The direct-current system is split up into many feeders, each controlled by automatic reclosing circuit breakers. A tie feeder connects the two substations and at night one motor-generator set supplies power to all the feeders in both stations.



Fig. 8—Control Buttons Outside of Red Ash Bed Substation

The general view of the substation shows how everything has been arranged to make inspection and repair work as simple and easy as possible. Each direct-current circuit is provided with a disconnecting switch enclosed in a steel cabinet.

extra circuit-closing contact on each running contactor of the motor-generator sets, two wires were run between the control house and the engine house at the shaft and connected to lamps enclosed in red globes. With the closing of either of the two running contactors the respective lamp is lighted, giving the necessary indication.

The equipment in Table I is furnished with direct-current power from the motor-generator sets.

The figures in Table II show that a large diversity factor may be expected when the number of locomotives supplied with energy is relatively large.

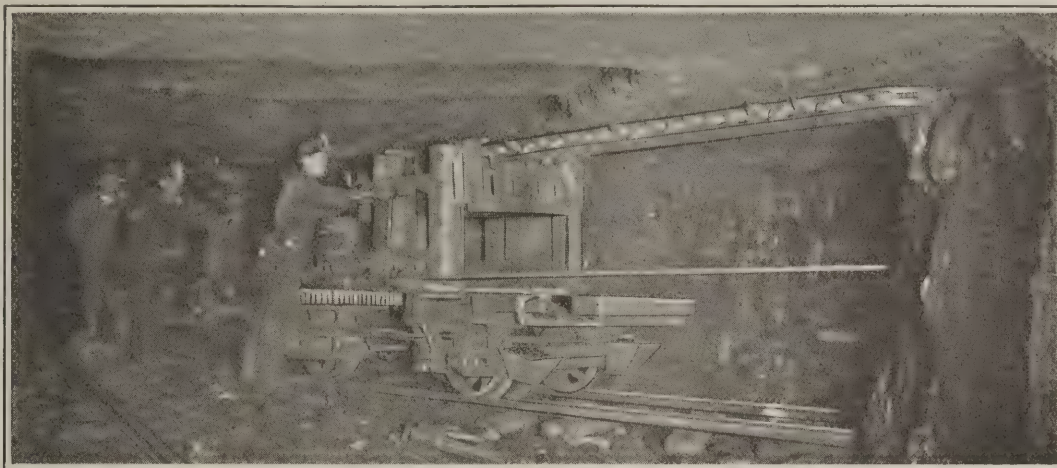
The locomotives at this mine are used mainly for gathering and they make relatively short hauls to the main haulage roads. However, many of the chambers pitch steeply, at gradients varying from 8 to 18 per cent. This explains the small number of main-haulage locomotives.

Before the voltage regulation of the two generators had been satisfactorily adjusted, so that a reasonable amount of direct-current power could be interchanged between the two substations over the tie feeder, and before the installation of the direct-current overload relays in the generator lead of No. 1 substation, the monthly 15-minute maximum demand for the entire operation was as high as 634 kw. In addition to the foregoing improvements, automotoneers were installed on most of the locomotives, and some changes were made in the method of handling trips. The maximum demand then dropped to 525 kw. but has since increased gradually to about an average of 575 kw.

The automatic substations have been in service for 18 months. The delays, directly due to failure, have been few and of such short duration as not to interfere with the output of coal. In fact it has been my experience that such minor delays need not be considered when automatic substation equipment is proposed.

Table II—Capacities, Loads and Power Demand of Machinery at Dorrance Colliery

Total capacity of motor generator.....	500 kw.
Connected load per kw. of generator capacity.....	3.84 hp.
Assuming 80 per cent average efficiency of motor-generator set the equivalent connected load to alternating-current side is.....	2,400 hp.
One alternating-current hoist.....	250-hp.
Total alternating-current connected load at mine.....	2,650 hp.
Capacity of transformer bank.....	600 kva.
Connected load per kva. of transformer capacity.....	4.4 hp.
Average monthly power consumption.....	105,000 kw.-hr.
Average monthly maximum 15-minute demand.....	575 kw.
Kilowatt demand per horsepower of connected load.....	0.22 kw.



Turning a Room with Straight-Face Machine

Utah Company Uses Top Cutting Successfully

Cutter Bar Bent to Avoid Loss of Height—Top Cutter Saves Its Cost in Timber, and Coal Lost in Roof Is Compensated in Coal Saved in Drawing Pillars—Suited Only to Thick Coal

BY THOMAS A. STROUP

Mine Superintendent, Utah Fuel Co., Clear Creek, Utah

SINCE 1915, the Utah Fuel Co., has had three straight-face mining machines in constant use at its Clear Creek property. During this time many data on the operation of such machines and on the application of top cutting to coal mines in general have been accumulated.

Wherever the physical conditions encountered are suitable, top cutting is a highly advantageous method of mining because of the ease of operation, the appreciable economy in labor and the great capacity obtained from a single machine. Under unfavorable conditions, however, this method is troublesome and wasteful. Mines adaptable to top cutting are, however, not uncommon, and this mode of mining deserves a much wider application than it now has. For several reasons, the idea of top cutting has always appealed to mining men. When it is used the roof rock is protected by the top coal and is not shattered in shooting. The method promises great economy in the use of timber as well as increased safety in mining. It has always seemed obvious that a coal-cutting machine that remains on the track while in operation would be highly advantageous. Furthermore, a machine with an adjustable height of cutter bar would certainly be of use in cutting shale and bony bands from the coal, thus insuring a clean product. These, in short, are the chief reasons for interest in top cutters.

In general, top-cutting machines have been developed along two separate lines, and at present are of two fairly distinct types. The arcwall machine is representative of one variety. This cuts by a swinging motion of the cutter bar about the axis of the machine.

It consequently makes a cut in the form of a circular segment. The Oldroyd machine, which has been developed more recently, makes a cut of the same general characteristics. It is believed by many engineers that a cut of this nature is tight on the ribs and difficult to shoot. There is unquestionably some foundation for this view, but the difficulties encountered have doubtless been overestimated.

A second type of machine designed to secure a square face in the room or entry being worked and one exactly similar in shape to that produced by an ordinary undercutter has also been developed. This is known as the straightface overcutter and was designed to overcome the objections incident to the circular cut. At the expense of a somewhat more complicated mechanism

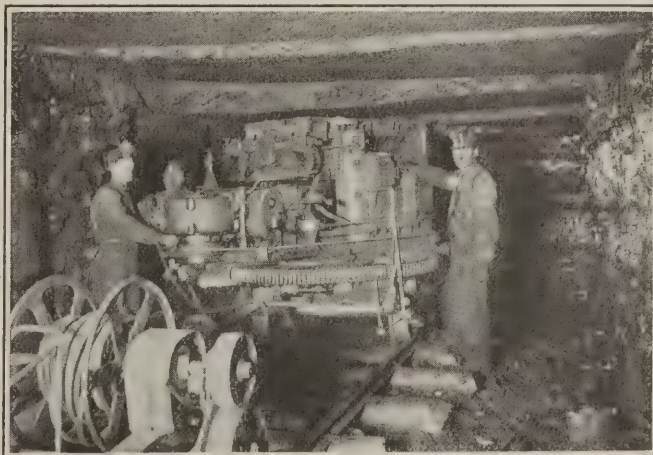
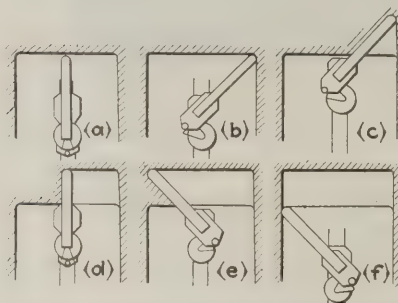
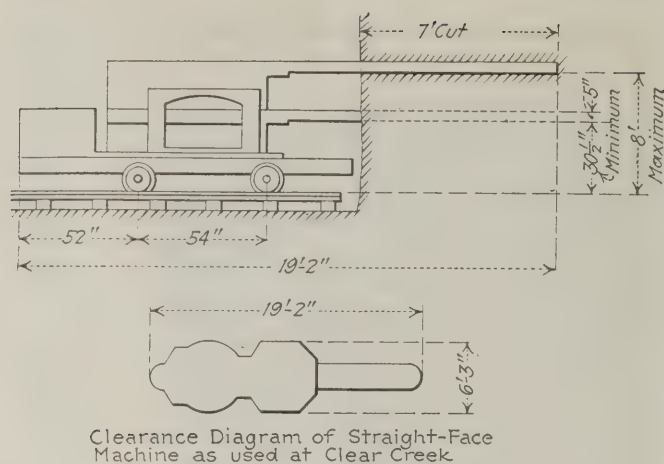


Fig. 1—Straight-Face Cutter at Work in a Room

The tendency of the cutterbar to crowd up or down may be seen by contrasting the offsets in the roof. Apparently this tendency can never be entirely avoided.

Article entitled "Use of Overcutting Machines" read at February meeting of Rocky Mountain Coal Mining Institute. Illustrations by courtesy of Goodman Manufacturing Co.



Operating Positions of Straight-Face Machine

Fig. 2—Operation and Clearance of Straight-Face Machine

By utilizing a cam cut in the base plate of the machine the cutter is constrained to excavate a square place instead of one that is semi-circular thus enabling the coal to shear on the lines of cleat.

than that employed in the arcwall, this machine gives a straight cut across the face and one that lends itself admirably to present-day shooting methods.

Top cutters cannot be advantageously introduced into all coal beds. Measures less than 6 ft. thick are little adapted to them, unless the problem encountered is that of cutting out a bone or clay band, and then removing the coal from both above and below it. In ordinary top cutting from 6 to 12 in. of coal must be left in place, in order to avoid cutting into the roof rock, also to provide the necessary cutting angle so that the place will not tend to lose height, as will be explained later. The ideal thickness of a coal bed for the use of an overcutter is 7 ft. or more. With straight-face machines the coal is cut preferably from 6 1/2 to 7 1/2 ft. above the rail. Hard shale bands cannot be removed with these machines, as well as they can with the ordinary shortwall machine, for the driving mechanism and cutter bar form a more rigid unit. The cutter will be deflected into the more readily cut coal.

At Clear Creek, a band of hard dark shale from 1 to 3 in. thick occurs about 18 in. below the top of the 8-ft. bed. This parting is persistent and extends all over the mine. Repeated attempts have been made to cut it out, but all have failed. At low feed the machines have ample power for the work, but the deflection of the cutter bar cannot be controlled. So great is the force of this deflection that in extreme cases the entire machine, weighing 7 tons, has been lifted clear of the rails, or, in the case of downward pressure, the rails have broken under the machine. Pressures of this magnitude may occur in shortwall work also, but they are not serious as the weight of the machine is appreciably less and its movement is virtually unrestricted.

Top cutters must not be expected to remove bands of

impurities that are appreciably harder than the rest of the coal bed. The presence of irregular masses or lenses of hard material also is fatal to the work of the top cutter. For best results, the coal must be uniform in texture, and impurities, if they occur, must lie in regular bands that can be avoided in cutting.

Top cutters create more dust than shortwall machines, for the bugdust must fall further to reach the floor. Application of water to the cutter bar, which is entirely practical with the shortwall machine, is a failure with top cutters. The cutter bar being located above the electrical driving unit, any water that may be applied will find its way to the motors and controllers. Of course, dust on the floor and at the face may be kept wet, but that made by the machine during the cutting process cannot well be controlled. In mines where the dust is particularly flammable, it would be well to avoid the use of top-cutting machines.

For the successful operation of top cutters the coal should part readily from the floor. At the bottom of some coal measures occurs a layer of impurities which may be "frozen" to the rock floor. In shortwall cutting, it is obvious that the cutter bar will work above these impurities. In top cutting, however, they are liable to be lifted from the floor in shooting and have to be sorted out of the coal. If the lower strata, where the impurities or clean coal are "frozen" to the bottom, the shoveling surface is rough and the efficiency of the loaders is greatly reduced.

An ideal bed for the use of a top-cutting machine is one that is free from impurities at the bottom and which breaks free from the footwall, leaving a smooth floor on which to shovel. This is the condition at Clear Creek and it has contributed in on small measure to the success of top cutting.

The character of the roof determines how much timbering is needed and so is also a potent factor in top cutting. As the machine swings horizontally from a fixed center above the track, it requires more room than an undercutting machine. In all cases, it is advisable to keep the timbers at least 21 ft. from the face. A row of props, however, may be set if required 4 ft. from the rail upon either side to within 14 ft. of the face. If the roof breaks up to the face, it will be necessary to break down the top coal and cross timber the place at a sufficient height to clear the machine. One great advantage of top cutting, however, is that a small layer of coal may be left undisturbed to protect the roof. Nevertheless with extremely bad roof this slab of coal in itself is liable to be dangerous. Under such roofs top cutting should be avoided.

Such machines as are used at Clear Creek obtain their straight-face motion from a cam cut into the base plate of the machine, upon which the entire mechanism moves. This renders the method of sumping the machine and withdrawing it from the cut somewhat unusual. In practice, the machine is run up to the face, the cutter bar swung to the corner where cutting is to start, which, at Clear Creek, is the right-hand side of the room. The miner in preparing his place has drilled a sump hole 18 in. deep 3 ft. off the floor and 18 in. to the right of the center line of the place. Into it the sump hook is driven as shown in detail in Fig. 3.

The machine is now started and pulled into the cut by a rope extending from the hook to a drum on the rear of the machine. When the latter has been pulled forward to such a point that the base plate touches the

face of the coal, the live drum is disengaged and the machine blocked in place for making the cut. This blocking is necessary for by it the machine is held in place despite the stresses encountered during cutting. It consists of props or ties placed against the ribs and against the frame or wheels of the machine itself. Even with these precautions, the operator of the cutter must be constantly on the alert to see that the machine is not lifted from the track, or the track pushed to one side by the heavy forces acting upon it. A device for raising and lowering the cutting mechanism either by hand or power is provided to relieve the strain should this happen.

After the sump rope has been cast off the machine makes its cross cut by being simply traversed on the cam by means of a pinion working on a quadrant on the base plate. The path described by the end of the cutter bar is a straight line which may vary in length up to 18 ft., depending on the starting and stopping positions of the machine on the cam. The cutter is withdrawn from its cut by means of a rope and jack pipe using the live drum again as a means of propulsion. This entire cycle of operation can be completed in an 18-ft. place in from ten to fifteen min.

All top cutters require good track. At Clear Creek, 30-lb. rails are standard, these being laid on 5x5-in. pine ties. In the past, however, some 20-lb. rails were used. By careful attention to laying, close spacing of ties and the proper fish-plating of all joints, 20-lb. rails may be successfully used. They are not, however, recommended. The track must be extended clear up to the face for each cut. For this purpose, pieces of rails from 6 to 7 ft. long are provided.

The track must be blocked up till it is approximately level and must, of course, be brought to gage and cross-leveled. It is also necessary to brace it against the ribs upon either side, so as to prevent the machine from pushing it over while cutting. The work is continuously advanced by laying the short pieces of rail above mentioned, but whenever a sufficient distance has been gained, these short pieces are lifted and a full length of rail laid. At the present time, the miners at Clear Creek are laying their own track. This work requires about one hour per cut, or per day.

When the top cutters were first introduced into these mines much difficulty was experienced for the places tended to lose height. An exhaustive inquiry into the cause and possible remedy for this condition was made, as it was understood that this was a common fault with machines of this kind and a detriment to their continued operation. As little assistance could be obtained from outside sources, the entire problem had to be solved locally.

It became evident from the outset that the roof would consist of a series of offsets and angle cuts, the front end of each cut being higher than the rear end. The

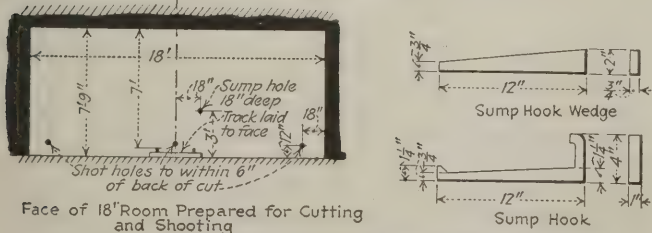


Fig. 3—Room-Drilling and Sump-Hook Details

Three shot holes which lack 6 in. of being as deep as the top cut and one sump hole usually about 18 in. deep are all the holes it is necessary to drill in the room face.

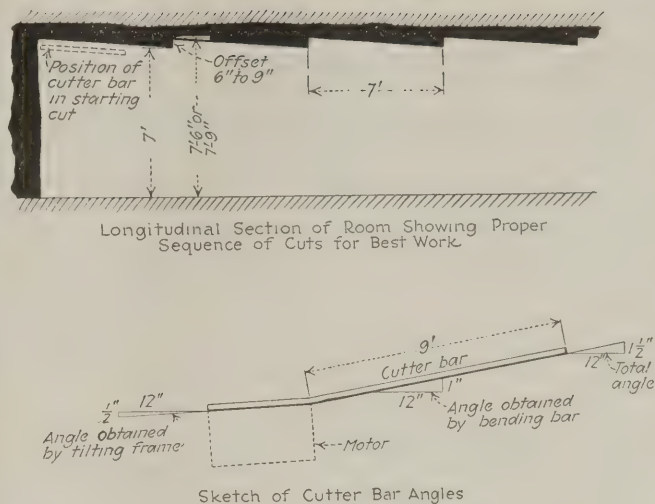


Fig. 4—Angle and Cut Made by Cutter Bar

Although the bar was tilted upward at an angle equal to $\frac{1}{2}$ in. per foot, this was not enough and it was given a bend of $\frac{1}{2}$ in. per foot. This gives the bar a total upward inclination of $1\frac{1}{2}$ in. and to the portion of the bar engaged in cutting a rise of $10\frac{1}{2}$ in.

builders of the machine had provided a slight adjustment on the front trucks by means of which the entire front of the machine could be raised until the nose of the cutter bar was about 6 in. above the horizontal, the bar thus making an angle with the track. It was soon found that this was far too slight an inclination and after much experimenting with methods of blocking up the front end of the machine, it was decided to try bending the cutter bar itself. This was done and it solved the problem completely, the coal now being cut continuously without recourse to brushing, which was a common and troublesome expedient for overcoming lost height before the bar was bent.

In practice, the cutter bars are heated and bent just forward at the clamp that binds them to the motor housing. The extending portion of the bar thus makes an angle with the portion clamped to the frame, this inclination being 1 in. per ft. The free portion of the bar is 9 ft. long, in order to obtain a cut 7 ft. in depth. Through the adjustment on the frame of the machine already mentioned an inclination to the horizontal of $\frac{1}{2}$ in. to the foot can be obtained, so that the total inclination of the bar is $1\frac{1}{2}$ in. per ft. This gives an offset or inclination of $10\frac{1}{2}$ in. in a cut 7 ft. deep. In making the cut, however, the bar almost invariably bears downward at the point, and the usual offset in the roof is from 6 to 9 in.

Fig. 4 shows in detail the roof offsets and angles made, as well as the alterations in the cutter bar found necessary to bring the machine to its highest efficiency. No difficulty has been encountered in making the chain follow the slight vertical bend in the cutter bar. Everything considered, therefore, the problem of losing height has been satisfactorily solved.

The cutter bars on these machines are built in a somewhat peculiar manner. A heavy T-rail is planed down to the width of the chain and hard steel guides riveted to it. Some trouble has been experienced from the breaking of these rails. It has been found feasible, however, to torch-weld the broken rail so that the expense is not as great as in the past. For the three machines employed at these mines, two spare cutter bars are kept ready in case of a breakdown of this character, or in case a bar is bent down to such an extent as would cause a probable loss of height. These

bars are bent to the proper angle before being sent into the mine. Two men can change one in about two hours.

The crew necessary to operate one of these machines consists of two men; an operator who controls all machine movements and a helper who handles the sump rope, brake, cable and makes himself generally useful. At these mines the men work on a tonnage basis, the rate being 10.3c. and the division of proceeds being 55 per cent to the runner and 45 per cent to the helper. As many as fifteen to sixteen places may be cut per shift if little traveling is involved and no operating trouble arises. From nine to eleven places, however, ordinarily are cut in one shift.

The average of power consumption is 43 hp. for a 6 ft. 9 in. cut with sharp bits. Readings for individual cuts have run as low as 35 hp. and as high as 48 hp. Power consumption should not vary appreciably from mine to mine.

Two men can change a set of bits in 15 min. The bits used at Clear Creek are of ordinary carbon steel tempered in black oil. Seldom will a set of bits (64 in number on the present machine) cut more than two places, and one place to a set is more common. It thus may be seen that the time consumed in changing bits approximates that employed in actually cutting the coal.

The possibility of using alloyed and self-hardening steel bits is deserving of study, as the wastes existing at present are obvious to anyone. The fact that the most glaring inefficiencies are covered by the contract wage does not decrease their seriousness. In fact the most grievous inefficiencies and the most costly ones encountered in present-day coal mining are found in contract work and are not the result of official organization or of day labor. One of the coal industry's most pressing problems is to correct these evils and to obtain cheaper coal as its portion of the benefits arising from their correction.

As has been mentioned, the saving in timber is an appreciable item in favor of top-cutting machines. In coal 7 to 8 ft. high with only a fairly good roof, such as that at Clear Creek, this saving is appreciable. It can only be estimated, of course, but it is believed that the original cost of the machine is saved every three years in timber alone, without any consideration being given to the labor required in setting it. The system of timbering employed in a top-cut room is shown in

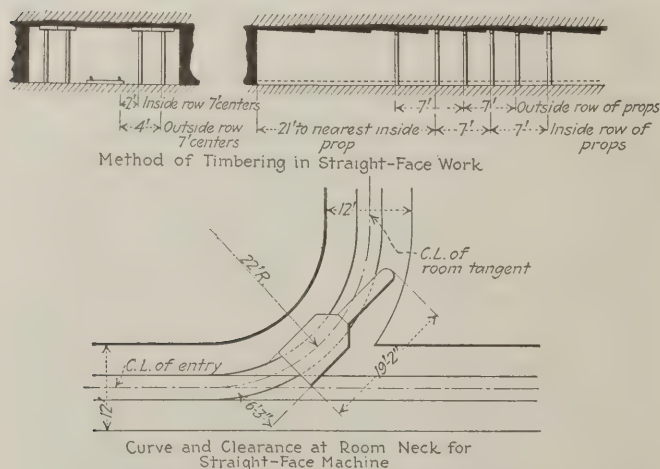


Fig. 5—Clearances and Method of Timbering

The machine being long, it is necessary to give the room mouth an easy curvature, the rail being laid on a 22-ft. radius. As the machine must cut with a sweep, the nearest inside prop must be 21 ft. from the face.



Fig. 6—What a Straight-Face Machine Cut Looks Like When Shot

From this picture the large percentage of lump attained by the use of the overcutter may be readily imagined from the size of the pieces shown in the illustration. Of course such pieces as these must be broken down with a pick before they can be loaded.

Fig. 5. Only props are used and many of these are ultimately recovered.

Even a small layer of top coal constitutes an effective bridge between the ribs of the place. This largely prevents the ribs from scaling and keeps the pillars in good shape while they are being drawn. Obviously when top coal is thin, none of it is recovered, but the increased recovery from the pillars usually far more than counterbalances this loss. Pillars in top-cutting mines always are drawn with less loss of coal and less expenditure for timbers than in those where shortwall machines are being used. In some measures this is because where top cutters are used the roof is not affected by shooting. It largely results also from the leaving of a coal bridge between the ribs.

The maintenance of top-cutting machines is relatively costly. The average cost at Clear Creek during the past three years has been 9.1c. per ton, exclusive of bits, which cost 1.8c. for replacement and for the labor of sharpening. Oil and grease cost 0.22c. per ton.

Top cutters present also certain advantages in pillar drawing where the end-cutting system is in use. The track can be laid close to the face, the clearance essential for the shortwall machine being unnecessary. The first row of timbers can be set close to the track. The roof break can thus be maintained closer to the face and greater safety and efficiency in operation secured. This method is being tried at Clear Creek, but it is as yet too early to publish details of actual operation.

The future of the top cutter is by no means certain. The introduction of loading machines will change cutting practice greatly. Under present circumstances, and probably in most machine mining, the top cutter should be preferred wherever physical conditions favor its use. For slabbing longwall faces in high coal and in end-cutting pillars this machine has certain advantages. But the perfection of loading machines and the consequent demand for large tonnage per place will probably lead to the development of super-cutters of the shortwall type. It seems possible to assume that cuts up to a depth of 12 ft. can be successfully made and shot, cuts 9 ft. deep having been repeatedly made and brought down without difficulty. That such long cutter bars, however, will be practical on top-cutting machines is open to doubt and beyond question the entire future of cutting is inseparably bound up with the future of machine loading.

Anti-Friction Bearings Lower Transportation Costs from Face to Railroad Car

Need Only One-Fourth as Many Applications of Lubricant as Plain Bearings and Have Nearly Twice as Long a Life—Lubrication Cost Reduced by Two-Thirds—Save Power and Equipment

BY FRANK H. KNEELAND
Associate Editor, *Coal Age*
New York City

WHEN the cave man, attempting to move a load greater than he could lift, became weary of dragging it over the ground and tried the expedient of placing lengths of logs transversely under it and thus rolling it along, he learned an important lesson, namely, that the co-efficient of rolling friction is not nearly as great as that of sliding friction. Of course the primitive individual making this discovery did not realize what he had discovered. Of coefficients of all kinds he knew nothing and probably cared less. What interested him and what he remembered and taught his progeny was that any weight can be moved with far less effort when placed on rollers than when dragged over the ground.

Down through the ages this discovery of the cave man has been utilized. For permanent work, that is, for installation upon vehicles, a wheel turning on an axle fastened to the body of the device to be moved soon took the place of the crude roller. This combined both rolling and sliding friction—rolling on the ground and sliding on the axle. As, however, the area of sliding friction was small and susceptible to lubrication, the shortcomings of rubbing friction were largely overcome. Even the ponderous creaking ox cart still used largely in tropical America and elsewhere is a vast improvement over the drag or stoneboat.

BICYCLE DEVELOPS ANTI-FRICTION BEARING

Unquestionably the wheel, whether turning upon or fastened to an axle, which itself turns in a bearing, has been responsible for much of the progress man has made thus far on the road of civilization. It has remained for comparatively recent times, however, to perfect a device whereby the sliding friction of the wheel upon the axle-tree, or of the axle within its bearing or journal, is replaced with rolling friction. Here rollers or balls are inserted between the inner surface of the moving wheel hub and the stationary axle, or between the revolving shaft and its stationary bearing. This arrangement entirely obviates sliding friction, and journals that accomplish this result regardless of their size, kind or type are known and designated under the general name of anti-friction bearings.

Generally speaking, anti-friction bearings are of two types, namely, roller and ball bearings. Both have been used extensively in industrial work and have become familiar to everyone, particularly since the invention of the bicycle and the later development of the automobile. In recent years these bearings have been applied freely in mine transportation. As the roller was probably known and used in industry long before the ball, the bearings employing this element will be considered first.

Because of its shape a right cylinder will roll without slippage only in a direction at right angles to its axis.

Any end movement of the roller is resisted by sliding friction, but its side movement is resisted only by rolling friction.

In its simplest form a roller bearing consists, as in prehistoric times, of a roller, the surface over which it operates and the body resting upon it. In this case the supporting surface, if straight, forms a raceway of infinite radius, whereas the weight carried, provided it be a beam or other object presenting a plane surface, corresponds to the shaft of a modern bearing, also having an infinite radius.

Industrially the roller bearing of the simplest type is composed of a raceway within a wheel if the shaft is stationary, or within a pillow block or bearing if the shaft revolves, together with a sufficient number of rollers to prevent contact between shaft and bearing or between shaft and wheel as the case may be. The harder and smoother all of these parts are made the less will be the resistance offered to rotation.

No matter how carefully and accurately the various parts making up such a bearing as has just been described may be machined, hardened and ground, dirt must be excluded and the rollers held in their proper positions if maximum efficiency is to be attained. Without these provisions such a bearing is difficult to handle, the rollers have a marked tendency to slip out of place and must be put in position one at a time. Furthermore, being put into place individually with nothing to hold them apart they grind against each other, this action being aggravated by any slight differences in diameter which rollers, be they ground ever so carefully, are nevertheless certain to possess.

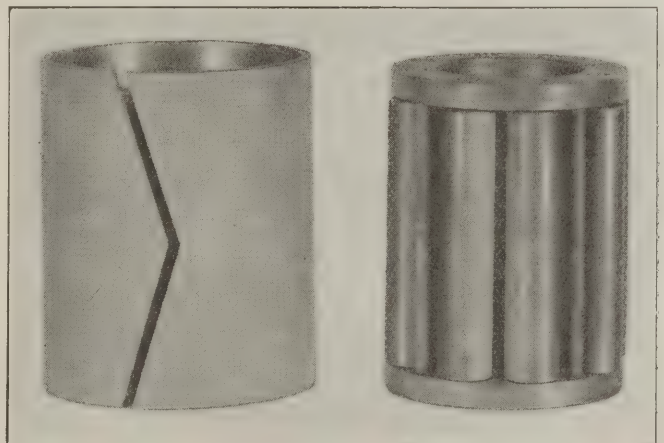


Fig 1—Cage with Rollers and Race

Solid rollers ground to size are provided with a gudgeon on either end. These gudgeons fit loosely into holes in the end rings which are held apart by four spacers or spacing rods. The race is a strap of steel bent to proper diameter, hardened and ground inside. The V-shaped joint makes the operation of the rollers easy and smooth.

As is well known, dirt in any bearing rapidly destroys it. This is particularly true of those anti-friction types where efficiency depends largely upon nicety of adjustment. Thus in the type of bearing just described dirt entering the raceway from the end or elsewhere, impedes the free rotation of the rollers, and finding its way between these members and either the shaft or raceway, is crushed or ground between these parts just as ore or shale is ground in a Chilean mill. In time such particles uniting with the oil used for journal lubrication forms an abrasive mud, which, accumulating as time goes on, gradually fills the entire space between the rollers.

On the other hand, if the particles of foreign matter entering a bearing of this kind are sufficiently hard to resist crushing, they become embedded in the steel of the bearing and then not only destroy the smooth surface of the parts but exert an abrasive action exactly analogous to that of a diamond truer on an emery wheel. Although this action is possibly slight for each individual particle, its effect on the aggregate wear and resistance is important.

As a rule the actions spoken of above, abrasion and gumming, take place simultaneously. Sometimes the gumming action becomes so pronounced and the bearings become so "stogged" or clogged with mud that the rollers cease to revolve. When such bearings have operated for a comparatively short time measurements of the rollers as well as of the shafts will show noticeable wear. In extreme instances each roller will become so worn that its cross-section almost resembles a crescent.

FUNCTION WELL ONLY WHEN DIRT IS EXCLUDED

Rollers or balls that do not roll are worse than useless, as they defeat the very object they are designed to accomplish. Consequently, dirt and all other matter except lubricant must be excluded from all anti-friction bearings if they are to function correctly and retain their efficiency for any length of time. Dirt is excluded usually by a felt washer. That this means is effective is evidenced by its almost universal use in the anti-friction bearings of automobiles and other road vehicles which always are subjected to the worst kind of fine abrasive dust.

In order to obtain the best results from a roller bearing, the rollers should be spaced equally around the shaft. This is accomplished by means of a cage. This

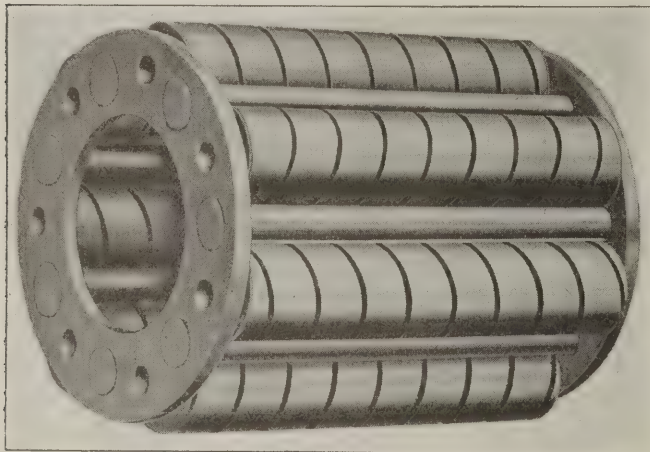


Fig. 2—Another Well-Known Type of Roller Bearing

Here the rollers are wound from high-grade alloy steel. This construction gives greater flexibility and assures larger grease-carrying capacity than is obtained with solid rollers. Winding them alternately right- and left-hand assures proper distribution of lubricant and uniform wear.

inclosure may vary greatly in its details of construction, but all varieties nevertheless follow the same general plan. The one shown in the accompanying illustration, Fig. 1, consists of two end pieces with suitable spacing rods extending between them. The end plates are rings with the internal diameter somewhat greater than the diameter of the shaft, their radial width being less than the diameter of the rollers. The spacers or standards are passed through holes drilled through the end plates and their ends are riveted down flush. The rollers, which are hardened and ground, are provided with projections, or gudgeons, on each end. These fit loosely into holes in the end pieces. The cage thus built up holds the rollers together as a unit, yet leaves them free to roll between the shaft and raceway.

RACEWAY GIVES EFFICIENT BEARING TO ROLLERS

In order to assure an efficient bearing for the rollers, the raceway, also shown in the illustration, is provided. This consists of a strap, or plate of steel, the ends of which are male and female V-shapes. This is bent to a circular form after which it is hardened and ground. As will be observed in the illustration the edges of the V's stand apart when the raceway is removed from the bearing. Before it can be slipped into place this opening must be sprung together. The V-shape of the opening avoids all possibility of distinct shock as the rollers cross it. A raceway of this kind assures a smooth, even surface upon which the rollers may operate, and may be renewed with ease if necessary.

In some instances the rollers are made hollow and a spacer is passed through each. This, however, does not in any way alter the basic principle of the bearing. Another type of roller bearing widely adopted in industrial work uses rollers each of which is a helix wound from a rectangular steel rod. Alternate rollers are wound right and left hand so that there is no possibility that they will wear either the raceway or shaft unevenly.

Several advantages are claimed for this type of bearing. In the first place, the rollers, although hardened and ground, are somewhat flexible. As a result, instead of obtaining line contact between roller and raceway or between roller and shaft, which is alone possible theoretically, surface contact, or what might be termed strip contact, is actually obtained. The flexibility of the rollers also permits them to accommodate themselves to any slight inequalities of either shaft or race.

MAY TAKE END AS WELL AS RADIAL STRESSES

More lubricant can be packed into a bearing of this kind than into one containing solid rollers, and the helical roller carries and distributes this lubricant efficiently throughout all parts of the bearing. Furthermore, this bearing, it is claimed, can absorb more dirt than a solid-roller bearing of the same size and still function satisfactorily. Of course, every precaution is taken to keep foreign material out of anti-friction bearings but the undesired sometimes happens, and dirt and dust find their way into a journal box no matter how thoroughly it may be protected.

All the bearings thus far described are intended to receive radial stresses only; any end thrust that may develop must be absorbed by some other part than the bearing itself. A type of roller bearing intended to take both radial pressure and end thrust is shown in Fig. 3.

In this bearing the rollers or the active portions thereof are not right cylinders but the frustums of cones. These rotate between male and female cone

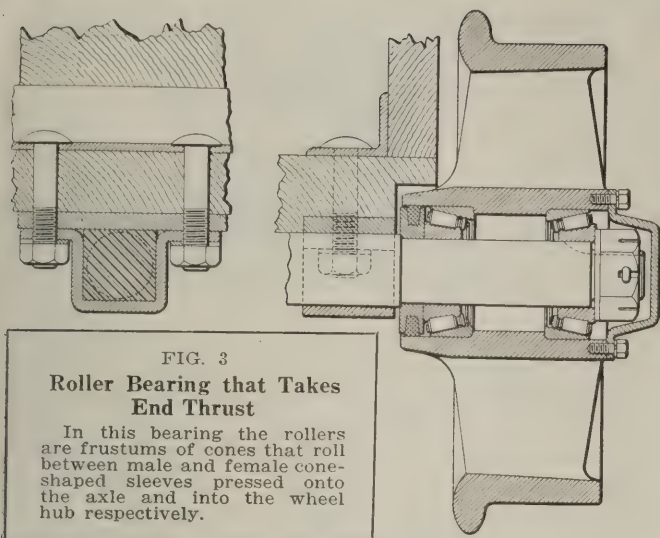


FIG. 3

Roller Bearing that Takes End Thrust

In this bearing the rollers are frustums of cones that roll between male and female cone-shaped sleeves pressed onto the axle and into the wheel hub respectively.

raceways or sleeves pressed upon the shaft and into the wheel hub respectively. It will be apparent at once that any end thrust exerted upon the flange of a mine-car wheel will be transmitted to the axle not through the end of the hub or the wheel cap but through the roller bearing. The axle in the illustration to which reference has been made, except where it passes through the wheel, may be square and bolted securely to the car body. The wheel thus will be free to revolve without end play and without touching anything except the rollers and the dirt-excluding felt washer. Wear to which all bearings are subject may be taken up from time to time as it develops.

So much for the roller bearing. Though the ball bearing possesses certain obvious advantages, it as a rule has been considered too expensive for installation on mine cars. It has, however, found a fairly extensive use on mining locomotives. Here it is employed mainly on the armature shaft although to a lesser extent upon driver journals.

In the ball bearing, hardened steel balls ground to an accurate spherical shape roll between inner and outer races that are likewise hardened, ground and highly polished. Theoretically a ball has only point contact with its race. As, however, this latter member is grooved to a radius only slightly greater than the radius of the ball and as both ball and race are, within limits, thoroughly elastic, small surface contact is secured. Deformation of the ball under normal load should be such as never to exceed or even approach the elastic limit of the hardened steel. The result is that if foreign matter, except lubricant, is excluded from such a bearing, it will operate almost indefinitely without appreciable deterioration.

This latter consideration, namely, absence of wear, renders these bearings particularly applicable to the armature shafts of locomotives where they preserve indefinitely the small interval between the rotor and the pole pieces of the field. Appreciable wear on armature bearings is liable to let the armature down where the action of the field magnets or poles is unequal. Eventually such wear will permit the armature to rub on the poles and thus be quickly ruined.

The ball bearing probably reduces the friction of rotation to a greater degree than does any other type of journal intended to carry heavy loads.

The resistance that it offers to rotation is only a fraction of that offered by the ordinary bronze or babbitt-lined bearing.

Anti-friction bearings can eliminate only those power losses that are caused by friction. Thus, suppose that the resistance to the movement of a car or trip provided with plain bearings and moving over a level track is 30 lb. per ton of car or trip weight, and if mounted on anti-friction bearings, this resistance is reduced, say, to 15 lb. per ton. A locomotive of given weight therefore when moving over a level track would be capable of hauling twice as big a load mounted on anti-friction bearings as it would when mounted on plain bearings.

GRADES MAKE A DIFFERENCE IN POWER SAVED

On grades, however, conditions are somewhat different. Suppose that two trips of equal weight, let us say 100 tons, one provided with plain and the other with roller bearings are to be hauled up a 2-per cent gradient. The drawbar pull in pounds necessary with the plain bearings will be $(100 \times 30) + (100 \times 2,000 \times 0.02) = 3,000 + 4,000 = 7,000$ lb. In the case of the trip mounted on anti-friction bearings the necessary drawbar pull under the assumed conditions will be: $(100 \times 15) + (100 \times 2,000 \times 0.02) = 1,500 + 4,000 = 5,500$ lb.

Thus, on a level track the saving in power amounts to $\frac{1}{2}$, whereas in the second case assumed it amounts only to $\frac{3}{4}$. However, in any case the saving in drawbar pull is equal to the difference in frictional resistance of the two types of bearings under load on level track. Under conditions as above assumed this is 1,500 lb. In most mines such a saving is certainly worthy of consideration.

Several advantages other than decreased friction inhere to the anti-friction bearing. A recent investigation into the use of this type of bearing as applied to mine cars only, brought out the following interesting details. Of the 750,000 mine cars employed in American coal mines, 376,500 are fitted with plain bearings whereas the rest or 374,500 are equipped with roller bearings. The average lubrication interval or time between lubrications with plain bearings is 24 days, whereas with roller bearings it is 101 days. The average life of a plain bearing is 3.9 years and that of a roller bearing is 6.1 years. The average annual cost of lubricating a car (four wheels) with plain bearings is \$4.70 whereas with roller bearings this is reduced to \$1.61. Grease appears to be the lubricant all but universally applied to roller bearings, whereas, in general, oil is used with plain bearings.

ENGLAND INVESTIGATES BALL-BEARING MINE CARS

In the United States ball bearings have been little used on mine cars. Some extensive experiments have been made in England, however, with this type of bearing. In a paper read before the North of England Insti-

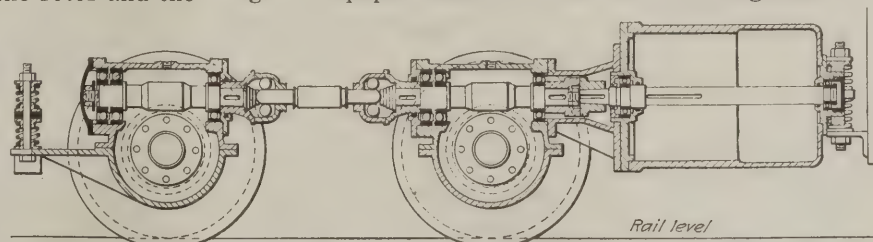


Fig. 4—Ball Bearings Used with Locomotive Drive Shaft

The flexible or segmented drive shaft in this illustration is mounted on ball bearings throughout its entire length. Driver journals may be of either the ball or roller type.

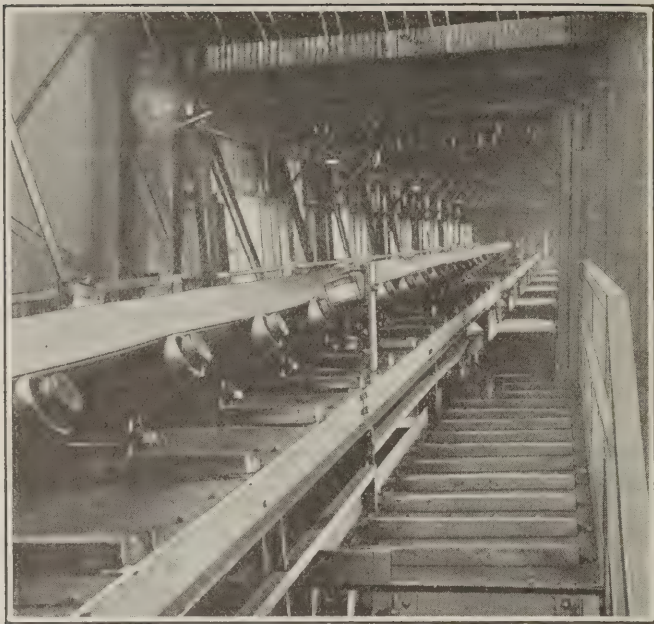


Fig. 5—Conveyor Belt Operating on Roller-Bearing Troughing Idlers

Some power must be expended to trough the belt and elevate the load carried. The useless horsepower or that expended in overcoming idler friction may be materially reduced by the use of anti-friction bearings in the idlers. The power saved by this means is frequently sufficient to pay handsome dividends on the increased investment.

tute of Mining and Mechanical Engineers, Dec. 9, 1922, Appleyard and Macaulay gave an estimate of the savings possible through the substitution of ball-bearing wheels for those fitted with plain bearings. These figures which are given in Table I apply to 2,000 cars with a capacity of about 2½ tons each.

The saving of \$25,077 represents over 28 per cent on a capital expenditure of \$87,480. It should also be noted that the savings of which these authors speak do not consider any economies in power whatever. Concerning this phase of the problem they say:

BEARINGS SAVE 10 PER CENT OF TOTAL CARS

“The saving in power, whether mechanical, animal or human, is so marked, especially at starting, that it can confidently be asserted that it is necessary to use only 90 per cent of the original number of cars to obtain the same service. The extra service that the cars will render is partly attained by the fact that a man can push with ease two ball-bearing cars in places where he can move only one plain-bearing car. This applies also to the haulage performed by ponies. Further, owing to the reduced friction, cars will travel by gravity down inclines where before power had to be used. Thus, with an equal expenditure of power, the number of cars required can be reduced by 10 per cent.”

Again the same authors state that by use of anti-

Table II—Data of Tests of Two Conveyors with and Without Roller Bearings

	Conveyor No. 1	Conveyor No. 2
Belt width.....	48 in.	48 in.
Conveyor length.....	381 ft. 4 in.	404 ft. 5 in.
Conveyor lift.....	108 ft. 1 in.	119 13 ft.
Measured speed, ft. per min.....	483.5	505.6
Measured capacity, tons per hour.....	795.	1,020.52
Horsepower (plain bearings).....	140.8	180.34
Horsepower (roller bearings).....	106.8	148.40
Horsepower (to elevate load).....	86.8	122.80
Frictional hp. (plain bearings).....	54.	57.54
Frictional hp. (roller bearings).....	20.	25.6
Saving through use of roller bearings hp.....	34.	31.94
Per cent saving.....	62.9	55.5

friction bearings on a main-and-tail-rope haulage, a trip of ball-bearing cars, though they weigh 4.75 per cent more than a similar plain-bearing trip, can be moved with 8.63 per cent less power than the trip with plain bearings.

Experiments were also made to ascertain the effort necessarily expended in starting plain- and anti-friction cars of the same weight upon level track and also to determine the pull required to keep such cars in motion. Cars weighing 1,008 lb. and exactly similar, except for the bearings, were used in this test. It was found that it required 12 lb. to start a ball-bearing car, whereas 29 lb. was necessary to start one having plain bearings. Similarly, it took a pull of 6 lb. to keep a ball-bearing car moving at 2 miles per hour over a level track but required 22 lb. to keep a plain-bearing car traveling at the same rate.

SAVE POWER WHEN USED WITH BELT CONVEYORS

In its issue of Feb. 23, 1923, p. 452, the *Colliery Guardian* prints the results of some interesting tests on anti-friction bearings as applied to belt conveyors. The results of these tests are summarized in Table II.

Assuming that power costs 3c. per kilowatt-hour or 2½c. per horsepower-hour and that the conveyor operates 8 hr. per day, 300 days per year, or a total of 2,400 hr. per year, the cost of driving it per horsepower per year will be \$54. A reduction of 34 hp. in the energy needed to drive a conveyor of this kind, such as Table II shows can be accomplished, would mean, assuming an over-all motor efficiency of 75 per cent, a monetary saving of roughly \$2,450 per year.

Other savings also are possible. Thus in a new installation the rating of the driving motor as well as the weight of the belt may be reduced. In an actual instance a 75-hp. motor was installed to drive a conveyor fitted with roller-bearing idlers, whereas a 100-hp. machine would have been necessary with plain-bearing idlers. In another case a 7-ply belt was strong enough with roller-bearing idlers, but a 9-ply belt would have been necessary had plain bearings been used.

The anti-friction bearing has entered the coal industry to stay. When competition is keen advantage must be taken of any device that will lower the cost per ton. Though such bearings will doubtless withstand much abuse and neglect, they were not designed with the idea that they should logically receive such treatment. Adequate care, therefore, in their lubrication and maintenance will be amply repaid.

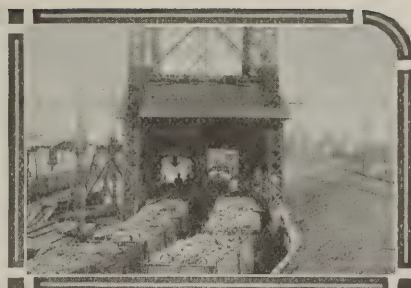
PROF. A. C. ALLEN, head of the department of mining engineering, West Virginia University, Morgantown, W. Va., who came to that institution from the University of Illinois, Urbana, Ill. in 1917, returns to his alma mater to become dean of the school of mines. He will complete the conduct of the regular short course in mining at West Virginia University before leaving.

Table I—Relative Annual Expenditures, Plain and Ball-Bearing Wheels

	Cost per Year
Plain-bearing wheels	
Oil.....	\$4,082
Cost of applying oil.....	3,645
Renewal of bushings.....	29,160
Total expenditure.....	\$36,887
(Cost of changing 2,000 cars from plain to ball bearings, loose-wheel type.....	\$87,480
Ball-bearing wheels	
Interest at 6 per cent.....	\$5,249
Depreciation of bearings.....	4,860
Grease (4 lb. per car per year @ 12.15c. per lb.).....	972
Grease application and bearing inspection.....	729
Total expenditure.....	\$11,810



News Of the Industry



Cincinnati Coal Convention and Machinery Exhibit Plans Taking Shape

Public Meeting to Be Held in Music Hall — Talks Will Be Broadcast by Radio—S. B. Crowell and H. L. Gandy to Make Addresses
—Live Topics for Discussion

Details of the program for the seventh annual meeting of the National Coal Association, which will be held in Cincinnati May 14, 15 and 16, are being perfected rapidly but have not yet been fully completed.

W. E. E. Koepler, chairman of the Committee on Arrangements, has just announced two important events. One is that arrangements are being made for a big public meeting in Music Hall, where the American Mining Congress will present its National Exposition of Mining Machinery and Mine Equipment, which will be addressed by prominent speakers whose talks will be broadcast by radio. The other is that Samuel B. Crowell, of Philadelphia, president of the National Retail Coal Merchants' Association, has accepted an invitation from the National Coal Association to address the convention on the forenoon of May 15.

The program at Music Hall will include among the speakers Harry L. Gandy, executive secretary of the National Coal Association. This meeting, to be held on the evening of May 14, will give time for delegates to visit the exposition of mining machinery and to meet the manufacturers who have displays of equipment there. Mr. Crowell will address the coal operators on "Our Customers," and it is expected that he will dwell upon the importance of a better understanding between all branches of the coal industry and the public. Mr. Crowell is an earnest advocate of the formation of a Coal Institute, regarding which various major groups of the industry have committees now at work.

Seek Lower-Cost Output

The American Mining Congress, through its secretary, J. S. Callbreath, has issued a special invitation to members of the National Coal Association to attend the Exposition of Coal Mining Equipment, which will be staged during the week of the association convention, and to join in the discussions of practical operating problems of the coal industry which will be taken up there. In a letter to Secretary Gandy, Mr. Callbreath expresses the opinion that "the outstanding problem of the coal industry is to obtain lower cost per ton of coal. The continued existence of many coal enterprises is largely

dependent upon the successful solution of this problem."

Mr. Callbreath outlines five important topics which will be discussed in Cincinnati at the National Exposition of Coal Mining Equipment and Machinery. These are:

To Discuss Live Topics

"(1) Problems of Mine Electrical Men.—The discussions of this topic will be under the leadership of Graham Bright, well-known consulting engineer, and will cover all the different phases of the effective uses of electrical power in connection with coal-mining enterprises. The leaders in this discussion are all well-known and representative operating engineers and will take up various phases of the problems of mine electrical equipment.

"(2) No subject is of greater interest to coal-mine operators than the equipment used in the preparation of coal. Colonel Warren R. Roberts, president of Roberts & Schaefer, will act as chairman of this meeting and there will be a general discussion of the new dry cleaning processes and of the various phases of primary and secondary preparation of coal.

"(3) How to increase the percentage of lump coal by better blasting methods is another topic of interest to all coal operating officials. Considerable experimentation has been done in obtaining better blasting methods and there will be an interesting discussion of this problem at Cincinnati.

"(4) An outstanding problem in obtaining greater economies in coal production is the correlation of mechanical loading with haulage and mining problems. Two afternoons of the week, Wednesday, May 14, and Thursday, May 15, will be given up to discussion of this phase of mine operation. There will be an interesting presentation and an analysis of the use of mechanical loaders in coal-mining properties.

"(5) The final discussions of Friday afternoon, May 16, will be devoted to the topic 'Necessity for Rock Dusting.' The chairman of this meeting will be John E. Jones, safety engineer of the Old Ben Coal Corporation, Chicago, a company which has been a pioneer in the installation of rock dusting as a means of eliminating dangerous explosive conditions in coal mines."

C. & O. New Equipment To Cost \$28,000,000

The Chesapeake & Ohio R.R. has placed contracts for \$28,000,000 worth of new equipment, according to an announcement by W. J. Harahan, president of the company. The orders placed include 5,500 hopper cars, 2,000 automobile cars, 600 ballast cars, 120 cabooses, 15 express cars and 100 locomotives. More than 100,000 tons of steel will be required to construct the equipment, it is said.

This will add more than 13 per cent to the coal-carrying facilities of the road, as it now has 41,820 coal cars. The Hocking Valley R.R., a subsidiary of the C. & O., owns about 12,000 coal cars.

Indiana Companies Join Merger Movement

Announcement has been made that negotiations for the consolidation of the Knox Coal Mining Co., the Howe-Coulter Coal Co. and the Panhandle Coal Co., owners of four mines in the Bicknell (Ind.) district, having a total production capacity of 1,000,000 tons annually, will be completed in a few days. The new organization, a name for which has not yet been chosen, will be capitalized for \$1,500,000. H. A. Husky, of Chicago, president of the Knox company, will head the new organization.

William Schrolucke, of Indianapolis, president of the Panhandle company, will be the vice-president and chairman of the board of directors; William H. Abraham, secretary-treasurer of the Panhandle company, probably will be secretary; W. P. Worth, treasurer of the Knox company, probably will be treasurer. Carl J. Fletcher, secretary of the Knox company, will be the general manager of the new company, and Wesley Harris will be in charge of the mine operations.

These men and another to be chosen, will form the directorate. The Howe company will not be represented on the list of officers. Mr. Fletcher said the consolidation will bring about cheaper production, the new company being able to operate part of its mines full time instead of having all four mines operate part time. Cheaper production is necessary to meet competition from non-union fields, Mr. Fletcher said. One of the mines now is being operated full time, and it is expected that another will be working at capacity in a few weeks.



Leon Besson

On April 1, Leon Besson became chief mine inspector for Kansas, succeeding James Sherwood, who returns to the service of the Associated Companies, handling mine liability insurance. The appointment of Besson by Governor Jonathan Davis has caused some political disturbance in the state because Besson is a socialist and was opposed by some good Democrats of the Governor's party. His choices of assistants are expected to cause some more disturbance.

Railways May Get Fuel Research Bureau

There has been so much confusion for years in the minds of railway fuel engineers as to the actual fuel value ratio between coals and oils that a bureau of research may be set up to make exhaustive studies of that and other fuel problems. The plan was approved a week ago at a Chicago meeting of the joint fuel conservation committee of the American Railway Association and the International Railway Fuel Association. The plan goes now to the American Railway Association's directorate for approval.

Other problems to be submitted to the research director for solution relate to the utilization of lignite coal, results obtained from relative grades of coal in relation to the cost involved, spark losses, the effect of electrification on fuel consumption per ton-mile and per passenger car-mile, the economic aspects of coal storage, influence of locomotive design on fuel economy, introduction of turbine-driven and Diesel motor type locomotives, etc.

At the meeting in Chicago the committees decided upon the text of a questionnaire to be submitted to all the railroads for the purpose of determining actual progress toward fuel conservation and what fuel-economy practices have been generally adopted. The first three booklets of the American Railway Association's manual on fuel and related economies as compiled by the International Railway Fuel Association also were approved at this meeting and will soon be available for distribution to the railways.

Mine Inspectors Prepare For Big Meeting

Safety in coal mines, viewed from many slants will be much at the fore in Cincinnati the week of May 12 not only because the American Mining Congress will pay attention to it but also because the Mine Inspectors' Institute of America will be in annual session there from the 14th to the 16th with a program that will be devoted 100 per cent to safety. Men from many states whose daily work is to make mines safe will assemble in the Sinton Hotel.

An official announcement by James Sherwood, president, of Pittsburg, Kan., says that all members of the Institute and all state or provincial mine inspectors in America are invited to study the program and either be present prepared to talk on one or more of the subjects or mail Mr. Sherwood papers they may write. The Institute is going to devote a good deal of time to the question of standardizing the safety laws of the country. So a committee composed of Dr. J. J. Rutledge, chief mine engineer for the Maryland Bureau of Mines; James Dalrymple, chief mine inspector for Colorado, and R. M. Lambie, chief inspector for West Virginia, will meet in Cincinnati two days in advance and prepare an outline for a standardization discussion at the forthcoming convention.

The outline of other subjects to be discussed follows:

(1) Qualifications of coal-mine inspectors, both as to practical experience and technical knowledge. James Dalrymple, chief, Colorado.

(2) Closed lights in all coal mines. Dr. J. J. Rutledge, chief, Bureau of Mines, Maryland.

(3) Systematic timbering. R. M. Lambie, chief, West Virginia.

(4) How lives and property may be best protected by inspection. V. E. Sullivan, inspector, West Virginia.

(5) Guarding and protecting of electrical wiring and equipment in coal mines. Jerome Watson, chief, Division of Mines, Ohio.

(6) Precautions and suitable pillars between working mines and abandoned mines filled with water. J. E. Holland, chief, Iowa.

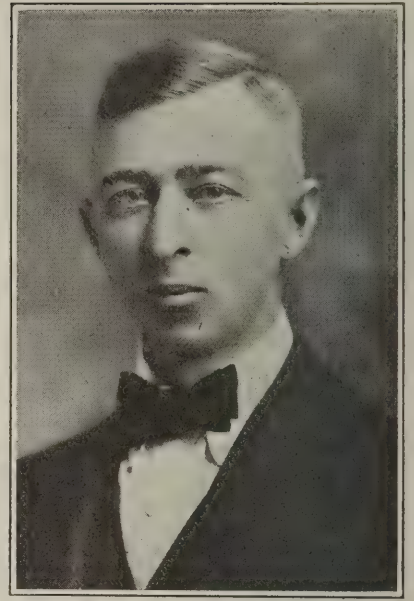
(7) Should coal be shot from the solid under any conditions in any state? And why? G. B. Butterfield, general manager, Associated Companies, Connecticut.

(8) First-aid and safety organiza-

Walsh Favors Rock

Dusting

Joseph J. Walsh, State Secretary of Mines, of Pennsylvania, has called a meeting of all the inspectors in the Pittsburgh district, to be held late this month, to urge the adoption of rock dusting to prevent coal-dust explosions in bituminous mines. In the past explosions of air heavily laden with coal dust has been responsible, says a department statement, for some of the most disastrous explosions in the soft-coal mines.



F. G. Wilcox

Appointed a director, president and general manager of the Price-Pancoast Coal Co., the West End Coal Co. and the Melville Coal Co. in succession to the late William L. Allen. Mr. Wilcox has had 20 years' experience in the coal industry, having joined the Hillside Coal & Iron Co., in 1904, when he was graduated from Lafayette College. He became associated with the Price-Pancoast Coal Co. in 1918.

tion. H. H. Warner, senior inspector, Associated Companies, Colorado.

(9) The necessity of getting the proceedings of the annual report of the meeting of the Mine Inspectors' Institute of America into the hands of the mine workers and mine managers. J. E. Roberts, chief, Missouri.

(10) The relation of accidents to lack of discipline and enforcement of safety rules. Prof. G. E. Abernathy, State Mining College, Pittsburg, Kan.

Low Bids for Navy Coal

Bids opened by the U. S. Shipping Board at New York on April 18 for furnishing and delivering alongside vessels in that harbor 1,065 gross tons of bituminous coal equal to either Pool 71 or 9 brought tenders from seven coal firms with prices ranging from \$4.23 per gross ton to \$4.97, or on a basis of \$1.03 to \$1.70 per net ton f.o.b. mine. The bidders and prices submitted were: Whitney & Kemmerer, \$4.85 per gross ton, f.a.s.; H. B. W. Haff, \$4.75; B. J. Lynch, \$4.97; W. A. Marshall & Co., \$4.62; Rhodes Fuel Corporation, \$4.54; Flack & Son, \$4.44, and Seiler Coal Co., \$4.23.

Brazil Block Operators to Sign Union Contract

The scale committee of the United Mine Workers of District No. 8, with headquarters at Brazil, Ind., and the Brazil Block Coal Producers' Association are holding a joint meeting to sign up a new mining contract. It is understood the contract is agreeable to all parties, but the delay in signing has been caused by failure of the wagon-mine owners to get together and complete the organization of their association.

Growth of West Virginia Coal Fields Laid to Freedom from Union Domination

B. M. Clark, president of the Association of Bituminous Coal Operators of Central Pennsylvania, takes issue sharply with some of the statements of John Brophy, president of District No. 2, United Mine Workers, made in reply to comment by Mr. Clark on the recent wage agreement. Mr. Clark says:

"The assertion made by the United Mine Workers that 'for a remedy they [the operators] suggest the same old panacea they have been offering for the past thirty years—lower wages' is not in accord with the facts. During the past thirty years and since I have been president of the operators' association, wages in the union mines have increased over 240 per cent. This speaks for itself.

"The present wage agreement, signed for a period of three years, will be carried out as faithfully by the operators (unless the United Mine Workers revise it) as all preceding agreements we have signed with them have been carried out during the past twenty-five years. The matter of changes in the contract rests entirely with the union.

"It is my opinion, however, that economic forces operating today will exercise a compelling influence upon the judgment of the United Mine Workers just as these forces will influence the judgment of the rest of us during the next three years. The law of supply and demand operates in the coal industry. People will buy coal or any other commodity at the lowest price obtainable. That section of the coal industry or any other industry that cannot produce at a cost below the market price will go out of business. Central Pennsylvania cannot produce coal at the selling prices in the market today. The effect of the law of supply and demand is as inevitable as time.

Says Overdevelopment Is Serious

"Overdevelopment of the bituminous-coal mining industry is not questioned. The extent of that overdevelopment, however, is a question upon which experts disagree. I am not sure that we can produce twice as much coal as we need. The overdevelopment, however, is sufficient to be serious for those who have their money invested in coal mining.

"Overdevelopment will continue to increase in the non-union sections of the country as long as the union is able to maintain such a high wage schedule in the union fields as to permit the non-union operators to make profits on selling prices that are below the cost of production in the union fields. That is the condition now. The policy of the United Mine Workers accounts in part for the overdevelopment of the industry. The development of the non-union coal fields of West Virginia is one of the industrial marvels of the past twenty years. This development has taken place during the period of growth and increase of power of the United Mine Workers in the older fields. It cannot be seriously questioned that the great mining development of West Virginia

is due to its policy of employing non-union labor.

"The real facts as to actual cars of coal loaded in the central Pennsylvania district as compared with the Pocahontas and New River districts of West Virginia are as follows: In January, 1923, Pocahontas loaded 80,725 cars; in January, 1924, 106,403, or an increase of 25,678 cars. In January, 1923, central Pennsylvania loaded 72,570 cars; in January, 1924, 59,402, or a decrease of 13,168 cars. In February, 1923, Pocahontas loaded 82,484 cars; in February, 1924, 117,769, or an increase of 35,285 cars. In February, 1923, central Pennsylvania loaded 70,006 cars; in February, 1924, 62,757, or a decrease of 7,249 cars. From March 1 to 15, 1923, Pocahontas loaded 68,785 cars; the same period, 1924, 87,970, or an increase of 19,185 cars. From March 1 to 15, 1923, central Pennsylvania loaded 54,768 cars; in the same period, 1924, 46,011, or a decrease of 8,767 cars.

Pocahontas Forges Ahead

"During these months in 1923 business was good in the coal industry and everybody had orders. The results for that period show the relation between these fields when competitive conditions are equal. The increase in car loadings in the Pocahontas district and the decrease in the central Pennsylvania district show accurately the results of the present competitive situation. In a falling or depressed market up to March 15, this year, the Pocahontas district has increased its loadings approximately 35 per cent over its loadings during a period of good demand for coal, whereas the central Pennsylvania district shows a decrease in its loadings in 1924 as compared with 1923 of 15 per cent. The weekly car loadings in central Pennsylvania have often exceeded 24,000. For the week ending April 5 the total loadings in the central Pennsylvania district were but 8,975, the lowest output on record during a period of no strike. The business is going to the non-union fields of West Virginia."

Miners Boom Pinchot for Presidential Delegate

Governor Pinchot has made public a telegram received from the miners in District No. 2, United Mine Workers, endorsing his candidacy for delegate at large to the Republican National Convention. Resolutions passed by the miners' executive board lauded the Governor for his "fairness to labor" and urged every mine worker to record his approval of the Governor's labor policy by voting for Mr. Pinchot.

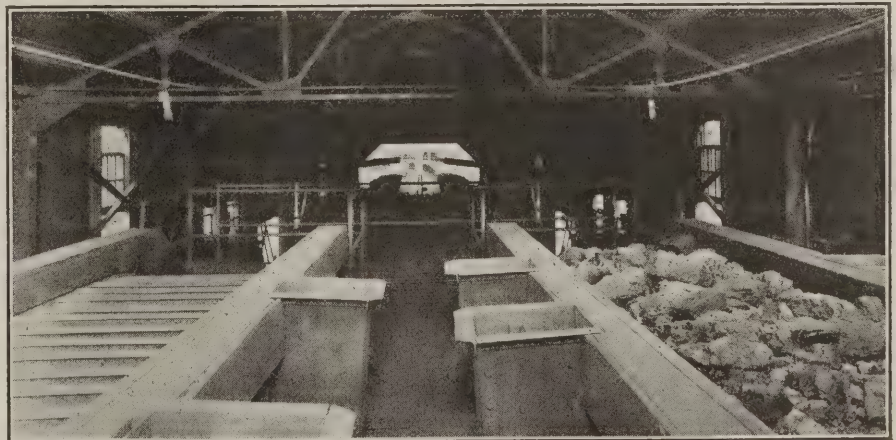
The telegram, sent from Clearfield, Pa., reads: "District No. 2 executive board passed following resolution today: 'In view of Governor Gifford Pinchot's fairness to labor, the executive board of District No. 2, United Mine Workers of America, ask mine workers and their friends who are Republicans to vote for him in the primary election, April 22, for delegate at large to the Republican National Convention.'"

All Quiet on Straight Creek

Things have been so quiet at Pineville and at the Liberty Coal & Coke Co. plant at Straight Creek, Ky., that the military protection has been reduced to about two companies, there having been no shooting or other disturbances for a week. Two companies have been withdrawn.

After failure to accomplish anything in a conference April 12 with union leaders and company officials regarding arbitration Governor Fields arranged to go to Straight Creek for further conferences, to include the company's own workers, but he has postponed his trip from day to day.

Federal Judge A. M. J. Cochran has granted a preliminary injunction enjoining the International union and its officers, the district union and its officers and the local union and its officers from interfering with officers, agents or employees of the company in the performance of their duties.



Picking Tables of Clearfield Bituminous Corporation, Rossiter, Pa.

Large pockets are provided for the removal of the refuse contained in the coal.

Coal Bids for Schools of New York Opened

Bids opened by the Board of Education of New York City on April 14 for furnishing, delivering, storing and trimming about 160,000 net tons of hard and soft coal to the school houses and offices of that body for the period ending April 30, 1925, showed a variety of prices ranging from \$10.61 for broken coal in the Borough of Manhattan to \$13.75 for chestnut in Richmond Borough. The amounts required are 40,900 tons of broken; 99,050 tons No. 1 buckwheat; 7,440 tons bituminous mine-run; 6,880 tons pea coal; 1,900 tons egg; 2,440 tons stove coal and 140 tons chestnut size. There were 17 bidders, some of whom bid only on individual lots in some of the boroughs.

In Manhattan the tenders on broken and egg coals ranged from \$10.61 to \$12.83 per ton; stove and chestnut, \$10.68 to \$12.83; pea coal, \$7.36 to \$9.12; No. 1 buckwheat, \$5.22 to \$6.53; soft coal, \$5.24 to \$6.46.

Bronx—Broken coal, \$10.66 to \$12.48; egg, stove and chestnut \$10.72 to \$13.48; pea coal, \$7.30 to \$9.12; No. 1 buckwheat, \$5.26 to \$6.53; soft coal, \$5.14 to \$6.46.

Brooklyn—Broken, \$11.23 to \$12.42; egg, stove and chestnut, \$11.37 to \$12.42; pea coal, \$6.98 to \$9.35; No. 1 buckwheat, \$4.98 to \$6.36 and soft coal, \$5.14 to \$6.49.

How New Immigration Law Affects Old Quotas

Washington, D. C., April 19.—The Senate passed the immigration bill tonight by a vote of 62 to 6 after discussion lasting about seven hours. The bill restricts immigration to 2 per cent on the basis of the 1890 census, which cuts the total quota from 357,801 to 161,990. The Senate adopted an amendment giving preference in admissions to persons skilled in agriculture, but in other salient features the Senate bill is in substantial accord with the Johnson bill as passed by the House. The measure will now go to conference and early agreement is expected. Predictions among Senators were that the President would not veto it. The annual quotas from principal countries under the old law as compared with those permitted under the new are as follows:

Country	Present Law	New Bill
Great Britain and Ireland	77,342	62,558
Germany	67,607	50,229
Italy	42,057	3,989
Poland	30,979	8,972
Russia	24,405	1,892
Sweden	20,042	9,661
Czechoslovakia	14,357	1,973
Norway	12,205	6,553
Rumania	7,419	731
Austria	7,342	1,090
Jugoslavia	6,426	835
Hungary	5,747	588
France	5,729	3,978
Denmark	5,619	2,882
Finland	3,921	245
Switzerland	3,752	2,181
Netherlands	3,602	1,737
Greece	3,063	135
Turkey	2,654	123
Lithuania	2,622	402
Portugal	2,465	574
Belgium	1,563	609
Latvia	1,540	217
Estonia	1,348	202

Lake Navigation Opens

The freight navigation season for 1924 on the Great Lakes was opened April 19 with the passage through the Soo locks of the steamers Theodore Wickwire Jr. and Frank H. Goodyear, laden with coal for Sault Ste. Marie, Ont.

Queens—Broken, \$11.23 to \$12.70; egg, stove and chestnut, \$11.37 to \$13.20; pea coal, \$6.98 to \$9.50; No. 1 buckwheat, \$5.13 to \$6.48, soft coal, \$5.14 to \$6.45.

Richmond—Broken, \$12.09 to \$13.50; egg, \$12.68 to \$13.75; stove and chestnut, \$12.75 to \$13.75; pea coal, \$7.14 to \$9.95; No. 1 buckwheat, \$5.45 to \$7.14. soft coal, \$6.19 to \$7.14.

For delivering 3,600 tons of soft coal, mine run to the Parental School in Queens the bids ranged from \$5.14 to \$5.40 per ton.

Union Rebels Still Fighting For Alex Howat

The struggle to get Alex Howat back into the Mine Workers union still has some life. The radical voices were scheduled to be lifted up again at the convention of Illinois Subdistrict No. 4, at Auburn, Ill., on the 23d. John Watt, secretary of the subdistrict, said that a resolution for a special International union convention to reconsider the Howat case would be passed. He asserted that the demand for such a special convention will be backed by Illinois, Michigan, Kansas, Washington, Montana, Wyoming, Nova Scotia and Vancouver.

Dissatisfaction of some Illinois mine workers with the new three-year union agreement with operators also will break into voice, he said. A good deal of dissatisfaction exists throughout the state because the miners think they are going to get very little work under such an agreement. They expect nearly non-union districts to win much of Illinois' markets.

Railroads Consume 9,432,000 Tons of Coal in January

Class 1 railroads of the United States consumed 9,432,000 net tons of coal during January, compared with 8,647,000 tons in the preceding month and 10,375,000 tons in January, 1923, according to a report by the Bureau of Statistics of the Interstate Commerce Commission covering 176 steam roads. During 1923 these roads consumed a total of 109,442,000 tons, compared with 96,077,000 tons in 1922. The delivered cost of coal consumed in road service in January was \$3.25 per net ton, compared with \$3.27 in December and \$3.73 in January, 1923.

Consumption of fuel oil by the roads during January totaled 188,842,000 gallons, compared with 184,722,000 gallons in the preceding month and 150,297,000 gallons in January, 1923. During 1923 the roads consumed 1,980,015,000 gallons, compared with 1,556,090,000 gallons in 1922.

Roads Break Traffic Records

Two new high records were established by Class 1 railroads of the country during February, according to the Bureau of Railway Economics. They handled the greatest volume of freight traffic, measured in net ton miles, carried during any February in history and the average daily movement per freight car for the month was 27.4 miles per day, the highest for any February on record.

Freight traffic in February amounted to 35,962,421,000 net ton miles, an increase of 3,332,065,000 or 10.2 per cent, over the same month last year, and an increase of 3,010,289,000 net tons miles or 9.1 per cent, over February, 1920, which was the previous record month. Compared with 1922, it was an increase of 7,511,508,000 net ton miles, or 26.4 per cent. For the months of January and February alone, freight traffic amounted to 70,463,134,000 net ton miles, the greatest volume ever handled by the railroads during the first two months in any year.

In attaining a daily average movement of 27.4 miles per freight car, the railroads of the country in February exceeded the same month last year by 2.6 miles, and February, 1920, by 5.1 miles. The average also exceeded that for January this year by 2.4 miles.

The average load per freight car in February was 27.6 tons, a decrease of 0.6 ton compared with the same month last year and 0.7 of a ton decrease compared with February, 1920.

Pinchot Publishes His Coal Exploits

Governor Pinchot of Pennsylvania has been issuing weekly statements to the newspapers giving in detail his own account of his administration. In his release of April 10 he tells of the settlement of the anthracite strike of last summer.

"When I came into office," he stated, "the whole state was suffering from a shortage of coal. Houses were poorly heated and disease increased so greatly that 6,000 persons lost their lives who probably would have been living today had there been no shortage of coal. That struggle between miners and operators cost \$30,000,000.

"Last fall the state and the nation were confronted with the probability of another coal shortage. Thereupon representatives of miners and operators were invited to Harrisburg, the public necessity of preventing a strike was laid plainly before them, and when the deliberations were over the strike had been settled. Thereby those who could not otherwise have got coal were enabled to secure it, while the few who might have got it in spite of the strike secured it at far less cost than they would otherwise have had to pay. Another heavy loss of life, comfort and money was thus averted."

U. S. Commerce Chamber to
Discuss Natural Resources
And Trade Associations

Natural resources and trade associations and their activities are among the score or more of topics of interest to the coal industry that will be discussed at the annual meeting of the Chamber of Commerce of the United States, to be held at Cleveland, Ohio, May 6-8. Other subjects that will be taken up include taxation, transportation, industrial relations, industrial mobilization, immigration and national economy.

The subject of natural resources will be considered at a group meeting to be held at 2 p.m., May 7, in the ballroom of the Hollenden Hotel. At this meeting, which will be held under the auspices of the Chamber's Natural Resources Production Department, of which W. DuB. Brookings is manager, James R. Garfield, former Secretary of Interior, will speak on "Government Control of Natural Resources"; Paul Armitage, of New York, chairman of the Tax Committee of the American Mining Congress, will discuss "Tax Problems in Relation to Reserves and Depletion of Natural Resources," and Goldthwaite H. Dorr, of New York, formerly counsel for the Bituminous Operators' Special Committee, appointed to co-operate with the U. S. Coal Commission in investigating and determining the facts about the bituminous-coal industry, will read a paper on "Trade Association Problems Relating to Natural-Resource Industries."

Trade Associations Prove Magnet

Three separate proposals concerning trade associations have been submitted by member organizations of the National Chamber for consideration, as follows:

The Memphis Chamber of Commerce proposes that the National Chamber advocate creation of a commission which would define the rights of trade associations and their members in all respects, including their rights to discuss operating expense, sources of supplies for materials, prices, trade competition, etc. A study of anti-trust laws and of the Federal Trade Commission's powers and activities would be included. The purpose of this is to establish recognized principles which would remove handicaps under which trade associations now operate, through fear that they may violate some law, rule or regulation and be called before a commission or the courts upon a criminal or civil charge, the existence of which, regardless of the merits, is detrimental.

The Southern Central Division of the National Chamber recommends that all possible steps be taken to effect elimination of obstacles and uncertainties which interfere with the most effective carrying out by trade associations of their function of disseminating information.

The National Coal Association proposes that the President of the United States be asked by the National Chamber to direct the Attorney-General to



Charles E. Karstrom

Here is a man who is becoming a more important figure in the Illinois coal industry. He is now president of the Harrisburg Colliery Co. and vice-president of the Shoal Creek Coal Co. In March, *Coal Age* reported the purchase of the Harco mine in Saline County, Illinois, by interests affiliated with Big Creek Coals, Inc., a concern which operates other mines in Saline County and which, by reason of the purchase, now operates the Harco mine. Mr. Karstrom is 36. He began his career in the coal business by entering the employ of Big Creek Coals, Inc., and grew in that concern until he was made vice-president. In 1920 he became vice-president of the Shoal Creek Coal Co. His offices are in Chicago.

institute a test case of such a character that it will determine the legal status of activities of trade associations in gathering and giving to the public statistical information concerning production, distribution, cost and prices when no improper private use of such statistical information by the association or its members is alleged.

Lehigh Section A.I.E.E. Holds
Anthracite Session

Members of the Lehigh section of the American Institute of Electrical Engineers met April 11 and 12 in Wilkes-Barre for another session in the anthracite region. On the first evening papers were read by Carl P. Brodhun and Lawrence W. Bevan on electric cables and wire ropes, a feature of the session being motion pictures of the Ashley Planes. Here the Jersey Central R. R. hoists in 24 hours 37,200 tons of coal to an elevation of over 1,000 ft. Henry Schroeder, of the Edison lamp works, gave an illustrated lecture on the history and manufacture of electric lamps.

On Saturday morning the members and guests of the society were entertained at the Hazard Manufacturing Co.'s plant, where they were personally conducted through the plant and shown every detail of the manufacture of electric conductors and haulage ropes. In the afternoon the party journeyed to Scranton and a similar inspection tour was made through the General Electric lamp works.

French Coal Output in 1923
Near Pre-War Level

French coal mines in 1923 produced 38,576,215 metric tons (37,714,393 tons of coal and 861,822 tons of coke) compared with a production of 41,000,000 metric tons in 1913 (40,501,000 tons of coal and 793,000 of lignite). Immediately after the war, as a consequence of German systematic devastation of the mines of the northern districts, the output was reduced by about 50 per cent. In 1919 it did not quite reach 23,000,000 tons (21,567,000 tons of coal and 909,757 of lignite). Since then the output has been steadily increasing, and the gain which was not halted by the great economic crisis of 1920-21, was especially marked in 1923.

Coal Output by French Mines
(In metric tons, of 2,204.6 lb.)

Years	Coal	Lignite
1913.....	40,501,000	793,000
1919.....	21,567,000	909,757
1920.....	24,303,228	971,076
1921.....	28,240,887	735,608
1922.....	31,940,000	758,000
1923.....	37,714,393	861,822

Such progress was made possible only through the most active, persistent prosecution of reconstruction of the mines destroyed in 1918 by the Germans. In 1923 the output of the mines of the departments of Nord and Pas-de-Calais amounted to about 20,900,000 tons, the figures for preceding years being shown in the following table, in metric tons:

1913.....	27,000,000
1919.....	7,000,000
1920.....	9,700,000
1921.....	13,500,000
1922.....	15,400,000
1923.....	20,900,000

French Production of Metallurgical Coke
(In thousands of metric tons)

	1921	1922	1923
Coke produced in coke ovens of metallurgical plants.....	1,039	1,509	2,310
Coke produced in the coke ovens attached to the mines.....	745	1,031	1,986
Total.....	1,784	2,540	4,286

French Coal and Coke Consumption
(In thousands of metric tons)

	Production	Imports	Exports	Consumption
1919....	21,567	22,262	590	43,239
1920....	24,303	28,041	465	51,879
1921....	28,241	22,719	2,192	48,768
1922....	31,940	27,474	2,567	56,847
1923....	37,714	29,987	2,772	64,839

Two Illinois Operators Are
Back in the National

Two important Illinois coal-operating concerns recently rejoined the National Coal Association. They are the Chicago, Wilmington & Franklin Coal Co. and the J. K. Dering Coal Co. These are the first to re-enter the association since the disaffection which was started more than two years ago by the withdrawal of the Peabody Coal Co. Later the withdrawal of the State of Illinois was complete. The general complaint was that the National cost more than it was worth. The value of having national representation, however, has since been realized by some Illinois operators. Also the National has removed some of the objections raised against its expensiveness. But there is no landslide of Illinois back into the association yet.



Problems In Underground Management



Concreting a Main Hoisting Shaft While Mine Continues in Operation

Concrete Mixed on the Surface and Poured Down 4-In. Pipe—Shaft
Enlarged 8 In. Each Way—Hoisting Uninterrupted
for Two Shifts Each Day

By J. W. POWELL
Contracting Engineer, Welch, W. Va.

CONCRETING the main hoisting shaft of a coal mine without in any way interfering with operations is a job that is not without its difficulties, but the following description of the concreting of the main hoisting shaft of the E. E. White Coal Co.'s mine at Glen White, W. Va., shows that attacked in the right way the work can be done effectively and without waste of effort. This shaft, which is 13x31 ft. in outside dimensions and 307 ft. deep, contained three compartments. It was originally timbered throughout with 8x10 oak timbers. End and side plates were backed with 2-in. oak lagging placed skin to skin. Sets were placed on 5-ft. centers and the buntons were 8x10-in. timbers with the 8-in. face vertical. The punch posts on the corners were 10x10 in. and 8x10 in. where they supported the cross buntons of the compartments. In order to render the shaft capable of accommodating larger equipment which it is intended to install later, the inside dimensions were increased 8 in., both in length and breadth.

Preparation for concreting was begun from the top of the water ring midway in the shaft and carried upward to the concrete previously placed below the shaft collar. All lagging, back filling and loose rock on the shaft ribs were taken out and the ribs carefully trimmed. Next, the sides of the shaft were thoroughly washed down with water from a hose which was connected to the water system at the top of the shaft, great care being taken to see that all mud and slime, which had accumulated upon the ribs during past years was thoroughly removed. This was considered a highly important portion of the work, for without it a proper bond could not be obtained between the concrete and the walls of the shaft.

After a section of the shaft, equal in length to eight or ten sets of timbers, had been prepared in the manner above described, a foundation platform was built as well as the first 5-ft. form. This was closely calked to prevent the concrete from leaking when pouring was begun. The forms were built in 5-ft. sections and made of 2-in. planks surfaced on one side. Five sets of

forms were built, and when the last was placed the first was transferred from the bottom to the top, the wall being continued upward in this manner.

Where springs of water were encountered in the walls of the shaft 1½ in. drain pipes were placed to relieve the pressure while the concrete was setting. These pipes were covered with a ball of cotton waste tied over their inner ends next to the rib of the shaft so as to prevent blockage by the concrete. This waste was afterwards fished out through the pipes by means of a hook, thus allowing the water to flow freely. A sleeve was placed on the inside end of the drainage pipe so that it could be plugged after the concrete had become set and firm.

In the accompanying illustration, A shows a general plan and vertical section of the shaft, as well as the method by which the shaft was concreted. A ¾-yd. gasoline-driven concrete mixer was employed in this work. This was connected by means of a sheet iron chute about 4ft. long to the top of a 4-in. iron pipe which was suspended in the shaft by a ½-in. cable, the upper end of which was clamped to the head-frame of the shaft. Every 40 ft., or every two pipe lengths, the pipe was attached securely to the cable by means of a specially designed clamp. Other-

wise the pipe was allowed to swing freely in the shaft. By this means, it could be pulled easily over to any point desired for the pouring of the concrete.

A detail of the attachment of the rope to the pipe is shown at C, the specially designed deflection box for the concrete being shown at B. With this combination of a loose swinging pipe and a deflection box, it was possible to eliminate entirely all chutes for conveying the concrete behind the forms. In the illustration, D shows a section of timbers removed and faced with concrete flush with the finished walls of the shaft.

A 1:2:4 mixture was used in this work, crushed limestone up to the size of 2 in. being used as the coarser aggregate. Reinforcement consisted of ½-in. distorted iron rods placed 2 ft. apart vertically and ¾-in. rods spaced 12 to 16 in. apart horizontally.

On top the crew employed in wheeling and mixing the concrete consisted of seven men including the bell boy. This number was excessive and could have been reduced to four if the material had been placed close to the mixer. As the tippie was kept in daily operation, however, it was necessary to unload the concrete materials from railroad cars at a point from 100 to 250 ft. away from the mixer. Even under these circumstances, however, as many as 200 batches were sometimes placed in eight hours.

Within the shaft five men were employed. Two of these were engaged in spading the concrete behind the forms; the other three built the forms, placed the reinforcement, repaired the central wall and did like work. The placing of concrete was performed under somewhat adverse conditions, that is, be-

Cost of Placing Concrete in Shaft Lining—Months of August and July

Labor Costs Operation	Hours	Hourly Wage Rate	Total Labor Cost	Cost per Cu. Yd.	
				Aug.	July
Building forms.....	176	@ 95c	\$167.20	\$0.90	\$0.89
Spading concrete.....	130	@ 95c	123.50	.66	.78
Mixing concrete.....	62	@ \$1-\$62	328.70	1.77	2.12
Mixing concrete.....	381	@ 70c-266.70			
Total labor.....			\$619.40	\$3.33	\$3.79
Material Costs				Cost per Cu. Yd.	
	Quantity	Price	Total Cost	Aug.	July
Cement.....	276.25 bbls.	@ \$3.30	\$911.62		
Sand.....	81.4 cu. yd.	@ 3.07	249.89		
Limestone.....	162.8 cu. yd.	@ 2.50	407.00		
Reinforcement.....	3,000 lb.	@ 3c	105.00		
Total.....			\$1,673.51	\$9.04	\$9.06
Summary					
Total cost of material per cu. yd.....				Aug. \$9.04	July \$9.06
Total cost of labor per cu. yd.....				Aug. 3.33	July 3.79
Total cost (labor and material) per cu. yd.....				\$12.37	\$12.85
Total quantity of concrete placed, August 183 cu. yd.					

tween the hours of 5:30 p.m. and 2:30 a.m. It was necessary to have the shaft in operating condition by 3 a.m., which was the time when the firebosses entered the mine to make their regular inspections. The work of concreting was nevertheless accomplished without interfering with the operation of the mine, or delaying it more than 30 min. during the entire job.

Some of the company officials questioned the quality of the concrete fearing that the aggregates would become segregated while being poured to so great a depth through a pipe so small as 4-in. diameter. It was demonstrated, however, that this did not impair in the least the quality or appearance of the finished concrete. The deflection box at the bottom of the pipe sprayed the concrete behind the forms where it was thoroughly spaded into place by the men stationed at this point. The concrete was mixed wet enough to allow its free movement into place behind the forms. This also resulted in a fine finish of the face because of the thorough spading.

The time that should be allowed for concrete so placed to set was somewhat

of a question. It was demonstrated by actual experiment at a point 300 ft. below the shaft collar that when forms were removed 24 hr. after the pouring of the concrete, this material was quite solid. In pouring the lower portion of the shaft, therefore, only three sets of forms were used.

The accompanying table is a report of the labor and material costs during the month of August. It represents approximately the average cost throughout the entire operation of lining the shaft.

Relative Dangers of the Coal Seams of Pennsylvania

Studies have been made by R. N. Hosler, into the relative hazard of the coal seams of Pennsylvania. The details of this inquiry may be found in "Statistical Analysis of Coal-Mine Accidents in Pennsylvania—1916 to 1922 Inclusive," published by the Pennsylvania State Government at Harrisburg, Pa. Arranging the seams of the state according to the frequency of fatalities the results are as in Table I:

Table I—Ordinary Inside Fatality Rate Per Million Tons Production

Seam	Fatality Rate
(1) Sewickley	3.44
(2) Double Freeport	3.03
(3) Upper Kittanning	2.95
(4) Lower Freeport	2.77
(5) Clarion-Brookville	2.61
(6) Pittsburgh	2.47
All seams	2.47
(7) Lower Kittanning	2.29
(8) Upper Freeport	2.16
(9) Middle Kittanning	2.11

It will be seen that the Clarion and Brookville beds are classed together and that the Double Freeport is separately classified. It is interesting to note how the Pittsburgh and Lower Kittanning, the former considered a relatively dangerous bed and the latter a relatively safe one have by care in the one, possibly, and less care in the other become close neighbors in the column of hazards. Only 7,588,000 of Middle Kittanning coal was mined in the seven years as compared with 1,054,452,000 tons in the nine beds. The Middle Kittanning seam is the least hazardous and least mined of any.

The seams may also be arranged as to frequency of fatalities based on one thousand 2,000-hour workers, see Table II.

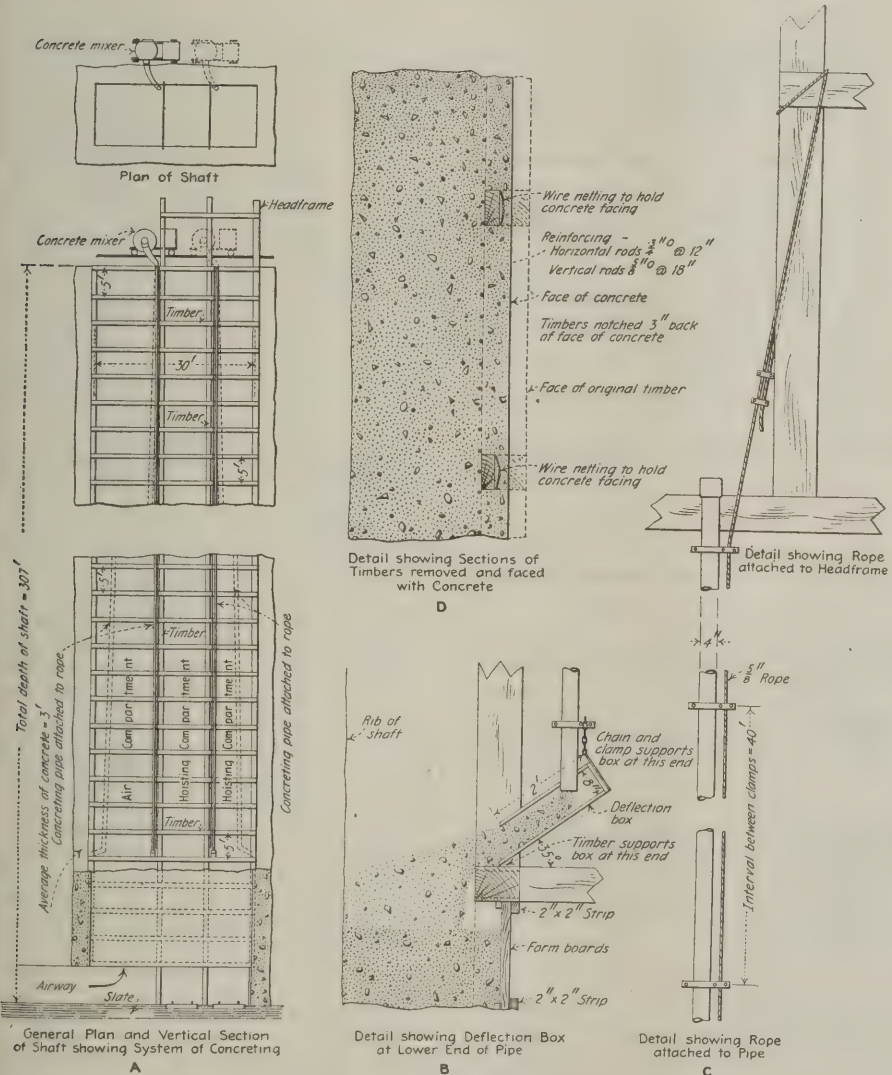
Table II—Ordinary Inside Fatality Rates Per One Thousand 2,000-Hour Workers

Seam	Fatality Rate
(1) Double Freeport	3.97
(2) Sewickley	3.64
(3) Upper Kittanning	3.22
(4) Pittsburgh	3.15
(5) Lower Freeport	2.85
All seams	2.83
(6) Upper Freeport	2.27
(7) Clarion-Brookville	2.26
(8) Lower Kittanning	2.21
(9) Middle Kittanning	2.14

The expression, "ordinary fatality" denotes a fatal accident that occurs to not more than a predetermined number of persons at any one time. It may be noted that the returns are to some extent of less value because they do not differentiate accidents from falls from those which occur from other causes, such as gas. A man working 250 days and eight hours each day will work 2,000 hours. That length of time has been chosen as the basis for computing Table II.

Light at the Working Face

Concentration of forces at the working face increases the need, and decreases the cost per ton, of supplying stationary electric lighting at the mine face or the roadways adjacent to it. Sam Mavor, of Glasgow, addressing the Mining Institute of Scotland, at Heriot-Watt College, Edinburgh, said that with the intensive system of mining in which coal cutters and conveyors were used jointly it was "not only practical but economical to light the working places." "It certainly," he added, "greatly facilitated the work in hand and in mines where open-flame lamps previously were used it contributed to the comfort and efficiency of the men." With more intensive mining the installation of a lighting system will come almost automatically as an indispensable adjunct to successful operation.

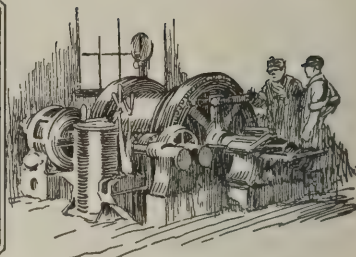


Method Devised for Concreting in Between Periods of Operational Activity

Concrete was mixed on the surface, spouted to a 4-in. pipe hung in the shaft by means of a wire cable, down which is flowed to a deflection box which shot it behind the forms. The pipe hung free in the shaft so that it was easy to pull it over from one side to the other, and thus to discharge the concrete wherever desired. Behind the forms the concrete was thoroughly spaded into place assuring a thorough mixture of the aggregates that may have become partially segregated during the long journey down the pipe.



Practical Pointers For Electrical And Mechanical Men



Deep Hole Drilling by Use Of Sectional Steel Rods

Much prospecting is now being done with rock drills and sectional drill steel. In 1916 a large western mining company drilled a 45-ft. horizontal hole by using 2-ft. sections of rod made from 1½-in. pipe; one piece being welded to a regular drill shank, the remaining sections having pipe threads on both ends. The necessary sleeves were provided for coupling the rods together as in ordinary pipe fitting, with the exception that the threads were cut to permit the pipe meeting end to end. Bit ends were threaded to fit the sleeves.

Later diamond-drill rod was used instead of pipe, and a water-connection swivel employed to introduce water directly into the rod, rather than through the rock-drill as previously, for it was found necessary to use rather high and direct water pressure to expel the cuttings from the deep drill holes.

Where hard rock was encountered it became necessary to use still heavier rod. The diamond-drill rod was abandoned and regular 1½-in. hollow round drill steel used in its stead. To maintain the maximum section of the drill steel, it was necessary to upset each end of the rod to 2 in. in diameter and machine a taper male thread on one

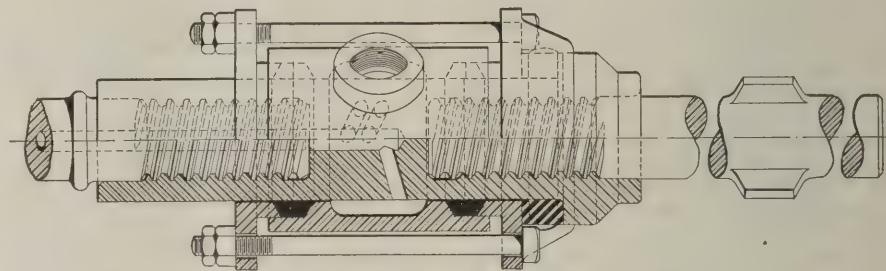


Fig. 2.—Swivel Used in Drilling Deep Holes

This swivel is part of the equipment used with drifting machines. When drilling deep holes, a thrust bearing is added to the swivel.

end with a corresponding female thread on the other. The rods were screwed together and in use they proved to be satisfactory mechanically, although the high-carbon drill steel was threaded in a lathe only with difficulty.

PRESENT DRILLING PRACTICE

The present equipment conforms closely to that used in standard mine practice and consists of a rock drill, 3-in. single screw columns, arms and saddle, 1-in. air hose, ¾-in. water hose, drill bits, threaded drill rods, sleeves and water-connection swivel. These items, except the last three, are standard mine equipment.

The column should be placed so as

to put the arm 4 ft. from the collar of the hole; this permits of a full 3-ft. run and allows room for the swivel. A good rigid set-up is markedly advantageous. The machine is then mounted in the conventional manner, except that as no water is passed through the machine, the water tube has been shortened by 2 in. and the common water spud is replaced by a plug. The water hose is connected to the water-connection swivel. A bit end is screwed into the swivel and drilling begins. The steel should be kept in alignment with the hole during the first 8 or 9 ft. of drilling. After the bit end is run out, the independent rotation on the machine is reversed and the joint unscrewed by the rotation mechanism, the bit end remaining in the hole. The machine is then cranked back and a 3-ft. drill rod is held between the swivel and the bit end in the hole and screwed up by the independent rotation running in its normal direction.

Drilling proceeds in this manner until the bit becomes dull, whereupon the clamp of the saddle is loosened, the machine turned to one side and the rods withdrawn and disconnected. The second (3½-in.) bit end is screwed into a sleeve on a 6-ft. rod and placed in the hole. Additional 6-ft. rods are added until the bit reaches the end of the hole. Drilling is resumed, and 3-ft. rods are added as the hole progresses; when the second bit becomes dull, the change is repeated.

To date the breakage of drill rods has been almost negligible, but fishing tools have been developed whereby a broken section in the hole may be withdrawn.

In drilling holes slightly above the horizontal to a depth of from 50 to 75 ft., water under 70-lb. pressure will eject the cuttings satisfactorily, but when drilling deeper holes or holes below the horizontal, higher pressures must be used. These may be obtained by tapping the pump column, if there is sufficient head in the shaft, or by the use of a small high-pressure pump.

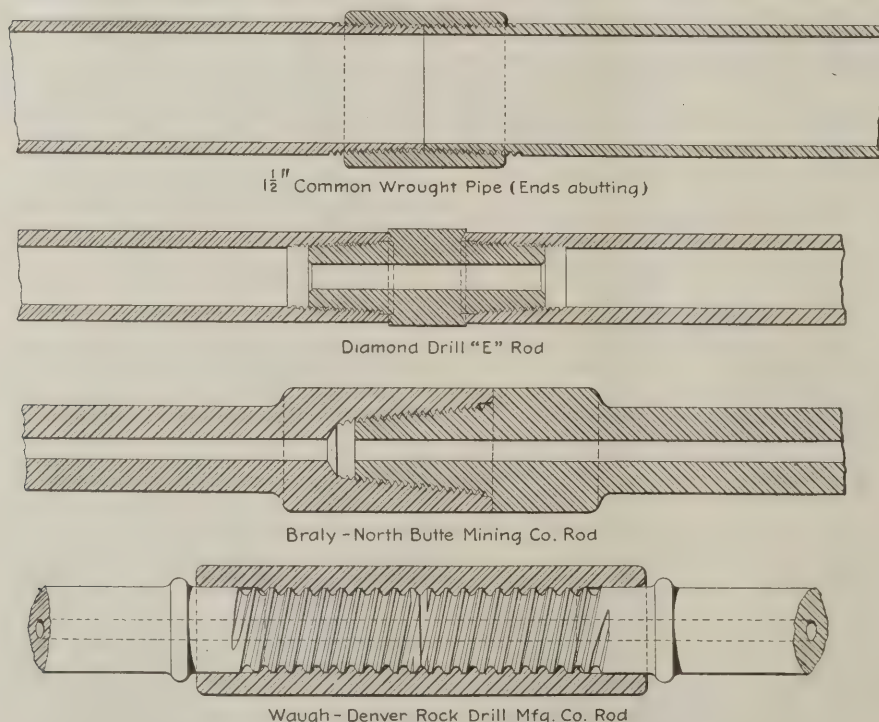


Fig. 1—How the Drill Joints Have Changed

From a simple pipe joint and sleeve coupling a new joint has been designed which makes the work of adding another section easy.

From 3 to 5 gallons of water per minute are required, depending upon the pitch of the hole and the hardness of the ground. When gravelly ground is encountered, it is sometimes necessary to blow out the holes, although this is not often required with 50-ft. holes drilled above the horizontal.

Care should be taken in coupling the rods to insure each rod meeting its fellow end to end. The sleeves are not expected or designed to transmit the energy which flows directly through the drill rods. This brings up the question, how the energy from the piston hammer is transmitted to the drill bit.

One hole was recently drilled to a depth of 227 ft. All the steel and couplings shown were used in the hole at one time and as the rods and couplings weighed about 900 lb., it is obvious that the entire rod was not moved by each blow of the 14-lb. piston hammer but rather that a flow of high-frequency vibrations was transmitted through the rod and was expended by the action of the drill bit against the rock. This is borne out by the fact that the drilling speed per minute on the

last 50 ft. of this deep hole was practically the same as on the first 50 ft., the slowest rate of drilling being between the 75 and 100-ft. points.

Sectional drill rods can be used for purposes other than prospecting, particularly the draining of water courses and old workings ahead of development faces. Open-cut mining in quarries using deep holes will probably present a field for the new method.

It must be borne in mind that the depth of hole that can be drilled is limited by certain factors, the principal one being the wear on the gage of the drill bits, for it is evident that if each bit can drill but 1 ft. and only seven changes are available, the result would be a 7-ft. hole. However, under favorable conditions, 6 ft. or more can be drilled with each bit and, this being the case, deep holes can be drilled quite cheaply. The application in each individual case is a matter that must be decided by the mine management.

H. R. DRULLARD,
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Get a Competent Engineer And Follow His Advice

Small coal companies which do not have elaborate organizations, too often accuse the engineer of being extravagant, set in his ways, and disposed to subordinate practice to theory. Almost every coal man admits that he needs civil engineers for underground surveying and map making, although there are still those remarkable souls who will stoutly maintain that they can set centers better with the naked eye and will continue to adhere to their judgment until their rooms run together and their entries fail to meet.

The mechanical or electrical engineer also has his moments of extreme popularity, usually when his knowledge is required to solve some difficulty which has suspended production. When the mine once more is running smoothly, should he suggest that something be purchased or done to prevent the recurrence of the trouble, he is likely to be informed that he is extravagant. The fact is that coal operators, in general, do not utilize their engineers properly when they have them.

ADVICE HAS SOUND BASIS

Whatever else one may say about the engineer he rarely makes a recommendation without having some basis of fact for his advice. The "practical" mining man often buys a piece of equipment because he runs into a persuasive salesman, or because it looks good, or more often because he has successfully used the product of the same manufacturer at another operation, although conditions at that plant may have been entirely different.

Reflect a moment on these facts. How many mine locomotives are selected after a study of the duty cycle disclosing the necessary weight, drawbar pull and speed needed to handle a certain number of cars per trip, and trips per day? How many cutting machines are chosen with cutter bars and cutter chains geared for a certain speed, so

as to cut with the utmost efficiency the coal in which they are going to be used? How many mine fans are selected according to the actual volume of air required to be moved against the water gage as determined by a study of the actual resistance of the airways which they must ventilate? How many pumps are selected to meet definite conditions of capacity, head, etc., and are installed with proper pipe lines to give maximum efficiency?

One hundred per cent of our coal-mine equipment ought to be selected only after the facts mentioned above have been ascertained and considered. As a matter of fact, far less than 100 per cent of the machinery is thus selected, and the reason why conditions are not worse can be traced directly to the fact that a great percentage of the machinery belongs to a few large coal companies who fully realize the importance of proper selection.

A large part of the trouble with electrical equipment is that it has been poorly selected for the work it has to do, though most of the equipment that is being built today is capable of giving real service when properly applied.

Certainly in these days of enlightenment no coal operator need deny himself the privilege of actually knowing definitely what to expect from each piece of machinery he purchases or the satisfaction of being sure that under the circumstances he has made the right decision. If he would only realize it, careful selection and specification of machinery is the coal operator's protection against loss. Such care in selection would tend to make manufacturers more aggressive and would soon put off-standard products out of business, for there would be no sale for such material.

Many coal operators have been in business for years and really have never learned how to get efficiency out of their equipment. There are classes of machinery capable of being utilized to great advantage by the coal industry which nevertheless most operators

view with disfavor simply because they were never given a fair chance.

The centrifugal pump is one of these. Where it can be used, a centrifugal pump possesses the advantage of low first cost, low cost for upkeep, economy of space and under certain conditions comparatively high efficiency. Furthermore, it is easy to say definitely, when a few facts are known, whether under certain conditions a centrifugal pump will prove satisfactory. Nevertheless, some operators are afraid of this equipment, and many operators condemn it because they have been unable to force this sensitive machinery with its definite limits of performance to accomplish something physically impossible, though a rather rudimentary investigation would have made its proper function clear.

To cite a specific instance: A certain well-known and extremely capable coal operator was managing some mines for a large corporation in Pennsylvania, where there were some centrifugal pumps which had evidently been improperly applied. They never worked well and were taken out and scrapped and replaced by reciprocating pumps. This man firmly resolved never to have anything to do with a centrifugal pump.

Later he moved to West Virginia. In one of the mines under his control was a pumping problem that gave much trouble. A certain body of water had to be kept down to a certain level to prevent it from flooding haulage roads. A reciprocating pump was being used and was extremely expensive as it was continually breaking connecting rods, crosshead guides, etc., as well as wearing out valves and water cylinders. As the pump was out of commission much of the time it always fought a losing battle with the water.

CENTRIFUGAL PUMP MORE EFFICIENT

The operator was finally persuaded to replace this reciprocating unit with a centrifugal pump, which was carefully selected and properly installed. The result has been that with a pump, which cost about the same or less than the water end of the old pump, about three times as much water has been moved with only a 50 per cent greater expenditure of power. For a period of two years there has been practically no upkeep cost. About two hours was all that was necessary to figure out, check up, and make proper specifications for the pump to be used in this case.

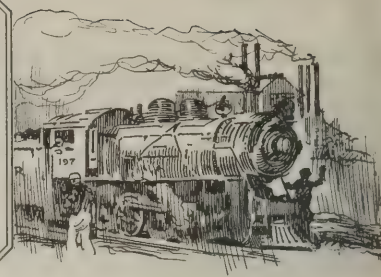
If a company pays for advice it should test it at least once, and then if it does not give satisfactory results, stop paying for it. The engineer has a definite function in coal operation. With his education and experience and with his technical societies and publications to keep him up to date, he is bound to have a more complete knowledge of the subjects in which he specializes than anyone else. The operator should encourage the engineer to keep adding to this knowledge, and then when he needs it he should take advantage of it, realizing that he cannot himself efficiently fulfill his general functions and at the same time keep at his finger tips the details necessary to every branch of his work.

E. D. KNIGHT.

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Production And the Market



Inactivity Persists Throughout Coal Markets; Output at Low Level; Prices Still Falling

Inactivity is the prevailing condition in the coal markets of the country. From week to week there is little noticeable change either in demand or price, the general tendency being downward. The condition of the market is rather strikingly indicated by the bids received April 18 by the U. S. Shipping Board at New York for 1,065 gross tons of bituminous coal of either Pool 9 or 71 quality, the quotations ranging on a f.o.b. mine basis as low as \$1.03 per net ton. Several railroads have signed up for fuel supplies for the coming year, but the closing of industrial contracts still leaves much to be desired, these consumers seeming to buy only for immediate requirements. There is no demand for tonnage for lake movement, and every indication points to a late start of the shipping season.

As the possibility of a strike of British coal miners grows more remote another possible source of business to the American coal producer is fading like a mirage. Nevertheless, one of the few bright spots in the trade was the export activity at Baltimore last week. On April 16 and 17 32,190 tons of cargo coal was loaded there for foreign countries and the total shipments during the first eighteen days of the month were only 2,000 tons less than those of the entire month of March. Italy continues to be the largest purchaser, with France second.

Coal Age Index declined 3 points to 169 as of April 21, the corresponding price being \$2.04. This compares with \$2.08 on April 14.

Demand for Steam Grows in Midwest

In the Middle West the demand for steam coal seems to increase a little each day, but the shortage of screenings consequent on the lessened production has not been sufficient to force prices up. Otherwise Midwest trade shows little perceptible change. Running time

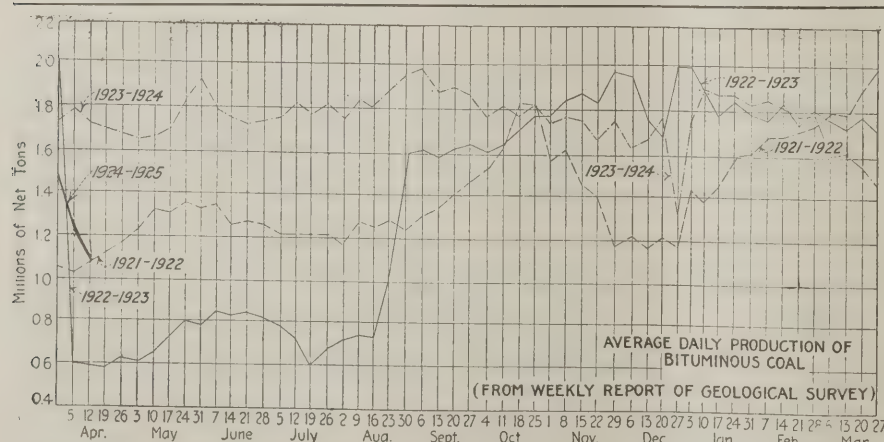
is low in all the Illinois fields, contracting being dull and the railroads still well fixed with supplies.

Demand is lacking from practically all sources in the Kentucky markets save for little buying by railroads, which are taking some tonnage to storage when they are not busy. Prices, however, are fairly firm all along the line. Northwestern markets seem to have hit the very bottom, sales and shipments from the docks being practically at a standstill. There are 3,250,000 tons of coal on the docks, of which 1,700,000 tons is free coal; the remainder is under contract but has not been accepted. Prices apparently are unchanged, but it is rumored that there is list cutting to obtain orders, so that another cut it likely. Stagnation reigns at Milwaukee. As the deadlock in wage negotiations continues at Kansas City, surplus coal supplies in the Southwest are nearing exhaustion, several large producers having ceased to quote prices. Warm weather has caused a slump in business in the Rocky Mountain region.

Ohio Markets Sink Further in Depths

Production in all Ohio fields is falling steadily with a continued lowering of demand, business at Columbus and Cleveland being lifeless. The market for slack at Cincinnati is better, but smokeless prices have softened. Pittsburgh has one of the dullest periods in its history except during a strike. Buffalo reports a slight improvement. Business is uniformly light throughout the New England and Atlantic seaboard markets from Boston to Birmingham.

Production of bituminous coal took a further drop of 84,000 tons during the week ended April 12, when 6,742,000 net tons was produced, according to the Geological Survey. Anthracite output was 1,856,000 net tons, an increase of 308,000 tons over the preceding week.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
March 29	10,430,000	8,818,000
April 5 (a)	9,629,000	6,826,000
April 12 (b)	10,401,000	6,742,000
Daily average	1,734,000	1,124,000
Calendar yr. to date(c) ..	156,712,000	148,595,000
Daily average to date	1,788,000	1,698,000

ANTHRACITE

	1923	1924
March 29	2,008,000	1,942,000
April 5	1,602,000	1,548,000
April 12	2,067,000	1,856,000
Calendar year to date	29,537,000	26,805,000

COKE

	1923	1924
April 5 (a)	428,000	278,000
April 12 (b)	421,000	266,000
Calendar yr. to date(c) ..	5,506,000	4,205,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Midwest Wants Only Steam

The coal trade of the Midwest shows little change during the week, even though the demand for steam sizes grows a little each day. The shortage of screenings certainly will have to make itself markedly felt on the market some time soon with production as low as it is in every field, but that effect has not been strong enough yet to push prices high. Southern Illinois screenings have not yet climbed above \$2.25. Much of that size brings only \$2.10 and \$2.15. One restraining influence is the Kentucky coal available at so much lower prices. However, the amount of this is much reduced by the April 15 strike in western Kentucky. Stocks of coal in striking Kansas are about exhausted, thus slowly removing another small competitor.

The Midwestern fields are getting very little running time and not enough big contracts have been made since April 1 to improve this situation. A few small contracts are about all that have been definitely sewed up yet, for railroads still have heavy tonnages on the ground and are dallying. In southern Illinois even the 50c. undercutting of the association operators by the independents and by the Jackson County and Du Quoin group of operators does not produce any spot-market business, so coal simply will not move at any price. Nearly all mines are idle.

Mt. Olive district mines are getting a day or two a week but they cannot move lump at \$2.85 when Franklin County can be had for a little less. Railroad tonnage in this field is fairly good, however. The Standard field, as usual, is in the worst position of all the Illinois fields. Crushers are working on lump that will not sell at \$2.25, so as to move the coal as screenings at \$2.

The spring lull has hit St. Louis and everything is practically at a standstill. Some yards did not move one load out in the three first days of last week. The public is not buying early storage coal and there is no demand for current needs. Wagon load steam has practically dropped off entirely on account of a large number of plants using electricity for power and needing no heat. Country domestic demand has practically ceased, excepting a little for anthracite chestnut. Judging from the way operators are going after this business there is plenty of anthracite. Country steam is reported fairly active at points.

Kentucky Trade Is Slow

The general situation in Kentucky is anything but satisfactory to operator and jobber, due to lack of demand from all sources. Retailers are stocked to supply immediate demands, and with mild weather are not in the market. Industrial consumers, utilities, byproduct and other heavy

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Market Quoted	Apr. 23 1923	Apr. 7 1924	Apr. 14 1924	Apr. 21 1924†
Smokeless lump	Columbus	\$6.15	\$3.35	\$3.35	\$3.25@	\$3.50			
Smokeless mine run	Columbus	4.25	2.35	2.25	2.15@	2.35			
Smokeless screenings	Columbus	4.10	1.85	1.85	1.75@	2.00			
Smokeless lump	Chicago	6.10	3.10	3.10	3.00@	3.25			
Smokeless mine run	Chicago	3.85	2.10	2.10	2.00@	2.25			
Smokeless lump	Cincinnati	6.35	3.35	3.25	3.25@	3.50			
Smokeless mine run	Cincinnati	4.25	2.10	2.10	1.85@	2.25			
Smokeless screenings	Cincinnati	4.00	1.85	1.80	1.60@	2.00			
*Smokeless mine run	Boston	6.25	4.20	4.20	4.15@	4.25			
Clearfield mine run	Boston	2.75	2.05	2.05	1.65@	2.40			
Cambria mine run	Boston	3.35	2.45	2.55	2.25@	2.75			
Somerset mine run	Boston	3.15	2.10	2.35	1.85@	2.60			
Pool 1 (Navy Standard)	New York	3.85	2.85	2.85	2.75@	3.00			
Pool 1 (Navy Standard)	Philadelphia	3.95	3.00	3.00	2.75@	3.25			
Pool 1 (Navy Standard)	Baltimore								
Pool 9 (Super. Low Vol.)	New York	3.10	2.20	2.20	2.00@	2.40			
Pool 9 (Super. Low Vol.)	Philadelphia	3.20	2.20	2.20	2.00@	2.45			
Pool 9 (Super. Low Vol.)	Baltimore	2.90	2.00	1.80	1.75@	1.85			
Pool 10 (H.Gr.Low Vol.)	New York	2.50	1.85	1.85	1.80@	1.90			
Pool 10 (H.Gr.Low Vol.)	Philadelphia	2.55	1.85	1.85	1.70@	2.00			
Pool 10 (H.Gr.Low Vol.)	Baltimore	2.50	1.75	1.65	1.60@	1.75			
Pool 11 (Low Vol.)	New York	2.05	1.40	1.60	1.40@	1.65			
Pool 11 (Low Vol.)	Philadelphia		1.50	1.50	1.30@	1.70			
Pool 11 (Low Vol.)	Baltimore	2.15	1.50	1.50	1.50				

High-Volatile, Eastern					Market Quoted	Apr. 23 1923	Apr. 7 1924	Apr. 14 1924	Apr. 21 1924†
Pool 54-64 (Gas and St.)	New York	1.85	1.50	1.50	1.35@	1.60			
Pool 54-64 (Gas and St.)	Philadelphia	2.20	1.55	1.55	1.45@	1.70			
Pool 54-64 (Gas and St.)	Baltimore	1.95	1.60	1.60	1.50@	1.70			
Pittsburgh ac'd gas	Pittsburgh	3.10	2.40	2.40	2.30@	2.50			
Pittsburgh gas mine run	Pittsburgh		2.25	2.25	2.00@	2.25			
Pittsburgh mine run (St.)	Pittsburgh	2.00	1.85	1.85	1.75@	2.00			
Pittsburgh slack (Gas)	Pittsburgh	2.10	1.30	1.30	1.25@	1.35			
Kanawha lump	Columbus	3.75	2.55	2.55					
Kanawha mine run	Columbus	2.25	1.65	1.55					
Kanawha screenings	Columbus	2.40	1.30	1.20					
W. Va. lump	Cincinnati	3.85	2.25	2.35	2.00@	2.50			
W. Va. gas mine run	Cincinnati	2.50	1.35	1.30	1.15@	1.50			
W. Va. steam mine run	Cincinnati	2.50	1.35	1.30	1.15@	1.50			
W. Va. screenings	Cincinnati	2.25	.90	1.05		1.00			
Hocking lump	Columbus	2.85	2.55	2.45	2.25@	2.60			
Hocking mine run	Columbus	2.00	1.65	1.60	1.50@	1.75			
Hocking screenings	Columbus	1.70	1.30	1.30	1.25@	1.40			
Pitts. No. 8 lump	Cleveland	2.90	2.35	2.35	2.00@	2.75			
Pitts. No. 8 mine run	Cleveland	2.15	1.80	1.80	1.75@	1.85			
Pitts. No. 8 screenings	Cleveland	1.95	1.30	1.30	1.35@	1.45			

Midwest					Market Quoted	Apr. 23 1923	Apr. 7 1924	Apr. 14 1924	Apr. 24 1924†
Franklin, Ill. lump	Chicago	\$3.65	\$2.85	\$2.85	\$2.50@	\$3.00			
Franklin, Ill. mine run	Chicago	3.10	2.35	2.35	2.25@	2.50			
Franklin, Ill. screenings	Chicago	1.95	2.15	2.15	2.10@	2.25			
Central, Ill. lump	Chicago	2.70	2.60	2.60	2.50@	2.75			
Central, Ill. mine run	Chicago	2.10	2.10	2.10	2.00@	2.25			
Central, Ill. screenings	Chicago	1.55	1.65	1.90	1.80@	2.00			
Ind. 4th Vein lump	Chicago	3.35	2.85	2.85	2.75@	3.00			
Ind. 4th Vein mine run	Chicago	2.85	2.35	2.35	2.25@	2.50			
Ind. 4th Vein screenings	Chicago	1.85	1.95	1.95	1.90@	2.00			
Ind. 5th Vein lump	Chicago	2.85	2.35	2.35	2.25@	2.50			
Ind. 5th Vein mine run	Chicago	2.10	2.10	2.10	2.00@	2.25			
Ind. 5th Vein screenings	Chicago	1.55	1.65	1.80	1.75@	1.85			
Mt. Olive lump	St. Louis		2.85	2.85	2.50@	3.00			
Mt. Olive mine run	St. Louis		2.50	2.50	2.25@	2.50			
Mt. Olive screenings	St. Louis		1.50	1.50	1.50				
Standard lump	St. Louis	2.50	2.35	2.35	2.25@	2.50			
Standard mine run	St. Louis	1.85	1.95	1.95	1.90@	2.00			
Standard screenings	St. Louis	1.10	1.20	1.20	1.15@	1.20			
West Ky. lump	Louisville	2.50	2.35	2.25	2.00@	2.50			
West Ky. mine run	Louisville	2.10	1.50	1.70	1.50@	1.75			
West Ky. screenings	Louisville	1.90	1.20	1.60	1.50@	1.75			
West Ky. lump	Chicago	2.60	2.60	2.25	2.00@	2.50			
West Ky. mine run	Chicago	1.80	1.10	1.60	1.50@	1.75			

South and Southwest					Market Quoted	Apr. 23 1923	Apr. 7 1924	Apr. 14 1924	Apr. 24 1924†
Big Seam lump	Birmingham	2.50	2.60	2.60	2.50@	2.75			
Big Seam mine run	Birmingham	2.10	2.00	2.00	1.75@	2.25			
Big Seam (washed)	Birmingham	2.35	2.20	2.20	2.00@	2.40			
S. E. Ky. lump	Chicago	4.00	2.35	2.25	2.00@	2.50			
S. E. Ky. mine run	Chicago	2.85	1.60	1.60	1.25@	2.00			
S. E. Ky. lump	Louisville	3.85	2.60	2.60	2.25@	2.50			
S. E. Ky. mine run	Louisville	2.60	1.50	1.60	1.25@	1.75			
S. E. Ky. screenings	Louisville	2.20	1.05	1.25	1.15@	1.35			
S. E. Ky. lump	Cincinnati	4.00	2.35	2.25	2.00@	2.50			
S. E. Ky. mine run	Cincinnati	2.25	1.35	1.25	1.15@	1.50			
S. E. Ky. screenings	Cincinnati	2.10	.85	1.00	.80@	1.00			
Kansas lump	Kansas City	3.85	4.50	4.50	4.50				
Kansas mine run	Kansas City	3.25	3.25	3.25	3.25				
Kansas screenings	Kansas City	2.60	2.50	2.50	2.50				

* Gross tons, f.o.b. vessel, Hampton Roads.

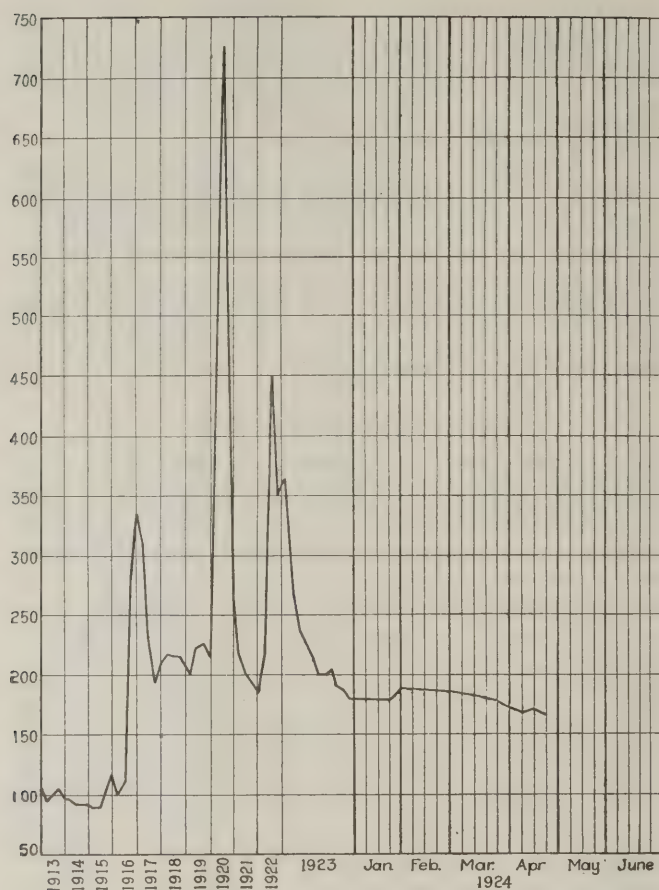
† Advances over previous week shown in heavy type, declines in italics.

‡ Strike on.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	April 23, 1923		April 14, 1924		April 21, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken	New York		\$2.34		\$7.75@ \$8.35		\$8.00@ \$8.65		\$8.00@ \$8.65
Broken	Philadelphia		2.39		7.90@ 8.10		8.50@ 8.65		8.50@ 8.65
Egg	New York		2.34	\$8.50@ \$10.50	8.00@ 8.35	\$8.25@ \$8.65	8.25@ 8.65	\$8.25@ \$8.65	8.25@ 8.65
Egg	Philadelphia		2.39	9.25@ 9.50	8.10@ 8.35	8.25@ 9.40	8.60@ 8.65	8.25@ 9.40	8.60@ 8.65
Egg	Chicago*		5.06	12.00@ 12.50	7.20@ 8.25	7.59@ 7.81	7.65@ 7.72	7.59@ 7.81	7.65@ 7.72
Stove	New York		2.34	8.50@ 10.50	8.00@ 8.35	8.25@ 9.00	8.25@ 8.85	8.25@ 9.00	8.25@ 8.85
Stove	Philadelphia		2.39	9.25@ 9.50	8.15@ 8.35	8.60@ 9.50	8.65@ 8.85	8.60@ 9.50	8.65@ 8.85
Stove	Chicago*		5.06	12.00@ 12.50	7.35@ 8.25	7.90@ 8.03	7.81@ 8.03	7.90@ 8.03	7.81@ 8.03
Chestnut	New York		2.34	8.50@ 10.50	8.00@ 8.35	8.25@ 9.00	8.25@ 8.75	8.25@ 9.00	8.25@ 8.75
Chestnut	Philadelphia		2.39	9.25@ 9.50	8.15@ 8.35	8.60@ 9.50	8.65@ 8.75	8.60@ 9.50	8.65@ 8.75
Chestnut	Chicago*		5.06	12.00@ 12.50	7.35@ 8.35	7.81@ 7.94	7.72@ 7.95	7.81@ 7.94	7.72@ 7.95
Range	New York		2.34		8.30		8.50		8.50
Pea	New York		2.22	6.30@ 7.50	6.00@ 6.30	4.50@ 5.00	5.50@ 6.00	4.50@ 5.00	5.50@ 6.00
Pea	Philadelphia		2.14	7.00@ 7.25	6.15@ 6.20	5.25@ 6.50	6.00	5.25@ 6.50	6.00
Pea	Chicago*		4.79	7.00@ 8.00	5.49@ 6.03	5.13@ 5.36	5.36@ 5.55	5.13@ 5.36	5.36@ 5.55
Buckwheat No. 1	New York		2.22	2.25@ 3.50	3.50@ 4.15	2.25@ 3.00	3.00@ 3.15	2.25@ 3.00	3.00@ 3.15
Buckwheat No. 1	Philadelphia		2.14	3.00@ 3.50	3.50	2.75@ 3.00	3.00	2.75@ 3.00	3.00
Rice	New York		2.22	1.75@ 2.50	2.50	1.85@ 2.00	2.00@ 2.25	1.75@ 2.25	2.00@ 2.25
Rice	Philadelphia		2.14	2.00@ 2.50	2.50	2.00@ 2.25	2.25	2.00@ 2.25	2.25
Barley	New York		2.22	1.00@ 1.50	1.50	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley	Philadelphia		2.14	1.15@ 1.50	1.50	1.50	1.50	1.50	1.50
Birdseye	New York		2.22		1.60		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines	1924		1923	
	April 21	April 14	April 7	April 23
Index	169	172	171	231
Weighted average price.....	\$2.04	\$2.08	\$2.07	\$2.79

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

takers appear to be buying only immediate requirements. There has been just a little railroad buying, however, as the Southern Ry. and a few others are starting to take a little tonnage and move it to storage when they are not busy.

Prices are quite firm all along the line. Western, Kentucky screenings are now quoted at the mine-run basis, while nut has advanced to \$2@2.25 a ton. Large prepared such as egg, lump and block are slow, as there is no material market for these sizes, but the small stove size has a good Southern movement in the summer, and screenings are needed by consumers using automatic stokers. Early opening of lake movement is not expected by the coal trade, as the ice is late in getting out of the lakes and there is no demand in sight.

Northwest Dull as Can Be

The soft-coal market at the head of the lakes seems to have reached a period of inactivity from which there hardly can be a change for the worse. Docks are selling little or nothing and shipments are at a standstill except for the coal which railroad companies are taking out to enable the docks to work a few days a week, and so keep their crews together.

Official announcement of stocks on docks shows that there are now 3,250,000 tons of soft coal on the docks, of which 1,700,000 tons is free coal. The balance is under contract but has not yet been accepted. Prices are the same as far as coal men will admit, but it is whispered that one dock is cutting below list to obtain a few orders, and it is probable that another cut may come. To add to the pessimistic outlook it is predicted that there will be a 30-per cent cut in

the ore output this year, which will mean less coal sold to the independent mining companies. For this reason the mining companies are not in a hurry to start operations and are not placing orders for fuel.

The coal market at Milwaukee continues flat and stale. Little is doing in either hard or soft coal. The latter is weak and almost unsaleable because of the promised May reduction. The cut of \$1 to \$1.50 per ton at the head of the lakes adds to the disinclination to buy at present prices. The weather continues warm, and the domestic coal-burning season is about over.

Little Doing in the West

While representatives of Southwestern district operators and miners in conference in Kansas City are deadlocked over a wage contract, surplus supplies of coal are being exhausted. Several large producers have ceased to quote prices. Jobbers are handling the product of some mines, independent of the operators' association, the operators of which have signed contracts renewing for three years the wage scale which expired April 1. For such coal of the Southwestern district as is available, the price remains unchanged. Kansas lump is \$4.50; nut, \$4; mine run \$3.50 and screenings \$2.50.

Warm weather throughout the Rocky Mountain region caused a considerable slump in the Colorado coal market during the past week. A number of additional mines among the less lucrative have been closed for the season. The mines worked on an average of about half time last week, the operators reporting about 28 per cent of the time lost on account of no market.

Mines in Utah are working about two days a week. Industries are buying little. The domestic demand is for slack, egg, nut and stove coal. The large sizes have become a drug on the market. There are many "no bill" cars of lump and domestic lump on the tracks just now. The labor situation is excellent and prices on small sizes remain firm.

Ohio Markets Still Sagging

Production continues to decline steadily in all Ohio fields. Demand for coal in the Columbus market has declined further, and with the continued reduction in demand throughout the state operators are closing down until market conditions improve. As a result loadings in the southern Ohio field have fallen below 10 per cent of capacity. Only a few operations having steam contracts or railroad fuel agreements are operating. Eastern Ohio is somewhat better off, but the output in that section is being reduced radically. Domestic trade is practically dead. Pocahontas is not in as good demand as formerly and Ohio-mined grades are dead. Steam business, which usually is the backbone of the market at this time, also is flat. There is practically no steam contracting, as users are buying what they desire in the open market. Railroad contracts have now been closed, and in most cases at extremely low quotations. There is now less distress coal on the market than was the case two weeks ago. Only occasional inquiries for lake contracts are heard and practically no contracting has been closed.

An appreciable betterment in the market for slack and softening in prices of smokeless are the high lights of the Cincinnati market. The slack situation was to have been expected but the other is not so easy to trace. For several weeks the demand for the residue has been a little stronger than production, and with the gradual clearing up of distress coal, it was only logical that screenings should be a little harder to get. Generally speaking the free movement is on a \$1 basis, though there are some off grades from Kentucky that are selling 10 to 20c. cheaper. The big spread in the price of run of mine and block coal still continues. Here and there there is an inquiry for 2-in. coal for lake shipment, but the full swing of this business has not started. River business has been cut down appreciably through the stoppage of mining in the K. & M. fields of the Kanawha district. Specialized coals are quoted as follows: Block, \$2.75@3.25; egg, \$2@2.50.

The "no market" situation, accompanied by 100 per cent transportation facilities throughout the country, and the lighter shipping of lake cargo coal due to the heavy stocks at the head of the lakes, has brought about extreme heaviness in the Cleveland market. Large consumers are still drawing upon stocks and the buyer who enters the open market at this time to supply his needs is not of such sig-

nificance as to have any salutary effect whatsoever upon the market. Inquiries for fuel are scarce and the negotiation of contracts for current coal year requirements are negligible.

The Pittsburgh market is perhaps the dulllest on record, except for strike periods. Line consumers are buying scarcely any coal, depending on stocks and expecting lighter consumption. The steel industry has slowed down 10 per cent from the rate in early March. The lake season still lags. The lake shippers do not seem to be doing much even in the non-union fields.

Business at Buffalo is somewhat better, though some of the confirmed pessimists assert that the improvement is only in spots and that the general trade is unchanged.

New England Reports Light Trade

Only light tonnages are being placed in New England. Sales are confined for the most part, however, to relatively small lots forced on the market by factors who are obliged either to move demurrage coal or make room for arrivals. There are signs that this practice is less in vogue than a fortnight ago, and minimum prices are less heard from.

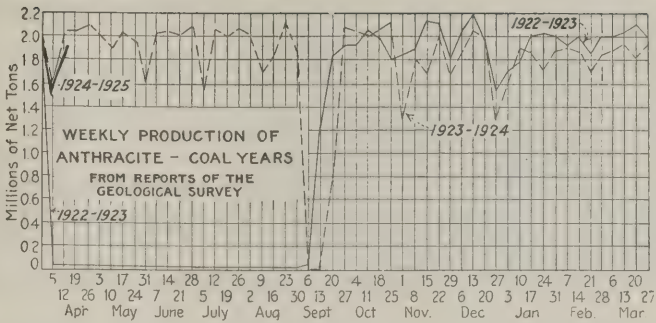
The Hampton Roads market shows the same indications. The volume of No. 1 and No. 2 grades on wheels has been reduced and spot prices are being more closely held at \$4@ \$4.25, depending upon grade. Certain of the agencies say now that no No. 1 Navy Standard coal can be bought at less than \$4.25 per gross ton f.o.b. vessel, and that statement probably is accurate as of this writing. In other words, there seems to be a firmer intention on the part of operators to curtail, and if held to long enough this policy would of course be effective.

All-rail from central Pennsylvania there is no material change. An increasing number of producers are determined not to mine coal at prices below the dead line. Money lenders are naturally encouraging this attitude, and while the way to improved conditions is an uphill road for the present it is clear that only by a close-hauled policy on the part of a large number of mine owners that present extremely low prices can be eliminated. A considerable tonnage of railroad fuel has been placed during the past fortnight or two at prices ranging from \$1.60 to \$1.75 per net ton, f.o.b. mines. The railroads generally will make a large saving on coal purchases during the current season.

Seaboard Markets Dull but Hopeful

Less coal is coming to the New York tidewater market. The average daily number of cars at the local terminals during the week was about 1,250, compared with about 2,000 a few weeks ago. While the market is draggy and dull there are some bright spots discernible. With free coals shortening and consumers reluctant to part with their reserve stocks there is a feeling that conditions will improve gradually. Reports from northern New York indicate more industrial activity with increased consumption. The local tidewater market showed a little more strength toward the week, both as to demand and prices.

Trade at Philadelphia is dull, but hope still persists that it will improve, though there are no signs that it will very soon. The one pleased person in the entire trade is the consumer, who feels that he has the upper hand now and can replace much of the stock that he is burning up at less than it cost him. Yet even this is no inducement for prompt filling in of the gaps that he is making. Spot prices are unchanged, and even though the same prices have ruled for



months the buyer seems to think that they may go even lower.

Little change is noticeable at Baltimore except for a marked renewal of activities for export movement. Despite restriction of production in a number of the fields, under agreements and otherwise, the supply at this point seems to be keeping up with the demand, which is exceptionally light.

Extreme dullness prevails in West Virginia with spot buying at the minimum and the bulk of loadings for contract delivery. As a result there has been a material curtailment in both high- and low-volatile fields and many mines are idle. The only improvement affecting smokeless mines has been at tidewater, due largely to curtailed shipments from the mines to the piers. Foreign inquiries are more numerous, largely as a result of a discussion of British labor troubles. Prices at the piers have steadied a little, but they are still unusually low.

Coal buying is lagging in the Birmingham market, inquiries coming in slowly and comparatively little new business being booked, either in steam and domestic grades. It seems difficult to interest consumers to the extent of stocking, little reserve supply being carried in any quarter. Contracting is still in its early stages, consumers apparently being of the opinion that there is no cause for special hurry to provide for future requirements. Spot sales of domestic sizes are light, contracts having been entered into by the principal dealers. Little distress coal is in evidence.

Anthracite Demand Below Expectations

While domestic sizes of hard coal are moving in good volume there is no rush. Dealers are taking their quotas of company coal and the larger independent operators are moving their tonnage without difficulty, but the smaller mines are not finding business so easy. Demand is not up to expectations. The easy winter and the knowledge that the miners are working under an agreement that will not terminate until next year have made the consumer indifferent. Even the fact that present prices are only for the month of April has no effect on buyers. Stove coal leads in activity, closely trailed by egg, with chestnut bringing up the third position. Call for pea coal is fairly good. The continued strength of barley coal is the feature of the steam market. It is in good demand and together with rice is moving steadily. Buckwheat drags along slowly. Unseasonably cool spring weather at Philadelphia and Baltimore has helped the sale of domestic sizes in those cities, but steam coals are in a bad way.

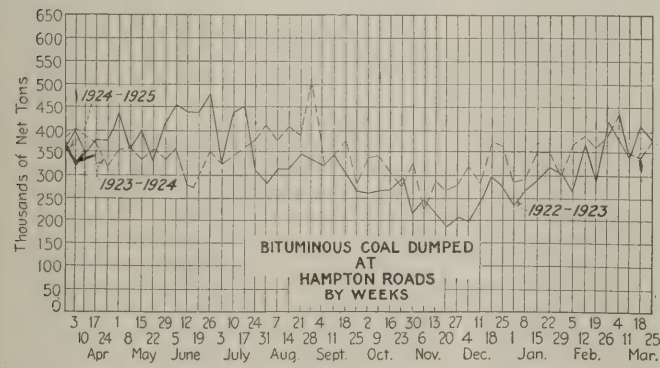
Connellsville Coke Market Stagnant

The Connellsville coke market reflects the decreasing activity in the steel trade in general and the extreme stagnation of the pig-iron trade in particular. Production of beehive coke during the week ended April 12 was 266,000 net tons, according to the Geological Survey, a decline of 12,000 tons as compared with the previous week.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended April 5, 1924.....	862,096	123,220
Previous week.....	907,548	154,680
Same week in 1923.....	996,375	164,195

	Surplus		Car Shortage	
	All Cars	Coal Cars		
April 7, 1924.....	278,724	159,438	551	.....
Previous week.....	248,301	135,976	364	.....
Same date in 1923.....	15,168	4,305	58,237	24,539



Foreign Market And Export News

Improved Outlook in British Coal Market; Colliery Output Rebounds

Operators and consumers are still having their difficulties in the Welsh market, though with an improved outlook for settlement of the miners' wage controversy there has been a slight slackening in demand. Most of the collieries are still heavily booked and have not yet caught up in deliveries. Buyers are fairly well stocked with supplies and the recent surplus of waiting vessels is less in evidence.

Home consumers are taking large quantities of coal so that in all there is little available for shipment abroad. There is considerable pressure for prompt supplies and prices are firm.

Heavy demands are being made by domestic consumers on the Newcastle market, especially for gas coals. Business with Europe has improved slightly, so that all the collieries are busy. Prices are firm.

A court of inquiry to investigate the miners' wage question has been named by the Ministry of Labor. Pending the outcome of the inquiry, the present wage basis will be continued. Elimination of the fear of a strike action and the Franco-German extension of the agreement regarding Ruhr coal deliveries are creating an easier tendency in the market and buyers are expecting lower prices.

A cable dispatch to *Coal Age* states that during the week ended April 5 the British collieries produced 5,852,000 tons of coal, according to the official estimates. This compares with an output of 5,745,000 tons during the week ended March 29.

Trade at Hampton Roads More Active; Prices Stiffen

Business at Hampton Roads is more active with considerable foreign movement and a stiffening in prices. Low stocks at tidewater added to the upward price movement.

Coal agencies reported that fully 40 to 50 per cent of the operations on the Chesapeake & Ohio, Virginian and Nor-

folk & Western had closed down temporarily because of overproduction.

Coastwise movement is dull, old contracts having been used up and no disposition being manifest on the part of consumers to come into the market heavily at this time. The tone of the market is firm and the outlook for business bright.

Business in French Market Above Seasonal Level

With the continuance of cool weather, business in household fuel in French markets is more active than usual at this time of the year. Trade in industrial fuel also continues to be satisfactory. With the decline of sterling, there has been a revival of coal buying in England, including a few orders for Cardiff semi-bituminous grades, which had been rather neglected of late owing to their high prices.

Following the meeting in Paris of Belgian and French house-coal producers, the Belgians, who had expected an amelioration of their coal market in the absence of British competition, and who are now fearful of the results of a fall in sterling, have changed their attitude and are now starting to apply summer prices on the following basis: 8 fr. premium per ton on all shipments by water during April, and 8 fr. per ton on all shipments by rail and water in May.

The new tariff of the Nord and Pas-de-Calais collieries, dated April 1, provides for a reduction of 3 fr. in the price of coal, and 8 fr. on ovoids, the new prices being applicable in all selling zones. On sized products, summer premiums are not applicable on ovoids, dry unscreened 50 per cent, nor on bituminous screened 50 per cent, nuts 30/50; dry coal for gas engines washed forging peas or briquets. Prices will be modified in case of wage increases and all taxes, increase on taxes, or any new tax on coal will be charged to the purchaser.

In spite of summer premiums granted by collieries, Paris dealers have decided not to alter their retail market list until further steps are taken.

Receipts of indemnity fuels by France and Luxemburg during March from the Ruhr were close to 1,000,000 tons.

Export Clearances Week Ended April 18, 1924

FROM BALTIMORE		Tons
For France		
Belg. Str. Gasconier.....		7,456
For Porto Rico		
Amer. Str. Major Wheeler.....		632
For Italy		
Ital. Str. Ignazio Florio.....		7,398
FROM HAMPTON ROADS		
For Brazil		
Br. Str. New Brunswick for Rio de Janeiro.....		8,011
Br. Str. Lady Astley for Rio Janeiro		4,082
Br. Str. Marie De Larrinaga for Rio Janeiro.....		4,800
For Canada		
Amer. Str. Harvey H. Brown for Halifax.....		4,021
Amer. Schr. Dorothy for Yarmouth, N. S.....		1,145
For France		
Fr. Str. Capitaine for Ouessant.....		6,157
Br. Str. Lancaster Castle for Brest..		7,683
For Italy		
Amer. Str. Middlesex for Genoa....		7,559
Amer. Str. Hampden for Genoa.....		7,532
Ital. Str. Lodovica for Trieste.....		626
Ital. Str. Cerea for Genoa.....		4,874
For Uruguay		
Nor. Str. Hesperos for Montevideo...		6,505
For West Indies		
Nor. Str. Bratland for Curacao.....		3,000
Nor. Str. Skogheim for Fort de France		3,888
FROM PHILADELPHIA		
For Cuba		
Dan. Str. Nord Amerika for Havana		

Hampton Roads Pier Situation

	April 10	April 17
N. & W. Piers, Lamberts Pt.:		
Cars on hand.....	1,546	1,473
Tons on hand.....	91,081	87,456
Tons dumped for week.....	126,711	118,343
Tonnage waiting.....	18,000	23,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,366	861
Tons on hand.....	105,800	58,950
Tons dumped for week.....	106,452	106,808
Tonnage waiting.....	962	.....
C. & O. Piers, Newport News:		
Cars on hand.....	1,450	948
Tons on hand.....	72,865	48,325
Tons dumped for week.....	70,670	86,219
Tonnage waiting.....	1,390	575

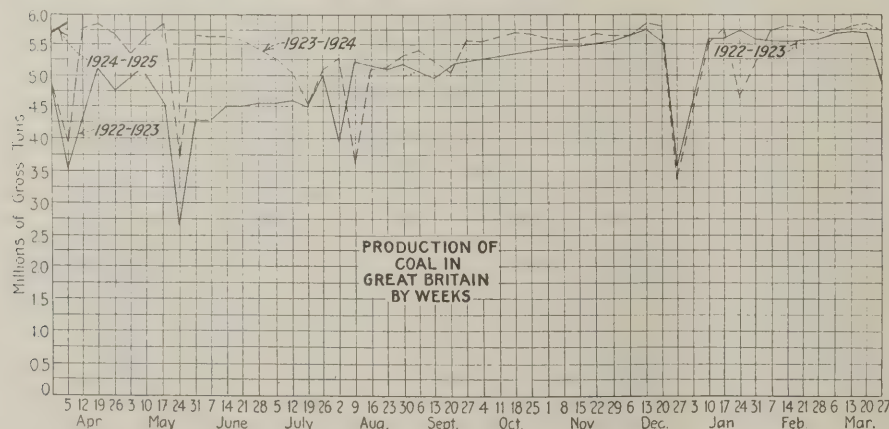
Pier and Bunker Prices, Gross Tons

PIERS		April 12	April 19†
Pool 9, New York.....	\$4.50@ \$5.00	\$4.65@ \$4.90	
Pool 10, New York.....	4.25@ 4.75	4.40@ 4.75	
Pool 11, New York.....	4.00@ 4.50	4.25@ 4.50	
Pool 9, Philadelphia.....	4.80@ 5.20	4.80@ 5.20	
Pool 10, Philadelphia.....	4.55@ 4.90	4.55@ 4.90	
Pool 11, Philadelphia.....	4.35@ 4.65	4.35@ 4.65	
Pool 1, Hamp. Roads.....	4.25@ 4.35	4.35@ 4.45	
Pool 2, Hamp. Roads.....	4.00@ 4.15	4.15@ 4.25	
Pools 5-6-7 Hamp. Rds...	4.00@ 4.10	4.00@ 4.15	
BUNKERS		April 12	April 19†
Pool 9, New York.....	4.80@ 5.30	4.95@ 5.20	
Pool 10, New York.....	4.55@ 5.05	4.70@ 5.05	
Pool 11, New York.....	4.30@ 4.80	4.55@ 4.80	
Pool 9, Philadelphia.....	5.10@ 5.55	5.10@ 5.55	
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20	
Pool 11, Philadelphia.....	4.65@ 5.00	4.65@ 5.00	
Pool 1, Hamp. Roads.....	4.25@ 4.35	4.35@ 4.45	
Pool 2, Hamp. Roads.....	4.00@ 4.15	4.15@ 4.25	
Pools 5-6-7 Hamp. Rds...	4.00@ 4.10	4.00@ 4.15	

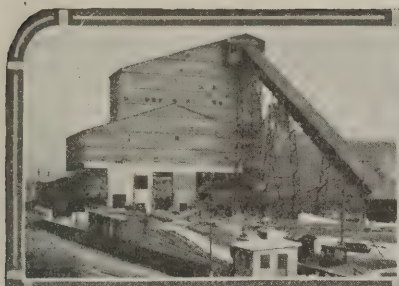
Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to <i>Coal Age</i>		April 12	April 19†
Cardiff:			
Admiralty, large....	31s.		30s. @ 31s.
Steam smalls.....	22s. 6d. @ 23s. 6d.		23s. 6d.
Newcastle:			
Best steams.....	27s. @ 27s. 6d.		27s. @ 27s. 6d.
Best gas.....	25s. 6d.		25s. 6d.
Best bunkers.....	24s. 6d. @ 25s.		25s.

† Advances over previous week shown in heavy type, declines in italics.



News Items From Field and Trade



ALABAMA

A. B. Aldridge and associates have purchased from the Sloss-Sheffield Steel & Iron Co., 18,000 acres of coal lands in Walker County, 40 miles west of Birmingham, for a consideration said to be between \$300,000 and \$400,000. This acreage is adjacent to land being worked by Mr. Aldridge and associates in supplying coal to the Alabama Power Co. for its big thermo-electric plant on the Warrior River.

The Pratt Consolidated Coal Co. recently completed a small slope at Mineral Springs, near Birmingham, and installed a washing plant for the preparation of the coal.

The No. 2 coal mine of the Alabama Company, at Lewisburg, has reached a depth of around 1,600 ft. and will soon be producing coal in quantity. Contracts have been let for a washery and other modern equipment for the mining and preparation of the coal. It is expected to push the production of this slope to around 2,000 tons daily ultimately, supplementing the production from old No. 1 mine located about a mile distant from the new opening.

The Roden Coal Co. recently installed concentrating tables and dewatering process for the better preparation of its output at Marvel mine, in Bibb County.

Moss & McCormack are doing some prospecting work and making preliminary plans for the development of the large tract of coal lands in Fayette County leased from the federal government some months ago. There is 1,840 acres in this tract, which carries several seams of workable coal, the most valuable and extensive of which is the Jagger seam.

The Gulf States Steel Co. is contemplating the sinking of a new slope and airway at its Virginia coal mines near Bessemer.

The new slope of the Bankhead Coal Co., recently reported, is expected to begin producing coal about June 1. A steel tiple and rotary dumps are being installed and the spur track is about completed. The mine is located at Bankhead, Walker County, the Mary Lee seam being mined.

The Bush interests have recently made additions to their coal-washing plants at Majestic, Bradford and Dixiana, practically doubling the capacity. The output of these mines is used principally in the by-product ovens of the Alabama By-Product Corporation, at Boyles.

ILLINOIS

Herbert E. Bell, of the Bell & Zoller Coal Co., of Chicago, operators of the two big Zeigler mines in southern Illinois, is about to erect a 23-story office building on Michigan Boulevard, in Chicago. R. H. Zoller, vice-president and general manager of the same coal company, a short time ago opened the Lake Shore Drive Hotel, 181 Lake Shore Drive, Chicago, a luxurious eighteen-story hotel fronting on Lake Michigan.

In spite of demoralized conditions in the coal industry, Peabody mine No. 6, near Springfield, made a record hoist one day recently, when it raised 3,717 tons of coal in eight hours, breaking the former record made May 23, 1923, when 3,225 tons was hoisted. A check of figures showed that 1,601 pit cars were hoisted, filling seventy-nine railroad cars.

The Springfield District Coal Co. has purchased about 400 acres of land at from \$75 to \$100 an acre.

KANSAS

Despite the cessation of work in the mines Kansas miners are going ahead with preparations for the state first-aid meet to be held in Arma on May 17. In addition to the state forces C. E. Saxon and P. E. Keegan, of the Bureau of Mines, are conducting a number of training classes.

Alex Howat, who was booted out of the union for calling an unauthorized strike two years ago, must go back to work in the mines in order to get back into the union. This was the word he got from international headquarters of the union at Indianapolis early this month when his case got a sort of hearing. James Harvey, member of the district board in Kansas reported that Howat was informed he was not put out of the union for life but that he must get back by exactly the same route that any other member must follow.

Certificates of completion of 12-week courses conducted under the Smith-Hughes act were presented to more than 150 Kansas miners at their "commencement" in the Kansas State Teachers College of Pittsburg the night of April 9. The men took work in mining, electricity and allied subjects. More than twenty classes were conducted at night in camps throughout the district by instructors of the Teachers College or miners who had been previously trained by the college. Charles F. Spencer, president of the Southwestern Interstate Coal Operators Association, was the principal "commencement" speaker.

The Cherokee Fuel Co. has been purchased by the Sinclair Coal Co., effective May 1. Both are selling agencies with offices in Kansas City, Mo., and Pittsburg, Kan. All the business will be conducted under the Sinclair company. The Cherokee has been handling the output of the Carbon Coal Co. and of the J. R. Crowe Coal & Mining Co.'s Kansas mines. The Crowe company itself sells the output of its Oklahoma mines. E. E. Trotter, Kansas City, sales manager for the Cherokee, will be retained by the Sinclair.

John H. Crawford, presiding judge of the Kansas Court of Industrial Relations, has announced that that body will take no hand in the cessation of coal-mining operations in Kansas. Two weeks after the general stoppage of work found more than 500 cars of coal on the tracks in the Pittsburg field awaiting orders. Under these circumstances no emergency exists, the public welfare is not affected and there is no occasion for the court to intervene, Judge Crawford said.

Attorney General C. B. Griffith of Kansas has given Judge J. H. Crawford of the Industrial Court an opinion that the state mine inspector should pass an examination and be granted a certificate by the State Mining Examining Board before qualifying to hold the position. Leon Besson assumed the position of inspector April 1 without meeting this requirement. Crawford has checked the matter up to the two members of the court, who made the appointment over his protest, and if they do not act it is probable that mandamus proceedings will be instituted by the Attorney-General to compel the inspector to take the examination.

The Central Coal & Coke Co. and the Pittsburg & Midway Coal & Mining Co. have recorded leases on several hundred acres of land in Labette County, near Edna, thirty miles west of the developed Crawford-Cherokee County field. All land within a radius of several miles of Edna is now under lease as well as the entire south portion of Labette County from Edna east of Chetopa. This land is contiguous to large tracts in Oklahoma on which the Central has taken leases within the last two or three years. The Labette County land has been leased for about \$35 an acre with a damage clause calling for \$75 an acre for land used in mining operations. The coal, which is 250 to 425 ft. below the surface, is said to have been shown by drilling to be from 4 ft. to 8 ft. thick and to be shiny black coal of high fuel value. This field is served by the Missouri-Pacific, M. K. & T., and Frisco railroads.

The Valentine Coal Co., capitalization \$60,000, has been granted a Kansas charter. It has holdings near Pleasanton, Kan., and Worland, Mo., where John Valentine, manager and heaviest stock-

holder, has operated shovel mines for some years. The main office will be in Worland. The Kabonic & DeGasperi Coal Co., capitalized at \$6,000, also has been granted a Kansas charter. It is a consolidation of the Kabonic Coal Co. and the DeGasperi Brothers Coal Co., operators of small shaft mines in Crawford County. Its office will be in Frontenac.

The Missouri-Kansas Coal Co., with offices in Kansas City, Mo., has leased for six months, with a purchase option, a shaft mine at McCune, which had been operated for a year by the Osage City Labor Exchange. This is a machine mine and had been handicapped by inadequate electric service, which recently was remedied.

KENTUCKY

E. L. Douglass and John W. Ritchie were appointed receivers for the mining properties of Jewett, Bigelow & Brooks in Kentucky at a hearing before Judge A. M. J. Cochran in the U. S. Court for the Eastern District of Kentucky sitting in Covington on April 15. This action was taken on the demand of several of the creditors not satisfied with the progress being made under the creditors committee appointed late in January. Default on payments to the Harvey Coal Co. of Knoxville, Tenn., former owners of one of the mines of the company also caused action from that quarter. The assets of the company have been estimated at \$5,000,000 by accountants and the financial troubles date back about three years, as told at the time that the creditors committee was formed. Separate action was filed against the Hazard-Jellico Coal Co. because a different set of owners were involved. Mr. Douglass has had direction of the J.B.B. mines for several years and Mr. Ritchie hails from Cincinnati and is the head of the Credit Men's Association there and skilled in the direction of receiverships.

The Deance Coal Co. is soon to build a substation in Happy.

The Chickasaw Coal Co. has been incorporated in Madisonville, with a capital stock of \$25,000, by James D. Overall, J. Basil Ramsey and others.

A voluntary petition in bankruptcy has been filed in federal court by the Drakesboro Coal Co., Drakesboro, Muhlenberg County, listing its liabilities at \$13,197, of which \$13,105 represents unsecured claims and its assets at \$11,080, of which \$10,000 represents property.

MISSOURI

One hundred miners employed by the Madison County Coal Co. have petitioned for a receiver for that company to be appointed by the Circuit Court of Madison County at Edwardsville. The miners in the petition contended that the company was unable to meet a payroll of \$13,000. Thomas R. Harris, of St. Louis, is president of the company. Slow collections are said to have caused the company embarrassment.

NEW YORK

The Mahoning Coal R.R., a subsidiary of the New York Central system, has declared a dividend of 20 per cent on the common stock, payable May 1 to holders of record April 17. A similar dividend was paid on Feb. 1. Patrick E. Crowley has been elected president and a director of the company, to succeed A. H. Smith.

The Atlas Powder Co. announces the removal of its New York Office from the Fifth Avenue Building, 200 Fifth Avenue, to the Park-Lexington Building, Park Avenue and 45th Street, the new phone number being Murray Hill 1411.

John M. Davis, president of Manning, Maxwell & Moore, and George B. St. George, president of the St. George Coal Co., have been elected directors of the **Coal and Iron National Bank**, Liberty and West Streets, New York City. They succeeded John L. Kemmerer, of Whitney & Kemmerer, and Henry Maynard of the Central Railroad of New Jersey, who resigned.

In its annual printed report for 1923 the **Delaware, Lackawanna & Western R.R.** reports net income of \$12,378,001, equivalent to \$7.09 per share on the \$87,277,000 of capital stock of \$50 par value outstanding. In 1922 net income was \$10,475,929. These figures agree with the preliminary report already published.

The **Peerless Anthracite Co.**, of Buffalo, has gone into involuntary bankruptcy. It was established some months ago by H. L. Snyder, of Buffalo, but has not been in

E. J. Berwind, president of the Berwind-White Coal Co., has retired from the directorate of the Erie R.R. active operation lately.

The **Akron Coal Co.**, of Akron, Ohio, announces the opening of a sales office at 872-74-76 Ellicott Square, Buffalo, in charge of J. Fred Morlock.

The **C. P. Brodhead Coal Co., Inc.** will be located May 1 in the Cunard Building, 25 Broadway, New York City.

OHIO

The **Columbus Board of Purchase** has awarded the contract for 10,500 tons of Hocking nut, pea and slack to the **Sunday Creek Coal Co.**, of Columbus, at its bid of \$1.45 at the mines. The freight is \$1.26, making the coal cost \$2.71 delivered. The coal is to be used by the municipal light plant, waterworks department and garbage department.

The **Chauncey mine**, near Athens, is preparing to start operations after an idleness of several months.

The **Northern Fuel Co.**, Columbus, recently chartered, has been organized by the election of H. H. Heiner, formerly president of the Maynard Coal Co., as president, and H. H. Heiner, Jr., vice-president and secretary. Offices have been opened in the Guarantee Title & Trust Building. H. H. Heiner, Jr., will have charge of the Toledo office, which is located in the Nasby Building. The company will wholesale all kinds of coal and has obtained connections with several large operations in West Virginia and Kentucky.

The **Goat Hill Coal Co.**, Bergholz, has been chartered with an authorized capital of 5,000 shares, no par value, designated to mine and buy and sell coal. Incorporators are Harry D. Eynon, John J. Davis, Delmer Johnson, John J. Freed and John C. Amstutz.

The **Boone Coal Sales Company** long established in the Dixie Terminal Building, Cincinnati, have joined the rapidly growing colony in the new Frederick H. Schmidt Building.

The **Norwood School contract** was closed on April 14 with Henry Feldman, of Cincinnati, as the successful bidder. There were eleven firms that put in bids for the business, which called for smokeless coal and the range of prices was from \$4.85-\$6 delivered to the schools.

A meeting of the creditors of the **Maynard Coal Co.**, which has been in the hands of receivers Frank L. Stein and William S. Harman for several months, was held in Columbus April 8, to discuss the possibility of reorganizing the concern. Several plans were proposed for a reorganization so that the receivership could be lifted. A committee of creditors consisting of Messrs. Fox and Meiner of Chicago, bankers, and Fred Essex, a coal operator of Columbus, was named to canvass the situation and report at a meeting to be called later.

Eugene Dubuis, who has been manager of the Columbus office of the Philadelphia & Cleveland Coal Co. for the past two years and previously traffic manager of the same company, has resigned to go with the Consolidated Mining Co., No. 8 East Broad St., in the sales department. H. S. Brown, Cleveland, has been named manager of the Columbus office in his place.

The **Pittsburgh & Bessemer Coal Co.**, of Columbus, has been named exclusive agent in Ohio and northern territory for the product of the Boone County Coal Corporation, of West Virginia. In order to enlarge its sales department D. D. Davidson, formerly connected with the Gibraltar Coal Co., has become associated with the Pittsburgh & Bessemer Coal Co.

PENNSYLVANIA

The Philadelphia & Reading Coal & Iron Co. and the Lehigh Coal & Navigation Co. have awarded contracts for anthracite stripping operations near Pottsville, in the Mammoth vein, said to be one of the largest in the world, reaching a thickness of 100 ft. in some places. The Philadelphia & Reading will open thirteen mines on Locust Mountain from Ashland to Shamokin, the Lehigh contract being for operations on land controlled by one of the company's subsidiaries. It is expected that more than 4,000,000 cu. yd. of earth and stone will be removed in the latter operation and that about six years will be required for its completion. An electric shovel weighing 38 tons will be used.

Effective April 1st, the **Pittsburgh Steel Co.** began operating its coal and coke operations under the name of the **Monessen Coal & Coke Co.**, instead of the **Pittsburgh Steel Co.**, as heretofore. The company's operations are Alicia No. 1, near Brownsville, in Fayette County, consisting of a large shaft mine, 400 rectangular coke ovens, coke screening and storage plants, with both river and rail loading facilities, machine shop and marine way, and Alicia No. 2, in Greene County about twenty miles up the Monongahela River from Brownsville, consisting of a large coal mine with both river and rail loading facilities.

The property of the **LaBelle Coke Co.**, at LaBelle, Fayette County, on the Monongahela River and the Monongahela Ry., which has been held under lease by the Peabody interests of Pittsburgh, is being taken back by the owners, the LaBelle Iron & Steel Co. The plant, consisting of 200 beehive ovens and a mine, has been idle since the middle of last month, due to refusal of the employees to work for reduced wages. The employees have not been paid since the mine ceased operations, and on April 1, the company store and office were completely destroyed by fire, thought to have been of incendiary origin. The LaBelle Iron & Steel Co. is a subsidiary of the Wheeling Steel & Iron Corporation.

A state charter has been issued to the **Daugherty Mining Co.**, to acquire coal lands and develop and operate them, with a capital stock of \$15,000. The incorporators are Percy M. Willis, Hendersonville, treasurer; Henry C. Daugherty, Finleyville, and Jesse C. Bortz, Hendersonville.

In order that the company can perform two operations at one stop, the **Baltimore & Ohio R.R.** has purchased 23 acres of land at the Yoder coaling station, at Myersdale, on which the company will construct a twenty-three acre storage dam for water for engines and erect a watering station in connection with the coaling station. The dam will impound a large body of unpolluted water, suitable for steaming purposes.

The **Jeddo-Highland Coal Co.**, will begin work soon on a new stripping operation in the Lehigh region. A mining village now occupies the site that will be worked.

Elmer O. Long, formerly of the engineering department of the Consolidation Coal Co., has resigned to accept the position of superintendent with the Listie Que-mahoning Coal Co., having charge of four mines in Somerset County.

UTAH

Utah loses all title to school section land in Kane County, township 40 south, range 8 west, by a decision just handed down by Eli F. Taylor, U. S. register of the land office. The Government contested the title on the ground the land was known to contain coal before the state's title attached. Section 2 in township 41 south, range 9 west, is retained by the government in the same action. Kane County is well provided with coal lands though they have never been developed as they have in Carbon County.

The cost of state inspections of coal mines in Utah, according to the Utah Industrial Commission, was less per million tons of coal mined in 1923 than in Wyoming, Colorado or Washington, being but \$550 for every million tons of coal mined during the year.

The **Great Western Coal Co.**, which filed leases on coal lands in Gordon Creek, Carbon County, was the successful bidder at the auction for the leases last week. A minimum of 27,000 tons annually must be mined by the company and \$45,000 must be expended on development in three years.

WEST VIRGINIA

The **Wheeling Steel Corporation**, Wheeling, is planning one of the largest coke-manufacturing plants in its section of the United States. The company's present plant across the river from Steubenville, Ohio, is to be increased. Ground has been broken and several hundred men are at work on this project. More ovens will be built and the present construction of the plant will be changed, as the plant is now working at capacity, but is unable to feed all of the corporation's furnaces. The company also will have one of the largest industrial railroad yards in the Ohio Valley to handle cars used for raw and finished products.

The **Sterling Island Creek Coal Co.** is the name of a new concern organized with a capital of \$25,000 to produce coal in the Logan County field. Among those interested in this company are W. L. Taylor, of Logan; W. T. Spicer, Molly Spicer, B. T. Spicer and Eddie Cameron, of Stollings. The company's general office is to be at Stollings.

G. H. Nowlin, Jr., of Lynchburg, has resigned as president and treasurer of the Smith Pocahontas Coal Co., effective April 1. The Smith Pocahontas Coal Co. operates mines at Caloric, W. Va., the general offices of the company being at Lynchburg.

The **Cleveland-Morgantown Coal Co.** has purchased 115½ acres of Sewickley coal in the Cass district of Monongalia County from Allison S. Everly and wife. The consideration was \$46,316. Henry A. Phillips has purchased 64½ acres of Pittsburgh coal in Clay district of the same county, the consideration being \$11,448.

Robert Talbott, well known in Fairmont coal circles, and his associates have just organized two new coal companies. One of them is to be known as the Talbott Fuel Co. and is capitalized at \$450,000. Interested in it are Robert Talbott, J. Paul Talbott, Robert Talbott, Jr., H. Glenn Hood and C. A. Hannah, all of Fairmont. The other new Talbott concern is to be known as the Robert Talbott Co., also with offices at Fairmont. This company is capitalized at \$350,000, the same people being incorporators.

James E. Barnes has resigned as second vice-president and district sales manager of the Logan Fuel Co. He had been in charge of the Dayton office of the company. Mr. Barnes had been active in the coal industry for the last 20 years. It is stated that Mr. Barnes will devote the greater part of his time in the future to the Dayton Standard Scale Co., of which he is general manager.

The **Harlan Ashless Coal Co.**, of North Fork, has just been launched with a capital stock of \$150,000, the general office to be at North Fork. This company was organized to operate in McDowell County on an extensive scale. Largely interested in the new company are Abe Forman, of Kimball; Harry Totz and W. S. Ray, of North Fork; M. H. Clark and P. G. Haines, of Welch.

WASHINGTON, D. C.

The appeal of James C. Davis, Director General of Railroads, against **Dexter & Carpenter, Inc.**, was sent April 14 by the U. S. Supreme Court to the **Circuit Court of Appeals for decision**. This involves a suit by Dexter & Carpenter for additional compensation for coal seized in the name of the Director General just prior to the coal strike of 1919 and used in the operation of the Baltimore & Ohio R.R. The coal from West Virginia mines, was en route to Baltimore for export when seized. The Director General paid the company the mine cost of the coal. The company sued for additional reasonable compensation. The District Court decided against the company, but the Circuit Court of Appeals reversed this and the District Court then awarded \$27,264. It was from this that an appeal to the Supreme Court was taken. The high court decided that the Circuit Court of Appeals should pass upon the award.

CANADA

The **Eastern Coal Dock Co., Ltd.**, of Montreal, with a capital of \$50,000, has been incorporated to manage dock properties and carry on business as coal dealers by Edward W. Wright, John B. Allen and D. J. Nickle, all of Toronto.

Traffic News

To Reopen New England Rate Division Case

Announcement was made in New York on April 14 that the Interstate Commerce Commission will on May 12 reopen the New England rate division case.

The roads that will lead the fight for a modification of the terms of this decision are the Central Railroad of New Jersey and the Delaware & Hudson, but it is expected that numerous other lines also will appear before the commission. The Erie filed an application for exemption before either of these roads, and it is understood that the roads of the Central freight territory, such as the Wabash and the Pere Marquette, contemplate entering the fray.

Meanwhile, according to counsel for one of the roads concerned, the New England roads have opened negotiations looking toward a settlement of the case, which was in the courts for more than a year previous to the final decision by the Supreme Court upholding its validity last summer, without further litigation. While they have not indicated just what measures they will take to counteract the effects of the move by the Jersey Central and the Delaware & Hudson, it is believed that these lines will bring forward proposals of their own for increased divisions even over the present rates.

The New England lines affected include the New York, New Haven & Hartford, the Central New England, the Boston & Maine, the Central Vermont, the Rutland, the Maine Central, and the Bangor & Aroostook. The last-named road did not participate in the benefits conferred by the decision on the rest of the New England group.

The "New England divisions" situation grew out of a decision handed down by the Interstate Commerce Commission in 1922 awarding these roads approximately 15 per cent higher returns than they had previously obtained on through freight traffic. The decision was sustained in the Supreme Court last August, but at that time the court indicated that, although the decision was just in its general application to the situation, individual roads should be permitted to seek relief from its provisions.

New Rate War in Northwest

A freight-rate war is in sight on coal from western Kentucky to the Northwest, having been started by a low rate instituted by the L. & N. to points on the M. & St. L. in Minnesota and South Dakota, which are 80c. to \$1 lower than rates on other lines. A similar reduction is promised to points on the Chicago Great Western which would affect southeastern Minnesota and Iowa points. It is asserted that if these reported low rates are continued it will cut off Illinois and Indiana mines from the business of the Northwest. There is general displeasure being voiced by many coal interests and railroads.

Oppose Building of 50-Mile Coal Line by M. K. & T.

Examiners of the Interstate Commerce Commission oppose the building of a 50-mile branch line into the Henryetta (Okla.) coal fields by the Missouri, Kansas & Texas R.R. The company uses oil-burning engines and asserts that it might be forced back into coal burners at any time and would need its own coal supply. The examiners say there is an adequate coal supply for the railroad and to open a new coal field would cause overproduction.

Mine-Rating Case Hearing May 19

Hearings in the mine-rating case, postponed from April 23, will be held by the Interstate Commerce Commission May 19. Commissioner Aitchison will preside.

Coming Meetings

Chamber of Commerce of the United States. Twelfth annual meeting at Cleveland, Ohio, May 6-8. Secretary, D. A. Skinner, Mills Bldg., Washington, D. C.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

West Virginia Coal Association. Annual meeting May 13-17, Cincinnati, Ohio. Secretary, W. H. Cunningham, First National Bank Building, Huntington, W. Va.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

Mine Inspectors Institute of America. Annual meeting, Sinton Hotel, Cincinnati, Ohio, May 14-16. Secretary, Martin Bolt, State House, Springfield.

Retail Coal Dealers Association of Texas. Nineteenth annual convention, May 20 and 21, Vernon, Texas. Secretary, C. R. Goldman, Dallas, Texas.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

New Equipment

Rubber-Jacketed Portable Electric Cable

A heavy-duty portable cord with unusual tensile strength has been developed by the United States Rubber Co., 1790 Broadway, New York, for use under severe conditions. This cable is especially suitable for electric light extensions, and for use with portable electric tools. Much of this kind of cable is now in use on cable-reel locomotives, and in electric storage battery charging stations. When the cable is made up of two conductors, polarity identification is made possible by the use of different colored compounds used upon the individual wires. The two conductors are twisted together and the interstice filled with cotton to make the complete cable round. The outer jacket is of special rubber compound for resisting wear and the deleterious effects of acids and oils.

Hook Stick Makes Fusing Safe

A convenient and safe means of opening and closing the circuit of insulator and expulsion type cutouts, also for renewing fuses or for performing other operations is afforded by a combination safety plug puller and switch hook recently designed by the General Electric Co.

The device consists of a fitting

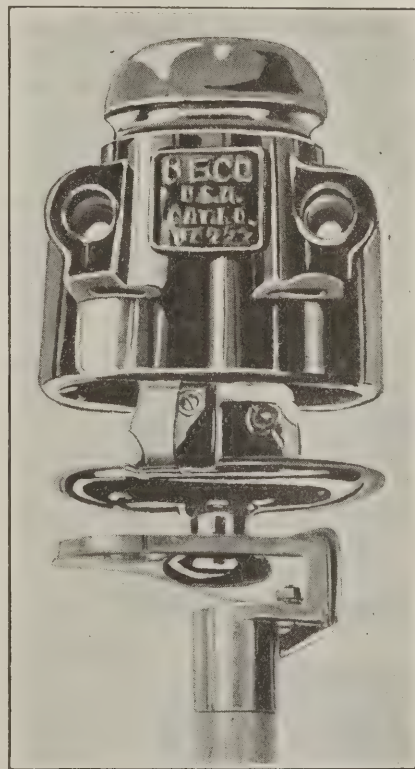


Fig 1—Safely Removing Fuse Plug

The fitting on the end of the pole securely grips the plug, and a slight pull easily withdraws it. There is no need to touch any part of the cutout until it is safely removed from contact with the line wires.

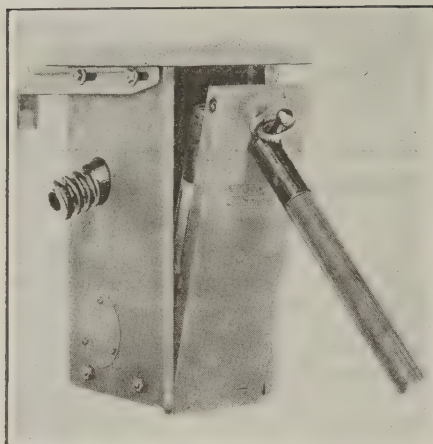


Fig. 2—Opening Fuse Compartment By Hook Stick

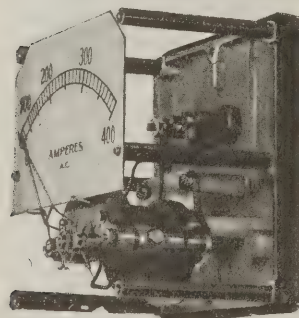
The use of the pole makes the opening of a fuse box of this type safe, the fitting on the end of the pole being specially adapted for this service.

mounted on the end of a treated maple pole. The enlarged portion of a slot in the fitting is slipped over the knob of the cutout plug, it is then guided to a position at the end of the slot where it is securely held by means of a spring. The puller is readily removed from the plug by a slight upward pressure and side push. The use of the puller makes it unnecessary to touch the plug with the hands at any time during its removal or replacement in the cutout.

A standard switch hook, mounted at the other end of the pole is designed to operate such expulsion type cutouts as are equipped with ring handles for this purpose. The device is suitable for use on circuits of 7,500 volts or less.

Meters Little Larger Than Their Scales

To meet the growing need for instruments which require minimum switchboard space and which nevertheless are accurate and easily readable, the Weston Electrical Instrument Co. of Newark, N. J., has recently developed a complete line of instruments of rectangular shape. All the meters of this group have uniform cases $5\frac{1}{2}$ in. wide.

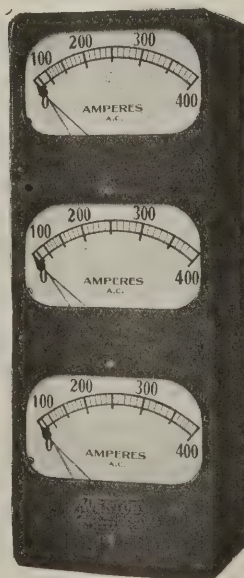
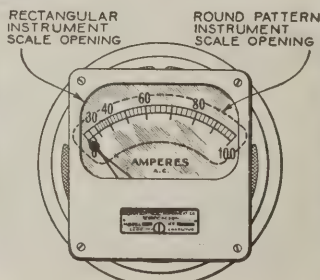


New Rectangular-Shaped Switchboard Instruments

Left—Wattmeter, and ammeter with cover removed.

Center—New instrument superimposed over round pattern showing scale openings and how same scale length was preserved.

Right—Triplex ammeter.



The scale on the new meters is the same size as in the instruments with round cases yet the switchboard space requirement of four instruments mounted side by side is about three-quarters that required for the round instruments. The illustration shows how this economy of space has been accomplished.

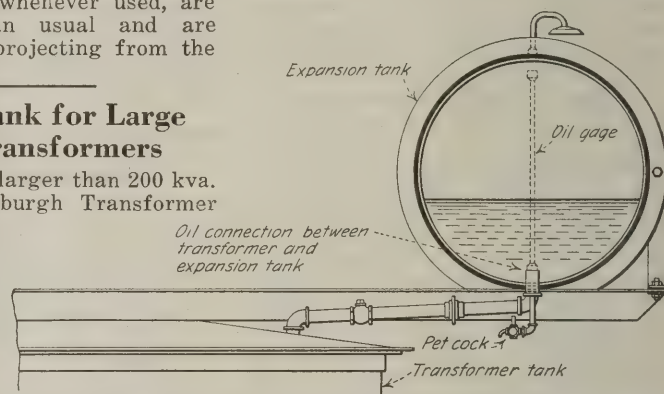
Where separate ammeters are required, as on three-phase circuits the triplex instrument, shown in the illustration, is useful. Larger and heavier scale numerals together with increased scale openings have greatly increased their legibility.

The wiring studs in the rear of the instruments have been grouped in the center. Resistors, whenever used, are much smaller than usual and are mounted on studs projecting from the rear.

Expansion Tank for Large Capacity Transformers

All transformers larger than 200 kva. made by the Pittsburgh Transformer Co. are air-tight and can be equipped with the new improved expansion tank recently designed by the company.

The tank minimizes the entrance of dirt and dust into the transformer oil; prevents rusting of the inside of the transformer tank; eliminates explosions due to ignition of any gas in the transformer; minimizes chance of moisture getting into the main tank, because a sump is provided in the expansion tank to drain off moisture; gives longer life to the insulating materials; and protects the oil from oxidation, thus tending to prevent sludging. The transformer tank can be completely filled with oil, thereby increasing the radiating surface due to the contact of the oil with the cover. Thus excessive heating and sludging of the oil is materially reduced.



Auxiliary Tank Keeps Transformer Oil in Good Condition

The pipe connection between the transformer tank and expansion chamber extends above the bottom of the latter, thus preventing moisture passing into the transformer. A pet cock at the bottom of the expansion tank drains off any water which gets into the oil.

Industrial Notes

In connection with numerous other improvements being made at the plant of the **Covel Smokeless Coal Co.**, at Covel, W. Va., a shaker screen is being installed by the **Roberts & Schaefer Co.**, of Chicago. The general office of this company is at Tams, W. Va.

The Cincinnati branch office of the **Stephens-Adamson Mfg. Co.** will, in the future, be in charge of **Walter E. Harris**, who for years has been the district manager at the **Huntington (W. Va.)** office, and is therefore widely known in the trade as an engineer and salesman of conveying and coal-tipple machinery. Mr. Harris will continue to head the **Huntington sales**. The engineering staffs of the company at both offices will be enlarged.

Willis C. Lincoln has been appointed Western sales manager of the **Electric Service Supplies Co.** with headquarters in that company's Chicago office. Mr. Lincoln has resigned from his former connection as manager of sales and engineering for the **National Railway Appliance Co.**, New York.

The **Simplex Wire & Cable Co.**, Boston, Mass., is enlarging its facilities for the manufacture of paper-insulated cable, a new four-story building with 40,000 sq. ft. of floor space having been constructed for the purpose. Increased storage space and larger laboratory facilities also are to be provided. The company's "Tirex" portable cord plant likewise is to have added facilities by the addition of 30,000 sq. ft.

The manufacturers of **Strom ball bearings** have changed the name of the company from the **U. S. Ball Bearing Mfg. Co.** to the **Strom Ball Bearing Mfg. Co.** No changes have been made in the personnel of the company, which is located at 4527-67 Palmer St., Chicago, Ill.

Lack of snow and rain in the **Sierra Nevada Mountains** threatens to reduce substantially the hydro-electric output of California, with consequent effect on economic conditions. Steam plants which are being rushed into service are said to be unable to meet the demand.

COAL AGE

McGraw-Hill Company, Inc.
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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

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"Safety at Last"

"SAFETY FIRST" has been bandied about for years without much result, at least at coal mines. "Safety at Last" might be a better description of our hope. Surely we have made little enough progress in the last decade or so. Now the Phelps Dodge Corporation with steeds thrice stolen is endeavoring to see if there is not somewhere a lock that will secure the stable door. With water, steam, adobe and rockdust, with shelving, gunite and projected dust, with sprayed undercutters and cars not loaded above the sides, surely the projected "Safety at Last" will be attained and none too soon.

It is fair to say that in no industry, save a few smaller ones like powder manufacture, is safety less readily attainable. The road to safety in coal mining is long and devious, we cannot start on our way too soon. Even as we write the Benwood mine disaster assures us that the journey to "Safety at Last" is almost as long as ever, though legislation in favor of rock dusting may be like an automobile lift on the weary road.

How Not to Avoid Taxes

OPERATORS having idle lands are disposed to operate them so as to make them earn something with which to pay their taxes. In many instances that is an ill considered action. The taxes have to be paid in any event. Why not let one area pay the taxes on another? The area worked can be made more efficient, forces will not be divided, and in the end, larger profits will be made. If a mine is opened in another county or township the taxes in that political subdivision will be increased with advancing prosperity and as a result, the total taxes paid in the long run may be higher rather than lower.

Unfortunately one's nature rebels against paying taxes indefinitely on an undeveloped, non-earning property, and the decision is made to develop it so as to make it pay its way—and perhaps something more. But this is a tendency to be resisted till the first territory is being operated at maximum efficiency and at such speed as to assure that the coal will be exhausted within the economic life of the surface buildings.

Twenty years from now better mining methods will have been discovered, and the mines opened now to meet the taxes will not be suited to the methods of that day. The only advantage of a new mine is a shorter haulage underground. The new mine will require less equipment than the old one, but just as much additional equipment in the old mine will provide the development that the new mine would supply.

A new mine absorbs all the enthusiasm that should fall to the old one, and the old operation becomes

neglected. It is best to curb that psychological desire to open up acreages just because they are a steady drain on income, for they may drain still more heavily when opened. Unfortunately, managers often are required to do not what is right but what is urged on them by impatient directors, who argue "Why did we buy if not to use what we bought?"

Union and Non-Union Territory

WITH few exceptions, union mines are in sections of the country having diversified industries, non-union mines being in areas where the coal and perhaps the lumber industries are the sole commercial activities. Difference of opinion will be expressed as to why this is so. Some will say that unionism cannot flourish where there are no other industries to which union men can escape when a strike comes and that where coal is the only industry the stores are not sufficiently financed or are owned by the coal companies. In the one case the merchant cannot support the idle union men and in the other case he will not. In that event the union men, who cannot get work during a suspension, cannot get supplies either and strikes fail.

Others will say that the age of the coal territory determines the degree of organized action of the employees and others again that coal-producing territory which has had many years of life develops capitalists who can invest in other industries and so has these activities as well as coal mining. Eventually they add, all territories which produce coal will be union and will produce other merchandise than coal.

Cause and effect are often difficult to separate and so much depends on leadership and solidarity among operators and mine workers that the social forces do not follow any law blindly. Wyoming, for instance, as far as the coal-mining regions are concerned, is a one-industry state, though cattle raising and sheep farming dispute this generalization. It is, however, neither old nor non-union. Maryland is old and has some local industries, yet it is largely non-union though it has many union adherents. Alabama has varied industries but is non-union.

With such exceptions in mind, however, it is nevertheless possible to state broadly that union areas have diversified industries, with farming as one of the more important of them, whereas non-union areas produce nothing but coal. In consequence, in times of a poor coal market men in non-union fields are not stimulated to discontent by higher wages or steadier work in industries competing for their labor. In fact if they left the mines their wages would be immensely lowered and work would be hard to obtain, whereas near union mines if wages were lowered it would be possible to get other work; and hence wages, regardless of the union, would have to be relatively higher than those in undeveloped or purely coal regions.

It is for this reason, or should it be these reasons, the non-union mines can lower wages to a figure to which the union mines could not lower them were there no union with which they had to deal. The non-union areas have naturally a low wage scale and can have it without any great discontent. The union areas have inevitably a high wage scale and must maintain some such scale or lose their men. This has proved to be a fact time and time again. The non-union fields have repeatedly lowered wages to a level to which the union fields could not have lowered them even if the union had not existed.

Miners are fairly mobile, but most of them merely move from one camp to another nearby. They rarely change from field to field. They are more mobile than in Europe, especially foreigners, but they do not leave one field for another readily. The cost and the uncertainties involved in moving make them "flit" rather than "fly," "move" rather than "migrate." Consequently wages will continue to be determined by local competition for labor rather than by national or international competition except where a strong union interposes to compel something resembling a uniformity of remuneration per unit of effort.

Too Many Grocery Stores

FOR many years the public has been cognizant of the fact that there were too many small retailers, men who made but little profit and used the labor of too many men, who scurried around for a little business that a few men could have handled had there been fewer establishments in the business.

That condition is duplicated at our bituminous mines. We should have fewer and better mining plants. The staffs at a number of mines should be concentrated on but half the number and every effort should be made to make these effective units instead of the limp organizations they too often are. The equipment in each mine should be the last word in effectiveness and efficiency, and no company can afford to make a general rejuvenation of all its properties at one time.

The wagon mine is not the only operation being eliminated; there should be many more mines than these laid idle, many of them of larger capacity, some of them perhaps efficient enough in their way as standards in the past have run, but not needed by the corporation that is operating them.

There are two reasons for closing down excess mines. One is that a mine working only a few days in the month does not produce cheap coal. One working only eleven days, for instance, finds its production cost raised almost 25 per cent. Working only seven and a half days, the cost of production is raised about 50 per cent. Another reason is that, as most companies can afford to equip well only a few mines with mechanical loaders and conveyors and all the proper equipment for safe, efficient and up-to-date operation such as will give reductions of almost 50 per cent in operating cost, it is better to close down a few mines and transform the rest. The latter will amply take care of the larger tonnage which low-cost production will afford, for reconstructed they will produce as much as the many mines now or formerly being operated.

We cannot afford to have mines working as listlessly and inefficiently as grocery stores.

Getting Down to Real Business

AT LAST there appears to be some hope that the manufacturers supplying the mining industry will adopt a one-price policy. Retail buying, especially of staples, has long been standardized, but when it comes to contracts for large quantities or big units, price-trading and bargaining is the indoor sport of the day.

In some sections of the field the practice of bargaining and price-cutting has become so bad that it is markedly uneconomic and unfair. Frequently the manufacturer submits his bid at a price much higher than that at which he expects to make a sale, and most of his agents' time is spent trying to find out, by any means possible, how much the original price must be shaded to get the contract. It is not unusual for many manufacturers' representatives to hang up at an expensive hotel for a week or more waiting an opportunity to get the inside track on the price. It is easy to see how an overzealous sales representative may reduce his price, on a wild tip, to a point where the manufacturer must sell at a loss.

The purchaser often sacrifices most when he thinks he has gained most. Brow-beating and delay sometimes make it possible for the purchasing agent to place an order at a price perhaps a thousand dollars or more under the first figures. But how does this react when the manufacturer realizes he can make no profit at the figure accepted? Does he not lower the quality of his product, let a defective part go into the order, refrain from sending along with the equipment the construction engineer who he intended should aid in its installation, omit important accessories which he would ordinarily supply?

How easy it is for the manufacturer and particularly a jobber to make up his loss on the sale of the original equipment by putting a high price on the repair parts, which generally do not receive the personal attention of the purchasing agent.

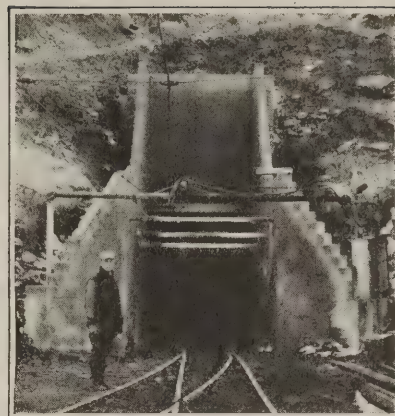
Then too, the purchaser must consider the demoralizing effect upon the engineering personnel when they find that they have recommended the purchase of one company's product and received that of another because the purchasing agent has been able to get a better price from another bidder. The losses occasioned by such last-minute changes after the engineering department has designed a layout and bought most of the material to fit in with the equipment recommended, are rarely less than the savings in first cost effected by the purchasing department.

Both manufacturers and coal companies will have to display considerable courage to minimize such economic crimes. The salesman's attitude must be changed and the purchasing agent will have to be made to feel he can serve best when he can confidently place his orders for good materials at a reasonable profit to the seller.

THE PRESIDENT OF A COMPANY is the court of last resort, the man who decides the big issues. Seldom are these men competent to make such decisions. Quite often they are lawyers, physicians, coal jobbers, traffic men—anything but engineers. Thus they need an exposition to clarify their ideas, and they will go to Cincinnati. But some are engineers themselves, you will say. But why speak of them? They will be there of volition as much as from a sense of duty.

Minimizing and Localizing Coal-Mine Explosions

Haulage Roads Adobe Dusted, Manways Rock Dusted
—Dust Barriers Placed at Strategic Points—Air Heated
by Radiators and Humidified by Steam and Water
—Undercutter Chains and Loaded Cars Sprayed



BY W. C. HOLMAN

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Dawson, N. Mex.

THE many coal mine disasters occurring during the past year have given impetus to, and aroused increased activity in, the study of ways and means for the promotion of mine safety. In the West particular interest has centered in the methods available of minimizing and localizing gas and dust explosions. At the present time much attention is focused on the experimental work being conducted at the Dawson coal properties of the Phelps-Dodge Corporation.

Through the co-operation of the management, the foremen and individual employees, much already has been accomplished. Officials of this company are always on the alert for new methods, continually conducting experiments, improving existing practice and rigidly enforcing safety rules, all of which tend to improve working conditions and to stimulate interest in safety.

In order to lessen the possibility of an explosion, as well as to dampen or arrest its propagation should it once start, "adobe" dust has been spread several inches deep on the main haulage roads throughout all mines. In each operation the main haulage is the intake air-course, and the disturbance caused by moving trips is sufficient to stir up this dust, whereupon the ventilating current carries it appreciable distances, depositing it upon ribs, roof, timbers and the like. Such inert dust deposits would undoubtedly tend to prevent the propagation of an explosion, no matter in what part of the mine it might initiate.



Fig. 1—General View of Surface

Openings to mines Nos. 1, 3 and 6 may be seen in this picture, also blacksmith shop, motor barn, fan house, mule stable, check cabin, lamp house and other structures.

Samples of dust from floors, ribs, roof and timbers are taken regularly each month and analyzed by the local chemist. A combined sample taken from all the mines ordinarily will show 85 per cent of incombustible matter or ash.

All motor roads that are treated with this adobe dust are continually raked and cleaned, one man in each mine being employed for that express purpose. He separates the coal and rock from the dust, piling them along the entry. These piles are removed about every two weeks. The dust itself is renewed from time to time as may be required, the length of these intervals depending much upon the ash content as shown by the report of the chemist. Loaders are not allowed to heap coal to any appreciable height above the sides of the mine cars. This is done primarily to prevent the scattering of broken coal along the haulage roads and also to avoid waste.

USE ROCK DUST WITH CEMENT GUN

Experiments are now being conducted in the manways of the various mines on the use of rock dust as a preventive of the spread of explosions. Quartzite or other metamorphic rock is crushed to pass a 200-mesh sieve, then thoroughly dried and sprayed into the air-course by means of a cement gun. By this method the floors, ribs and roofs of the entries are coated with this inert material. Rock dusting appears to be more economical than adobe dusting in return air courses and in such intake courses as are not used as main motor roads.

The use of adobe and rock dust on intake aircourses in all mines is now considered standard practice by this company. Beyond doubt it forms an effective safety measure for minimizing and localizing possible explosions. A scheme for coating the ribs and roof of all motor roads with adobe mud is also being tried. This is sprayed into place by means of a cement gun. The gun is mounted on a special truck, to which is attached a compressor and water tank as well as cars containing the adobe and all necessary accessories. The entire train thus formed is drawn through the mine by an independent electric locomotive.

In order to reduce the possibility of an explosion still further batteries of V-shaped troughs forming dust barriers have been installed at strategic points on the main entries and air courses and at all intersections of cross entries with main entries both on the haulage roads and return aircourses. A battery con-

sists of sixteen V-shaped troughs each from 10 to 20 ft. in length depending upon the width of the entry in which they are installed. These troughs are made from 1x8 in. boards and are supported near the roof of the entry on 2x6 in. stringers. They are filled with dry shale or rock dust which will average about 95 per cent ash. This dust is periodically tested and is renewed whenever it becomes too damp or too greatly contaminated.

At present the number of dust batteries installed in the various mines is as recorded in Table I.

Table I—Batteries in Phelps-Dodge Corporation Coal Mines

Mine. No.	Batteries	Mine. No.	Batteries
1	17	6	32
2	21	8	17
3	27	9	20
5	12		

Five automatic water barriers have also been installed on the main haulage road of Mine No. 5. Each of these consists of four ¾-in. automatic water sprays discharging within a space of about 10 ft.

As an experiment in humidification of the mine atmosphere, live steam is conducted into the main motor road of Mine No. 5 for a distance of 700 ft. Here it is forced through radiator coils from which it is discharged by ¾-in. steam jets into the air current. A 200-hp. boiler, installed near the mine portal, generates steam at a pressure of about 13 lb. gage. From the boiler it is conducted into the mine through a 3-in. main to eighteen of these radiators, each of which is made up of 1½-in. pipe in the form of an L, 10 ft. on the long side and 5 ft. on the short side, with a 2-in. junction pipe on each end. Each radiator is fitted with two ¾-in. steam jets which, together with five ½-in. jets on the main line, discharge steam into the air current.

In connection with this humidifier a ¾-in. automatic spray has been installed about 300 ft. beyond the radiator. This raises the humidity of the air slightly more than 10 per cent at this point.

Tests conducted throughout the mine showed a minimum humidity of 95 per cent at a temperature of 60 deg. F. during the month of January, 1924. The humidification system installed in this mine is in addition to

the trip sprays later described and the dust barriers already mentioned.

The cement gun is being used to cover the ribs, roof and timbers on the main motor road in all mines with a thick coating of gunite mixed in the proportion of one part cement to four parts of sand. When gunited all cracks and crevices are filled and the ribs present a far smoother surface than before, thus reducing the friction offered to the air current. No ledges or shelves protrude upon which inflammable dust may accumulate. Furthermore, the entries are lighter and more sanitary than before.

In all main entries 3-in. pipe is carried to within a few hundred feet of the advancing face. In tunnel entries 1½-in. pipe is used up to within 50 ft. of the face. These lines are provided with suitable connections every 100 ft. to permit of a hose being attached for sprinkling purposes.

In all rooms ¾-in. pipe is laid to within 20 ft. of the face, and 20 ft. of rubber hose is furnished to enable the miner or loader to sprinkle the coal before loading it into mine cars. The loader not only sprinkles the loose coal but is required to wet down the surrounding ribs and gob thoroughly for a distance of 50 ft. from the face. Regular sprinklers are employed to keep all mule-haulage roads and secondary aircourses in a safe condition.

To each mining machine a ¾-in. pipe is attached. This is reduced at the end and bent downward so as to allow water to flow on the feed side of the cutter chain, this pipe being connected to the water line by a 50-ft. hose. Thus while the machine is in operation water is discharged under the cut, saturating the coal dust as rapidly as it is made. The use of this device allays all coal dust produced in the undermining of the coal.

MINE CARS ARE DRENCHED WITH SPRAYS

Moreover, all loaded car trips are drenched by sprays before leaving their respective districts, and this process is repeated on the main partings. These sprays are made from 1½-in. pipe bent to form a loop about 36 in. in diameter and perforated with ¼-in. holes. Water is sprayed from them in such volume that each car receives about 15 lb. in passing. Water for operat-

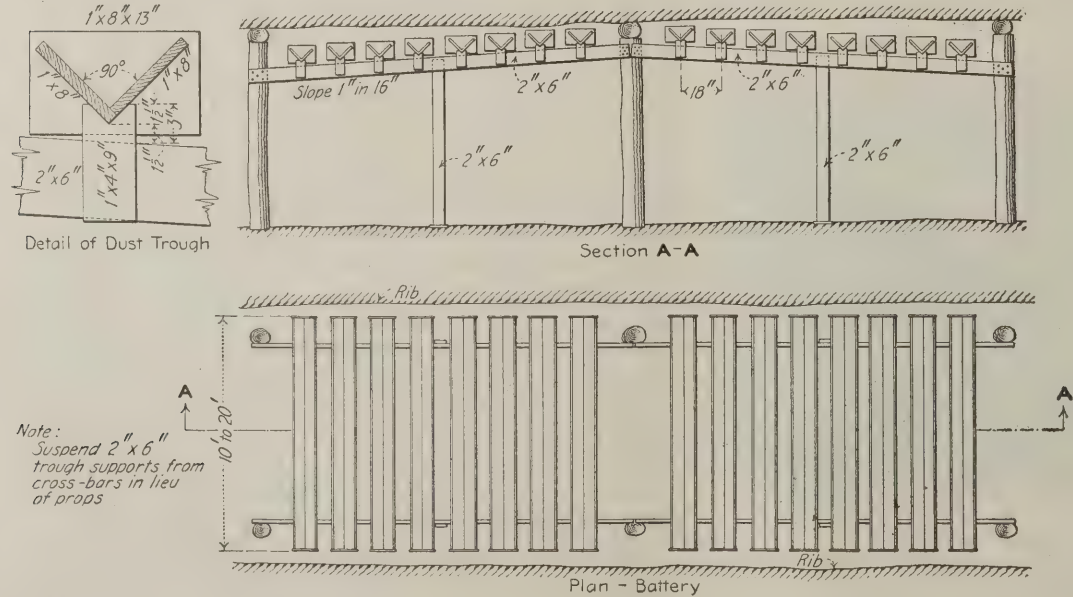


FIG. 2
A Dust Barrier
Fine stone dust is placed in the troughs which are supported near the roof of the heading in such a way that the force of an explosion even though comparatively incipient will upset them. The dust will therefore fall in a series of sheets extending across the heading effectively damping and extinguishing the explosion flame.

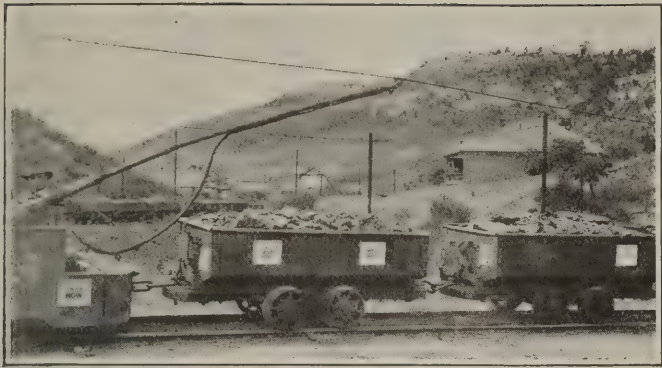


Fig. 3—The So-Called Silent Foreman

Of repeated reminders of possible danger do much to render men careful. They are most effective when given by word of mouth, but the next best thing is to make them visual. Posters, each carrying a warning of danger or admonition to be careful are here shown pasted to the sides of locomotive and mine cars.

ing the sprays and for sprinkling is pumped from the mine workings either directly to the main or into elevated tanks placed at such points on the surface as to secure a gravity head. The height at which these tanks are installed is determined by the pressure necessary. They are always kept full so that they may furnish water for sprinkling requirements in case of trouble with the pumps. Connections are also maintained with the city water mains.

The number of trip sprays maintained in the mines at the present time is recorded in Table II.

Table II—Sprays in Phelps-Dodge Corporation Mines

Mine No.	Sprays	Mine No.	Sprays
1	6	6	7
2	7	8	3
3	11	9	5
5	9		

In these mines the electric arcs caused by the usual type of trolley locomotives are regarded as a possible source of danger. Consequently storage-battery locomotives are now being installed experimentally. This installation will comprise 15-ton storage-battery machines so designed that they may be operated either singly or in tandem. The standard battery unit will be of 80 cells mounted on a four-wheel truck. When operated in tandem two of these units will constitute a single locomotive. This will be 16 ft. 6 in. long, 57 in. high and 68 in. wide, these being approximately the dimensions of the heavy locomotives now being used for main haulage. The charge in each unit will be freshened every time the machine reaches the outside which on an average will be once an hour. During the night the locomotive batteries will be completely charged.

Mining machines likewise will be equipped with 29-plate, 88-cell batteries carried on trucks especially designed to meet the requirements of the underground workings. By these means the ordinary electric sparks and arcs caused by the trolleys will be entirely eliminated.

At all mines double-inlet reversible fans are employed for ventilation purposes. These normally operate exhausting. Mine No. 5 is fitted also with an auxiliary fan. All these mine fans are operated on 220-volt current except those at Mines Nos. 1, 2 and 5, which are run on 2,200-volt circuits. In every instance a separate line supplies power to the fan.

The various mine offices, motor barns, lamp houses,

etc., are connected to the fan houses by an alarm system. This is intended to give warning in case of trouble with the fan motors. The largest fans in operation are those located at Mines Nos. 2 and 3. These are 18x6ft. machines rated to deliver 400,000 cu.ft. of air per minute against a 5-in. water gage, when operated at 150 r.p.m. Each normally consumes about 420 hp. Periodic tests are made of the power consumption and air delivery of these fans. When necessary, changes are made in their operation to assure that the required quantity of air is supplied to the mines.

One highly important detail of the ventilating system is the provision that air passing through worked-out or gobbed areas is not allowed to circulate through working places but is returned direct to the main aircourse. It is the practice to wall off as rapidly as possible all caved and abandoned workings. Concrete or cement blocks made of coke breeze are used for all permanent stoppings. Explosion doors are constructed at all fan houses to guard against injury to these machines.

MUCH ATTENTION GIVEN TO FIRST AID

It has been truthfully asserted that the most efficient safety device possible is a careful man. In order, therefore, to promote care and discourage carelessness on the part of every one, instruction in first aid has become one of the most interesting and important activities connected with the safety program of the Dawson mines. Every possible effort is being made to extend first-aid training.

In order to obtain maximum efficiency, classes have

SAFETY~ FIRST
BULLETIN
I

DANGEROUS ROOF
Examine and Test
the Roof at your
working place

Charles Roman — Room 5 — 6th East — No. 6 Mine

The result of carelessness
-STOP-
Do not take the chance
-LOOK-
Bar down loose coal or rock
-LISTEN-
Put up props if necessary

BE CAREFUL —
— PROTECT YOURSELF
! THIS MAY HAPPEN TO YOU !
TENGA BUEN CIUDADO
PHELPS DODGE CORPORATION
STAG CANYON BRANCH
JAN-1923

Fig. 4—A Typical Safety Bulletin

After an accident an investigation is made and its cause determined. The accident is then reenacted and various pictures taken. These photographs form the nucleus of an effective safety bulletin. The one here illustrated is typical and shows "how Charlie Roman got his."

been organized among the several nationalities employed in these workings and residing in the various sections of the camps adjacent to the mines. These classes are in charge of competent, trained, local instructors assisted by interpreters. The course of instruction is covered in ten lessons of two hours each after which an examination is held and a certificate awarded to those showing the necessary proficiency.

Between Nov. 1, 1923 and March 1, 1924, 950 men, 33 women, 25 boy scouts and 80 school children completed the first-aid training as prescribed by the United States Government and passed the examination given by the officials in charge of Bureau of Mines Rescue Car No. 2.

Safety bulletins also are prepared from time to time by the engineering department and distributed about the works. Causes for the common types of serious accidents are studied, and photographs made at the working places, the subjects used being well-known employees. This lends local color to these bulletins (which usually takes the form of blue prints with photographs mounted thereon) and makes them highly interesting to the miners. They are eagerly studied when posted in conspicuous places such as the lamp house and check cabin.

All accidents are reported by the foremen, such reports giving the cause of the mishap and suggestions for the prevention of similar occurrences in future. These reports are filed for future reference and study. When fatal accidents occur, safety inspectors visit the scene and make a detailed study of all the conditions there existing. From the report then made a sketch is drawn by the engineering department showing the working place, the accident and its cause. Prints of this drawing are embodied in the report which must be made to headquarters. They are also used for the study of ways and means for the prevention of other serious accidents of a similar nature.

Posters executed in various colors are pasted on the sides of pit cars or locomotives and covered with a coat of white shellac. Some of the inscriptions used upon these posters are as follows: "Set that prop now," "Be careful of your eyes," "Take down that loose roof," "Don't let machine jack slip." These serve to admonish those who see them that they need to be constantly on the alert for dangerous conditions or practices.

FOREMEN'S MEETINGS PRODUCE GOOD RESULTS

In addition to all of these precautions, semi-monthly meetings for all underground foremen and assistant foremen are held regularly. At these "get togethers" various subjects are discussed including the general conditions of the mines, the improvements of existing rules, the formulation of new regulations, the causes and results of accidents and the hazards expressed by accident records. Improvement of working places and many other interesting topics are also considered. At certain specified times, usually three times each year, the underground foremen meet in joint session with those employed on the surface. All are interested in safety and first-aid work, and these meetings are usually of a highly instructive character.

Some of the more or less general rules which have already been formulated and are now followed are:

Not more than 1½ lb. of permissible powder may be placed in any one hole. Adobe dust is furnished at all working places and must be used for tamping holes.

Shooting off the solid is not permitted. All coal must be undercut and the bug dust or cuttings removed before it is shot down. All shots must be fired electrically, connections being made to the underground feeder lines by the shotfirers, who are required to report outside before the rounds may be fired.

Other rules are: All missed holes must be reported to the fireboss who temporarily suspends work at that particular place until conditions are made safe. Miners have nothing whatever to do with the use of either powder or caps. Only magnetically locked safety lamps approved by the Bureau of Mines may be used and these are in the hands of foremen, firebosses and shotfirers who have been thoroughly instructed in their use. Open lights are strictly forbidden in underground workings. All employees are searched frequently and without previous warning for matches or other smoking materials. Any found guilty of violating this fundamental safety rule against carrying such materials into the mine are liable to immediate discharge.

"Rome was not built in a day," and genuine mine safety cannot be attained overnight. For its accomplishment is needed time and unremitting application. This is the end kept constantly in view by the owners of the Dawson mines who are attempting to foster care and caution by all known means. Unquestionably much has already been accomplished, but continuous effort on the part of all hands along the lines above described should yield even greater results in the future.

Raton Coal Equal to That from Ohio

ONE of the most valuable coal deposits in the western states in quantity, quality, and accessibility of the coal is that of the Raton coal field, in Colfax County, N. M., situated in what is known as the Raton Mesa region, of Colorado and New Mexico, an area that measures about 90 miles from north to south, and 50 miles from east to west.

The bituminous coal in this region, which occurs in two series of beds, compares favorably in quality with the best bituminous coal of Ohio. Much of the coal of the lower series will coke, and at many places this coal occurs in thick beds that are easily mined. Coal has been mined in the Raton field on a commercial scale since the early seventies. The first large mines, which were near Blossburg, were operated for many years but were finally abandoned, as coal could be mined to better advantage at Koehler, Van Houten, and Dawson. Extensive mines have been opened recently at Brilliant, Gardiner, Sugarite, and Swastika. During the 10 years from 1911 to 1920 the Raton field yielded more than 27 million tons of coal.

Though the coals of this region are among the best in the West, their quality differs greatly from place to place. Most of the coal beds of the Raton field are relatively thick, contain excellent coal, lie almost horizontal and are not much faulted, but at some places the coal has been coked or completely burned out by intruded igneous rocks.

A description of the southern part of the Raton Mesa region, with maps, is given in Geologic Folio 214, issued by the Geological Survey, Department of the Interior, and the geologic structure of the coal-bearing beds of the Raton field is described in detail in the Geological Survey's Bulletin 752, Coal resources of the Raton coal field, Colfax Co., New Mex., just issued.

Survey Shows Big Percentage of Illinois Mines Generate Their Own Electric Energy

Steam Is Universally Generated—Return-Tubular Boilers Predominate—
Steam Engines Popular but Several Plants Have High-Pressure Turbines—
Seventy-Eight Per Cent of Mines Operate Private Power Plants

BY A. J. HOSKIN

Acting Head, Mining Engineering Department
University of Illinois, Urbana, Ill.

INASMUCH as Illinois is one of the largest of coal-producing states, the equipment at its mines probably is fairly representative of American coal-mining practice. Consequently, data I have collected showing what types and sizes of boilers, engines, turbines, direct- and alternating-current generators are used at many of these mines to supply power to both steam- and electrically-driven machinery will exhibit the general trend of power generation and supply at the mines of this country. We are at a period in all mechanical industries when efforts are continually being made to improve the efficiency of power generation and of power consumption. Many coal operators are not progressive, but some are outstanding in these matters and may be said actually to pioneer in their method of solving power problems. Many high- and mixed-pressure steam turbines recently have been introduced at Illinois mines. A few magnificent electric power-generating plants have been erected by coal companies, and these contain all the refinements of operation to be found in up-to-date public-utility plants.

The economic conditions in the coal industry are discouraging to many coal men and it is likely that most of the old mines will continue till they are finished with their present power units or with renewals of the same types. Operators of new mines, however, will equip their plants with more-or-less standardized apparatus. The data regarding Illinois coal mines which follow are restricted to shaft operations because such mines are

far more numerous than slope and open mines and their power requirements are always greater.

Steam is generated at all Illinois mines, even where none is used to drive machinery—as at the few wholly-electrified mines. When steam is not maintained in readiness to run hoisting engines, fan engines, tippie engines or pumps, or for emergencies at such mines, small quantities are nearly always required for heating buildings and to supply water for wash-houses. The steam requirements greatly vary and are largest for big companies operating plants that generate electrical power for distribution to groups of mines owned by one company.

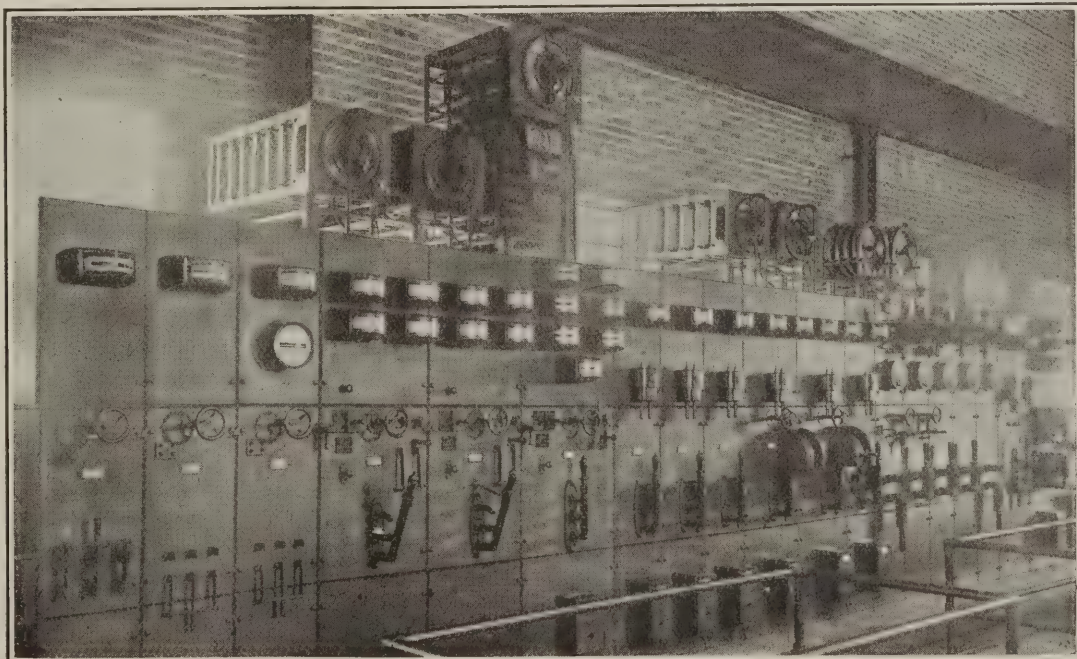
Consequently, it is to be expected that boiler equipments will vary widely in capacity, type and efficiency. The return-tubular type predominates, it being used exclusively at about 78 per cent of the mines. At 8 per cent of the other mines it is supplemented by other types. At these mines there are, on the average, nearly six—actually 5.8—return-tubular boilers per mine, each of an average rated capacity of 145.5 hp.

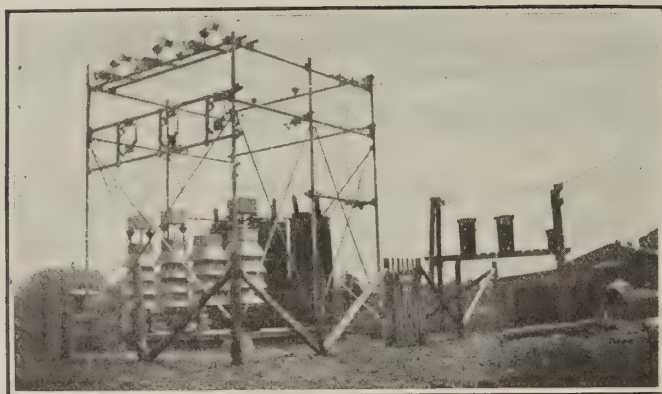
At 14 per cent of the mines the boilers are exclusively of the water-tube type. Adding the 8 per cent at mines having mixed types, 22 per cent of the mines use water-tube units. These mines have as an average three such boilers each, their average capacity being 368.9 hp. per unit.

Illinois coal-mine operators utilize 7.6 times as many old-fashioned return-tubular boilers as modern water-

Switchboard for Steam-Turbine Plant

Many of the larger plants erected by coal companies have all the refinements found in up-to-date public-utility plants. Some plants use mixed-pressure steam turbines, getting the low-pressure steam from large hoisting engines.





High Voltage Transformer Substation Well Protected

From this bank of transformers power is distributed for the various operations in and about the mine. Choke coils and lightning arresters protect the transformers from any surges or other disturbances which may come over the power company lines.

tube boilers. Wherever water-tube units are in use, they have 2.7 times the capacity of the average fire-tube unit.

Interesting and varying opinions are entertained by Illinois operators regarding the value of the fuel they consume under their boilers. Some operators insist that their power fuel costs them nothing, it being grades of slack that command no market. Other operators carefully assess their power plants with their consumption of screenings or run-of-mine at the local current prices for these grades.

It is common practice at some mines to send to the boiler rooms any grades of coal that are not finding ready market. This occasionally results in the consumption at the plant of the better grades such as nut and lump. One operator frequently orders his lump coal sent to his boilers, his argument being that his lump costs him no more than does his slack. He thus takes direct issue with those men who claim that their fuel costs nothing.

OPINIONS ON POWER COSTS ARE DIVERSE

These diverse opinions are encountered when one endeavors to ascertain the relative costs of power generation at different mines. One superintendent will claim his power costs him nothing except the labor and a small item for supplies and upkeep, while a neighboring superintendent finds relief in accounting for a high coal-production cost by referring to his excessive power-generation expense which involves the combustion of good run-of-mine coal that has cost at least so much per ton.

Where water-tube boilers are installed, automatic stokers are invariably used. They are employed also at a few plants under fire-tube units. About one-sixth of the boilers are thus fired.

For the generation of electric power at the mines the usual motive power unit is the steam engine. The variety of these units well illustrates the progress that has attended the building of stationary engines during the past forty years. Some of them are strikingly interesting because of their antique features. On the other hand, there are some fine high-speed, straight-line engines and several of the Corliss type. A few of these are compound engines and operate condensing.

At about 62 per cent of the mines, engines are used exclusively for driving the electric generators. The average plant includes two engines, and it is the practice to assign each engine to a separate dynamo. Eighty-

five per cent of these engine-generator sets are direct-connected, 12 per cent are belted, the remaining few being either geared or rope-driven. The average generator capacity per unit is about 187 kw.

Steam turbines are used exclusively at only 4 per cent of the mines. These generally operate upon high-pressure steam. However, at one plant the power is derived from a mixture of live steam with the exhaust steam from a hoisting engine. The average capacity of a turbine and its built-in, alternating-current generator is a little more than 1,100 kva.

At about 12 per cent of the mines the generators are driven both by engines and turbines. Invariably the engines drive direct-current dynamos, turbines being used to drive alternators. At these mines the average capacities of these respective units are 177 kw. and 619 kva.

At the mines which generate all their electric power, which constitute 78 per cent of the entire number, the average generating capacity is 582 kw. Included in this summary are mines having all kinds of steam-driven generators. The average turbine has about 4½ times the capacity of the average engine. The average alternator has a rated capacity about 3½ times that of the average direct-current dynamo.

As it is in a class by itself, the magnificent power plant of the Standard Oil Co., at Schoper, is not included in the above generalities. In this plant there are two turbines of 4,000 hp. and one of 2,000 hp., each driving its own generator. The gross capacity of the equipment is 6,250 kva.

Electricity is used at every mine. Its sole use may be for illumination—as at a few ‘pick’ mines—and, in such cases, it is generally purchased. Some mines both generate and purchase electric power for the major operations, thereby eliciting an interesting economic inquiry. In the case of a mine that outgrows its power-generating capacity, one can readily understand why the owner might decide to purchase the necessary additional power rather than increase his plant but, when we find instances in which progressive operators have closed down their wholly-adequate powerhouses and are operating upon purchased electric power, we face a paradox.

OF THE ACCIDENTS CAUSED BY EXPLOSIONS, 40 per cent occur in the actual use of explosives, 40 per cent in their transportation and 20 per cent from suffocation by their fumes, stated J. E. Crawshaw of the U. S. Bureau of Mines in his remarks on “Explosion Hazards in Coal Mining” at a recent safety conference held in Pittsburgh, Pa. In 1921 about 40,000,000 lb. of permissible explosives were used in coal mines, representing only 18 per cent of the total consumption of explosives for this purpose. About 12 per cent were high explosives and 70 per cent were black powders. The use of permissible explosives and approved electric blasting equipment must be increased if greater safety is to be attained. J. J. Walsh, secretary of mines of the State of Pennsylvania, remarked that one of the laws scheduled for consideration at the next session of the Pennsylvania Legislature would compel the use of permissible explosives and electric blasting equipment in the mines of the state. The measure as applied to the anthracite field failed to pass two years ago. From present indications state-wide adoption is now probable.

Much High-Grade Material in Inferior Coals Which Sand Flotation Can Release

Many Coals Can Be Converted Into a Metallurgical and a Steam Product, Both Readily Salable—A Rise of One Hundredth in Specific Gravity Equivalent to an Increase in Ash of One per Cent

By H. M. CHANCE

Consulting Mining Engineer,
Philadelphia, Pa.

OUR low-ash coals are not by any means exhausted and may be obtained from many, and not, as is the general impression, from a few districts or from a particular bed or beds in that district. What promises a far greater supply may be found hidden in beds of relatively poor quality.

Coal is not a homogeneous material. No two lumps of coal are exactly alike. The distribution of ash throughout a coal bed is generally erratic and uneven. Layers and masses of high-ash and low-ash coal exist more or less irregularly intermixed in most coal beds. As everyone knows beautiful specimens of pure coal obtained from coal beds of poor quality are frequently used in promoting the sale of a coal property.

The problem involved in separating this pure low-ash coal from the higher-ash coal with which it is intimately associated is not unlike that of separating an ore, such as lead or zinc, from the rock or gangue matrix containing it, except that in ores the great difference between the specific gravities of the particles of ore and of the gangue of rock make their separation relatively easy. On the other hand, the difference in specific gravity between low-ash and high-ash coal is so small that the concentrating methods effect the separation of these two grades only with difficulty.

NOT NECESSARY TO CRUSH ALL THE COAL

The irregularity just mentioned, in the distribution of ash in coal, applies to coals of high grade as well as to impure coals. High-grade coals generally contain large percentages of phenomenally low-ash coal. The masses, layers or particles of such low-ash coal, however, may be of any shape or size; and a satisfactory separation generally can be effected without resorting to fine crushing of all the coal, the method that is so largely used in jigging coal for metallurgic coke-making. Low-ash and high-ash coal often are found together in lumps that to the eye appear to be of a uniform high grade.

The sand-flotation method of washing coal, by which an accurate separation of the coal into separate grades readily can be made, seems likely to add these widely distributed low-ash resources to our valuable low-ash reserves. The use of this flotation process depends on the following facts:

(1) The specific gravity of every piece of any particular coal depends on the percentage of ash in that particular piece, the specific gravity increasing almost uniformly about 0.01 for each per cent of ash. For example, if a coal with 3 per cent of ash has a specific gravity of 1.32, another piece of the same coal with 5 per cent of ash will have a specific gravity of 1.34; with 7 per cent of ash the specific gravity will be 1.36;

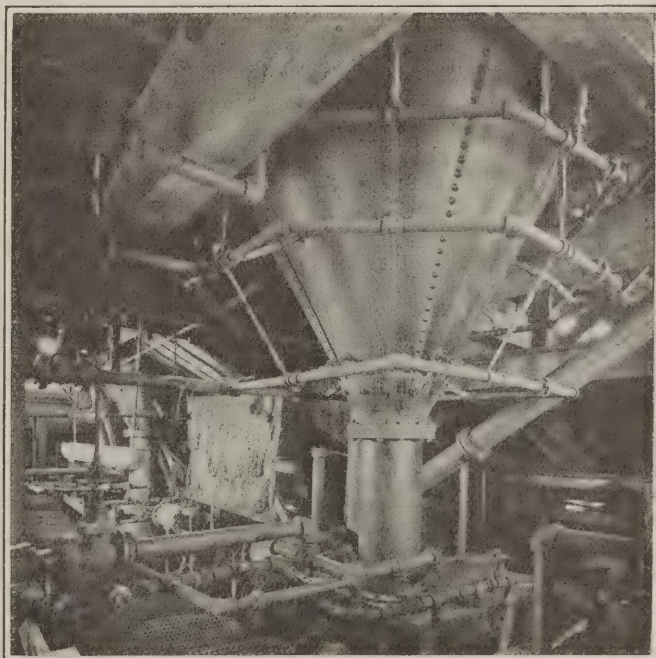
with 10 per cent of ash it will be 1.39 and so on. Apparently there are few exceptions to this rule.

(2) The distribution of ash in coal is quite generally erratic. Coal not being a homogeneous material, low-ash and high-ash coal may exist irregularly mixed through a single lump, which may appear to the eye to be homogeneous and of uniform quality throughout.

(3) The sand-flotation method separates materials on the "float-and-sink" principle; that is to say, it floats all materials lighter than the specific gravity at which the separation is to be made and all heavier materials sink. It thus virtually weighs every piece, large or small, floating only those that do not exceed a specified specific gravity.

The sand-flotation method was fully described in *Coal Age*, May 4, 1922, and it is not necessary to give again the details of the process. The number of plants now using this method, in the anthracite region, has increased to six, another plant is now under construction and others are being designed.

Each of these plants is owned and operated by a different company. They are widely distributed and no two of them are operating on exactly the same kind



Tank in Which Coal Floats and Refuse Sinks

Coal is subjected to the float-and-sink test, but the liquid in which the test is made is not densified by the use of soluble salts but by particles of sand suspended by mechanical agitation. The material heavier than a given specific gravity is, as popular parlance would erroneously state it, "sucked into the quicksand and swallowed up by it." Eventually it is drawn out through a valve lock and sent to the refuse bin.

of coal. They have a combined capacity of more than 1,000,000 tons annually. These plants are used not merely for the differential separation of the coal into two or more grades, but more particularly for the removal of slate, rock, fireclay, pyrite and heavy bony coal.

WHY COAL AND MINERAL PROCESSES DIFFER

From the zinc-lead ore parallel, referred to previously as an illustration, it is evident that the separation of masses of low-ash from a high-ash matrix is a process similar to that applied to ore dressing. To free ore from its matrix the material must be crushed; if the ore masses are large, coarse crushing is first used to recover the large pieces of ore. Similarly, with the differential separation of low-ash coal, when the coal contains relatively large masses or lumps of low-ash coal this should be removed before the coal is crushed to smaller size.

Here, however, the parallel ends, because the problem is not one of separating a very heavy substance from a much lighter material, as is the case in ore dressing. In treating coal it is necessary to separate all material having a lower specific gravity than that specified from that having a higher.

This can be effected by the use of high-gravity liquids, or high-density solutions, such as are commonly used in laboratory or experimental tests, but cannot be used in work on a commercial scale.

Table I illustrates the close relationship of the specific gravity of coal and its ash percentage, and shows the possibility of making differential separations of a coal into grades of different character. The data given are taken from the records of a series of tests on No.-2 buckwheat (rice) coal, which unwashed contained 34 per cent of ash.

Separation at a specific gravity of 1.90 gave 68.35 per cent of coal (floated), containing 10.10 per cent of ash and 31.65 per cent of refuse (sunk), containing 85.30 per cent of ash.

The refuse therefore contained nothing that could be classed as coal. The washed coal, containing but 10.10 per cent of ash, has a relatively low-ash content and is a satisfactory fuel for steam-making and other purposes. It does not, however, consist simply of particles of coal containing 10 per cent of ash, but is a mixture of particles having a range, in the percentage of ash, from 1.88 up to 39.85 per cent, as shown in Table I.

Table I—Showing the Composite Character of Coal

Coal tested was buckwheat No. 2 coal carrying 10.10 per cent ash

Specific Gravity of Liquid		A Coal, per Cent		B Coal, per Cent, Cumulative		C Ash, per Cent		D Ash, per Cent, Cumulative	
Less Than	More Than								
1.90	1.84	2.44	100.00	39.85	10.10				
1.84	1.80	2.25	97.56	34.07	9.35				
1.80	1.76	1.64	95.31	30.68	8.76				
1.76	1.73	1.96	93.67	26.54	8.38				
1.73	1.70	3.25	91.71	22.89	7.99				
1.70	1.68	2.05	88.46	18.58	7.47				
1.68	1.66	1.64	86.41	16.12	7.18				
1.66	1.64	0.48	84.77	12.63	7.01				
1.64	1.63	5.34	84.29	18.16	6.98				
1.63	1.61	9.54	78.95	11.43	6.22				
1.61	1.59	9.54	69.41	9.02	5.50				
1.59	1.57	11.44	59.87	7.05	4.95				
1.57	1.55	24.79	48.43	5.27	4.45				
1.55	1.53	21.36	23.64	3.29	3.58				
1.53	1.49	0.57	2.28	1.88	6.34				
1.49	....	1.71	1.71	7.82	7.82				
		100.00							

The analyses in Table I were made by George C. Davis, chemist, Philadelphia, Pa. If this coal is subjected to differential separation at specific gravities of 1.59, 1.57 and 1.55, respectively, the character of the two products yielded will be, approximately, as in Table II.

Table II—Showing Float-and-Sink Results

Specific Gravity of Liquid	Coal Floated, Per Cent	Ash, Per Cent	Coal Sunk, Per Cent	Ash, Per Cent
1.59	59.87	4.95	40.13	17.77
1.57	48.43	4.45	51.57	15.39
1.55	23.64	3.58	76.36	12.11

OUTCROP COAL MAY BE LIGHT BUT ASHY

Table I shows two apparent failures to follow the rule as to the relation of specific gravity to percentage of ash. The observed variations between gravities of 1.63 and 1.64 and results adjoining (Column C) was caused by the substitution of a new hydrometer, after breaking the one used in making the previous tests. Before the difference was discovered and adjusted, high-ash matter, which should have been distributed through the material separated at 1.66 and 1.68 gravities, was thrown into that separated at 1.64 gravity, thus increasing both the percentage of ash and the quantity separated at that gravity and reducing these items in the material separated at 1.66 and 1.68 gravities.

The other instance of variation from the rule appears in the separation obtained at 1.49 gravity, in which coal *lighter* than that separated at 1.53 showing 1.88 of ash, shows an exceedingly high-ash percentage of 7.82. This latter discordance is caused by the presence, in the coal tested, of a small quantity (1.71 per cent) of outcrop coal. This outcrop coal, though carrying 7.82 per cent of ash had its specific gravity reduced, by oxidation or partial disintegration, some 8 or 10 points below normal.

Bituminous coal has the same characteristics as is shown by these tests of anthracite. Its specific gravity is, of course, less; but, taking almost any bituminous coal as it is mined and shipped, and testing it by the method just described, it will be found to consist of lumps and particles varying widely in ash and in specific gravity.

Tests recently made on typical bituminous coking coals from Pennsylvania, Alabama and West Virginia show that products with less than 5 per cent of ash and sometimes less than 4 per cent can be obtained from coals normally averaging, as mined, from 9 to 15 per cent of ash. This result is obtained with less loss of combustible in the refuse, than occurs in jigging. Even when considering the most practical work in the washing of these coals by jigging, we find the products carrying from 6 to 10 per cent of ash.

When all of the coal cannot be recovered by this process and made an especially low-ash fuel available for metallurgic use, a differential separation can be made, at a specific gravity that will yield a suitably low-ash product, together with a higher-ash product that will not carry too much ash to prevent its satisfactory use and sale as a steam or domestic fuel. This will be found practicable in nearly all cases where the separation of the low-ash coal is effected without fine crushing.

In the application of the sand-flotation process to

the washing of bituminous coals, a feature worthy of mention is the reduction of crushing to a minimum, as the large lumps of low-ash coal are recovered without fine crushing. Furthermore the removal of fines made in the mining, handling and crushing of the coal before it is introduced into the machine, eliminates most of the troubles of sludge sedimentation and recovery by keeping this fine material dry. Another feature is the clarifying of the water for re-use, which is an advantage not obtained in washing bituminous coal by the methods in general use.

Glen Alden Uses All Available Pumps to Unwater Mines

River Water Entered at the Rate of Half Million Gallons per Minute—Will Take Nearly Four Months to Unwater Beds

THE engineers of the Glen Alden Coal Co., of Scranton, Pa., are making rapid progress unwatering several of their mines which were flooded April 7 when the Lackawanna River broke into the National mine near Taylor, Pa.

An investigation to ascertain the extent of the damage done by the flood disclosed that it was the worst ever experienced by any company in the anthracite field. About two years ago, rains and melting snow poured volumes of water into cave holes on the mountain side. On this occasion, the main pumping station at the Hampton Water Shaft was all but lost, the water rising several inches on the pumproom floor. Recently, when the Lackawanna River broke into the mines, the pumps were completely submerged.

The surface adjacent to the pothole where the river entered the mine was seriously creviced and caved and had been so for many years. The mine operations at this point are close to the surface and the hillside back of the old breaker is covered with many caves and potholes. A few years ago, there was a serious squeeze in this mine. Many acres of ground subsided, and several men lost their lives.

For years the anthracite mining companies have been building large breakers capable of preparing the out-



The Expensive Pothole

For many years nearly all the Glen Alden Coal Co. mines in and around Scranton have been interconnected in such a manner that most of the pumping can be done from one centrally located pumping station. The coal beds extend under the Lackawanna River and at many points run close to the surface, consequently a break under or near the river may cause the inundation of a large area of many mines and is always greatly feared.

put of several mines. As a part of this plan, the old breaker at the National mine, which is on the east side of the Lackawanna River, was abandoned and a tunnel was driven under the river to connect with the Taylor mine so that coal from the National mine could be prepared at the Taylor breaker. Knowing that the river bottom was close to the National mine operations at this point, the tunnel was made unusually narrow for double track, about 12 ft. wide.

Sometime ago, the earth over the tunnel a short distance back from the river's edge caved in and formed a pothole. The river, swollen by continuous rains, gradually washed away the earth between its bank and this point, and the ground finally gave way. Torrents of water rushed into the mine when the river turned its course into the hole.

For nearly two days the water flowed into the workings, part of the time at about 500,000 gal. per min. The natural drainage of the area is toward the Hampton pumping station about two miles away. Every effort was made to block the hole and stop the flood. Almost as quickly as bales of hay, bags of sand, timber, earth,



An Innocent Locking Pothole Cost a Fortune to Fill When the River Overflowed and Flooded the Mines

Mine cars, bales of hay, bags of sand, timber and rails were sacrificed to stem the flood. Unfortunately the ground in this vicinity is very loose and it was easy for the water to wash it away. Only large heavy materials would stay in the hole; many bales of hay and bags of sand were carried hundreds of feet into the mine. The picture gives but a faint idea of the quantities of materials used. Most of the water took a direct course to the Hampton Pumping Station where five 5,000-gal. centrifugal pumps were unable to handle the water quickly enough to prevent their submergence. About two to four months will be required to unwater the various mines affected.

mine rails and mine cars were thrown into the gaping hole, they were washed on into the mine. A fortune was lost in a few hours.

The Hampton pumping station is located in a natural basin in the coal beds, and here nearly all the water from about eight mines is concentrated and pumped a distance of 550 ft. to the surface by five 5,000-gal. centrifugal pumps, each driven by a 1,000-hp. motor. Under normal conditions, two of these pumps will prevent the water from rising, but just before the flood three pumps were required owing to an increase in the volume of water running into the pumping station from the mines located on the mountain side.

When news was received that the river had broken in, all five pumps were put in operation, and for a time it looked as though the discharge from the pumps was sufficient to prevent the water entering the pumproom. However, the pothole at the river was worn larger and larger, and finally dams and temporary obstructions set up in the mines were washed away. When the sudden rush of water came, two mine foremen at the Sloan mine nearby were trapped and drowned. The water being up to their waists, the pumpmen were forced to abandon the pumps, which they left running.

After the flow of water was checked, some of the engineers went to the pumproom, and after considerable difficulty and wading in water up to their necks they found all the equipment completely submerged.

Fortunately, the pumproom is located in the Clark bed which is some distance above the Baltimore beds. Although much of the river water found its way to these

latter they did not fill completely, and it is possible to drain a large quantity from the Clark bed to the lower beds, thus lowering the water so that the pumproom can be reached and cleaned out.

Material required to repair the pumps, motors and controllers has been ordered, but the repair work will be slow and difficult. In the meantime, pumping equipment has been transferred from other mines of the company and other coal companies in the immediate vicinity. It will take from two to four months to unwater the flooded areas.

The Hampton pumping station is the largest in the coal regions. Auxiliary power circuits were provided between the pump room and the company powerhouse nearby. Many protective features had been provided for the pumps and motors.

Such an important pumproom probably should have been surrounded with a wall or dam to prevent the water, even if it should rise higher than the pumps, from flooding the equipment. Perhaps it would be well to install more submerged-type vertical centrifugal pumps in the anthracite field, similar to those operated by the Hudson Coal Co. at a mine near Carbondale, Pa.

When the flooded area has been unwatered, much work must be done before it will be possible to resume mining in some of the workings. The rapid flow of water in the gangways has no doubt washed away much of the road beds, and tracks will have to be rebuilt. The timber which came through to the pumproom consisted of mine props and air stoppings along the haulage ways.

The Miner's Torch

Sameness

A SHORT time ago I was asked to make a little talk at a "Safety-First" meeting of plant executives employed by one large company and in introducing me the chairman stated that they had decided by way of variety to ask outsiders to address the meeting occasionally, which explained my presence.

His use of the word variety led me to ask some questions and I was surprised to learn that the different executives had reached a point where they felt that they had exhausted the subject of Safety-First so far as they were individually concerned, and for the life of them, they could no longer make talks that could be expected to hold the interest of their fellow employees.

It happened that only that day I had copied in my note book for future consideration the Bible quotation that reads like this: "There is no new thing under the sun" and the remarks of the foremen about having exhausted the subject under discussion reminded me of the quotation. Almost unconsciously I dismissed from mind the little speech that I had prepared for the occasion and ventured forth into a discussion of the Bible quotation. The impromptu talk that I made was received with so much interest that I have given the subject considerable thought since then.

It is possible to write about a single subject every day in the year and do it without repeating oneself and

do it in an interesting manner, both as concerns the one who is doing the writing and the one who does the reading. If you doubt this read the daily comments of the man who reports the stock exchange happenings for your daily paper; or again, consider that for over seven years now a certain newspaper writer has been giving us almost daily articles about conditions in Europe and they are just as interesting now as they were the day he began.

There is no new thing under the sun yet there are no two persons or things under the sun that are exactly alike. If you question that, talk with an employment manager who comes in contact with hundreds of men seeking work, or better still, take a walk in the woods and count the different varieties of leaves that you find there.

The principal difference between the man who can exhaust the Safety-First subject in one paper and the man who can prepare an interesting Safety-First bulletin every day in the year is that one has imagination and the other either lacks imagination or does not make use of it, generally the latter.

I have about reached the conclusion that whenever you find a man who cannot talk interestingly about his work you have found a man who has reached a state where he is no longer interested in it. Imagination and interest walk arm in arm; of course no two men have the same amount of imagination and no two men can inspire you with the same amount of interest by word of mouth, yet you are never left in doubt as to the inspiration a man finds in his work if you discuss his work with him.

Moral: When you have seen a thing from one angle you have not exhausted the possibilities.

"Balanced Mines" Should Have Rock-Bottom Costs

Waste Motion and Lost Coal Are Reduced and Loose Ends
Are Few Indeed Where the Whole Property Is Co-ordinated
All the Way from Hoisting Engine to Cutting Machines

BY CHARLES E. ANDERSON
Christopher, Ill.

AT EVERY mine inevitably arises the problem of putting its various parts—its workings, its equipment and its departments—in balance. Though it is entirely practical to design the entire operation so that each part will fit into a co-ordinate whole, this is seldom realized. The engineers about to open a new mine may try to strike such a balance, but companies with an old and poorly systematized mine too often think their cases are hopeless and that they must go on losing coal and paying too high a cost for what they do get. They should not be so helpless. There are ways in which such operators can put into proper balance the length of their panel entries, panels and partings and the size of their cars and tracks. These methods, properly applied, should reduce their costs.

What relation does the length of panel entry have to the length of a parting on the main-line haulage? What relation has it to the length of loaded and empty tracks on the main bottom? What relation has it to the size of locomotives in use, both gathering and main line? What relation to the size of steel on the haulage roads has it? How can we determine what size the shaft should be, the size of the hoisting ropes, the height of tippie and size of hoisting engines?

These vital questions can be answered correctly in every case by a simple analysis of the local conditions. It is taken for granted that in locating the shaft of a new property, boreholes have been sunk and levels run on them, thus giving the loaded cars the advantage of the dip. Of course, other considerations enter into location of the hoisting shaft, the most important being the necessary space for loaded and empty railroad cars and the grades for handling them.

In machine mines, the cutting machine is the basic factor with which to begin. The panel entries should be just long enough to provide a full machine run on each panel and still leave a sufficient barrier pillar. In some sections there is an agreement between the operators and miners' union that arbitrarily sets the number of men that a machine may cut coal for, and in such cases the length of panels should be governed by this number.

We will say that fourteen men constitute a full com-

plement of men for a machine. Then fourteen rooms will be necessary. Owing to the condition of the roof it is found that the rooms should be opened at 50-ft. centers, and that a barrier pillar 125 ft. thick must be left. We must provide panels having a total length of 800 ft. in order to obtain space for fourteen rooms on 50-ft. centers and leave the desired barrier pillar. Thus we have established the proper length of panel.

As a panel has fourteen rooms, and as the men work "double," seven-car trips are required in order to give a turn of one car to each pair of men. There being one full machine run on each panel, and twenty-eight men on each pair of panels, one gathering locomotive will be needed to care for each two pairs of panels, having fifty-six men assigned to it, or four full machine runs. This requires space for twenty-eight cars on the parting for both loaded and empty tracks for each locomotive so used. Should there be two locomotives working

HOW "MINE BALANCE" AFFECTS COSTS

WHAT does it cost a mine owner to have his mine "out of balance?" A little study of each property so afflicted will convince the operator that the costs are heavy. He can find lost motion everywhere and lost motion is costly. He can find machines and loaders tied up in one section for want of transportation while a motor is wasting time handling ridiculously small trips in and out of another section where machines are few. He can find much inequality in distances between workings and partings. He can find some partings always congested while others have unused space expensive to construct and maintain. He can see the top coming down or the floor coming up on pillar coal and even on room coal that could have been recovered if the workings in that part of the mine had been operated in unison, under a proper system. Hence the need for mine balance.

on the same parting with a full complement of men, and an additional locomotive pulling from the men that are working the heading for development, space will be needed for fifty-six cars for the two locomotives having four full machine runs, and fourteen additional cars for the heading men, making a total of seventy cars. Under this system it will be found that an equal turn of cars will be pulled for all the men in the section.

At one mine working under this system there was a fairly good bottom and 8 ft. of coal was being taken. The operators planned on hoisting 5,000 tons per day of eight hours; so it was decided to use as large cars as possible, keeping in mind that the men must push the empty cars into the working face from their room switch. The management consequently decided to use a 5-ton car, having roller bearings and 20-in. wheels. It was found that the car would have to be built 10 ft. long and 24 in. high to hold that quantity of coal. The gage of the track was 42 in., this width being chosen because the company had much equipment of this gage available. As they had decided upon a 10-ft. car it was necessary to have 700 ft. of empty and loaded space on the parting in order to provide room for seventy cars.

Having decided upon a 5-ton car, and having to han-

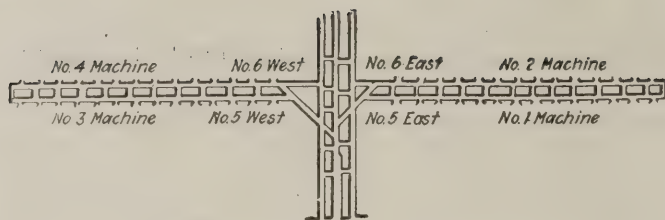


Fig. 1—On This Type of Panel, Gathering Motors Serve More Men Than Is Customary in Most Mines

Locomotive goes into one panel entry to leave empties spotting them at the mouths of the rooms and then switches to another to get loads.

dle seven-car trips over a maximum grade of 3 per cent in the panels, the size of the locomotive necessary was found by using the following method, suggested by a statement made by J. T. Beard, "A tractive effort of 30 lb. per ton is required to haul a load on level track, together with 20 lb. per ton additional for each per cent of grade." The maximum grade being 3 per cent, the net load 10,000 lb. and the weight of a car 3,500 lb., the necessary drawbar pull for a seven-car trip is found to be $7(30 + 60) (10,000 + 3,500) \div 2,000 = 4,252.50$ lb.

Again quoting J. T. Beard: "The tractive effort of a locomotive having steel-tires is 25 per cent of its weight, plus 10 per cent if sand is used." The weight of the locomotive needed to pull the trip, therefore, is $4,252.50 \times 4 = 17,010$ lb. or approximately $8\frac{1}{2}$ tons. As the maximum grade is never of great length, advantage was taken of the 10-per cent allowance for sand and 8-ton locomotives were installed. They have been found to be of ample weight.

The size of steel for the panels was found by the following rule, also given by J. T. Beard: "The weight of rail in pounds per yard necessary for a given weight of locomotive is found to be ten to sixteen times the weight in tons, on each of the drivers, where four drivers are used." So we have $16 \times 8 \div 4$ or 32 lb. per yard, so 30-lb. steel was installed. This also has proved sufficient.

MAIN LOCOMOTIVE TO HAUL 35 CARS EACH TRIP

The main-line locomotives will be required to haul in a single trip from the inside parting as many cars as the two locomotives gathering from rooms will bring to that point in two trips and one locomotive gathering from the headings will bring in one trip. Thus the main locomotive must be expected to haul at each trip five gathering trips of seven cars or thirty-five cars. As the main bottom to accommodate the main-line locomotive must provide space for two full trips of empty and an equal number of loaded cars, space will be needed for 140 cars, or seventy on either side. As the mine under discussion uses cars that are 10 ft. long, both loads and empties will require 700 ft. of track. Add to this length the needed space for diamond switches or other equipment to be installed, and the total required length of the main bottom is established.

The weight of the main-line haulage locomotive can be found in exactly the same manner as that of the gathering locomotives. In this mine, most of the main entries were either level or favorable to the loaded trips, but some gradients slightly exceeding one per cent had to be left against the loads. Using the same method as before the drawbar pull $= 35(30 + 20) (10,000 + 3,500) \div 2,000 = 11,812$ lb. $= 5.906$ tons or

the draw-bar pull necessary to haul the thirty-five car trip over the maximum gradient along the road which is one per cent. Allowing the locomotives 25 per cent of their total weight for drawbar pull we have $5.906 \times 4 = 23.624$ tons which is the necessary size of locomotive to handle the trips over this grade. Twenty-five-ton main-line locomotives were installed and they have proved satisfactory.

The weight of steel for the main-line track was computed in the same way as that for the inside locomotives, except that a smaller factor was used in this instance. Using the factor of ten instead of sixteen we have $10 \times 25 \div 4 = 62.5$ lb. per yard. Sixty-pound steel was installed with perfect satisfaction.

The advantages of such a system are at once apparent. There is no lost motion in this plan, except that the mining machines are limited to fourteen men. This cannot be overcome until actual tests have been run and new agreements made. The number of men on a machine can be increased to eighteen and still be taken care of under this plan, simply by adding a little to the weight of the haulage locomotives and the track.

MORE MEN SERVED BY GATHERING LOCOMOTIVE

The number of men served by the gathering locomotives will be seen to be considerably higher than is generally found in most mines, but let us analyze it. (Fig. 1.) We will number the machines being served by one locomotive Nos. 1, 2, 3 and 4. Nos. 1 and 2 are located on the 3rd and 4th East panel, and directly across from them are Nos. 3 and 4 in the 3rd and 4th West panel.

The locomotive will take seven empties and spot them in the 3rd East panel for machine No. 1, proceed through the last angle crosscut near the face of the panels and gather seven loads from machine No. 2 in the 4th East panel, leaving No. 2 gang without empty cars for the time being. Having placed these seven loads on the parting, the driver will now take seven empties into the 3rd West to machine No. 3, and again go through the last angle crosscut and pick up seven loads from machine No. 4 in the 4th West panel.

Putting these loads on the parting he will go into the 4th East panel with seven empties to machine No. 2, cross through into the 3rd West panel and gather up the seven loads there. After depositing these on the parting he will return seven empties to machine No. 4 in the 4th West panel, pulling machine No. 3 in the 3rd West panel as he comes out, thus completing his turn of singles to the four machines.

This has required him to make four trips, and as he should not get less than ten tons per man, he will be required to make a total of sixteen trips in order to get the proper quota from his territory. This gives him a full half hour to make each trip. It will be

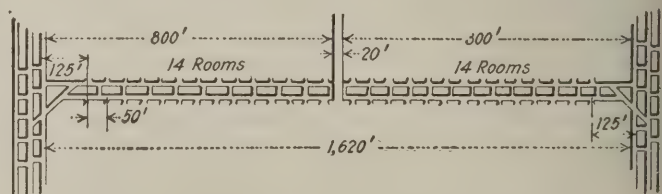


Fig. 2—Cross Entries Should Be Turned So That Panel Entries Will Face on Either Side

Each entry has length enough for fourteen rooms and a barrier pillar 20 ft. thick. The rooms are set on 50-ft. centers.

found that he can do it in less time and that he will average twelve tons per man or more. By this system the gathering locomotive driver will be required to gather 112 cars to complete his proper day's work, which will give a total of 560 tons per locomotive so used. As a matter of fact some of them actually average 125 to 140 cars per day. The effect upon the haulage costs readily can be seen.

There is another point to be considered in connection with the length of the panels. It is the recovery of the pillars, one of the most important features of mining, yet one that is sometimes sadly neglected. There is a great difference between extracting pillars in live workings and extracting them in workings that have been standing a long time. Where all the rooms are driven up together and work is started on the pillars immediately after they have been driven their proper distance, it is possible to recover a larger percentage of the pillars if due care is taken to concentrate the work so that a "break" can be obtained at the proper place and the weight relieved.

When more places are turned on a panel than the machine can cut, there are just that many rooms standing while the rest are driven up. The laggards are bound to take weight and many of them will cave so high that no pillars can be drawn. Under these conditions every attempt to extract them fails, and sooner or later it is decided that the pillars cannot be recovered in "this particular mine" and the effort is not renewed.

Owing to the varying conditions in each field of mining, no set rule for recovering pillars, of course, can be given, except that the work must be so conducted that the roof will be made to break and relieve the weight. However, no case has ever come to my attention where pillars were drawn successfully unless the work was done immediately after the rooms were driven up.

The length of the panel entries also determines the distance between cross-entries (see Fig. 2). These should be turned so that panel entries can be driven on either side. Consequently, twice the length of the panel entries plus enough to leave a small pillar, where it is not advisable to hole through, gives us the proper distance for turning the cross-entries. In the case cited above, where there are fourteen rooms on 50-ft. centers, panel entries are 800 ft. long. To find the proper distance to turn the cross-entries we have $(800 \times 2) + 20 = 1,620$ ft. A rigid following of this rule will keep all sections of the mine balanced.

Except in mines that are nearly finished, the workings can be re-arranged so as to conform to the system outlined and to co-ordinate each department. Where rooms have been turned in the panels indiscriminately as fast as they were reached nothing can be done except to work them out in the best way possible and get

out of them; but in all new work the plan described can be followed by simply rearranging the system to conform to the general outline given.

The following instance is a shining example of correcting old workings. The cross-entries in a certain mine were turned so that there were thirty-three rooms on the panels between entries and barrier pillars of 125 ft. The men constantly made it a practice to turn rooms on the panels as fast as they came to them, so that they had room for only one machine in a panel at one time.

In one case miners reached room No. 25 and holed into workings of the same panel being driven to meet it from the next cross-entry. There were only eight rooms on that side, the first two being driven up to the full distance. The next rooms were nearly done, while the rest were shorter as the point where they holed was approached. All switches were turned

so that all the coal was taken out through the cross-entry farthest from the shaft, and pillar work started in room No. 4, counting from the side nearest the shaft.

The first three rooms in the cross-entry had caved so high that none of the pillar coal in them could be drawn and all this part of the work was showing weight badly. Before all the first pillar was recovered a squeeze started that extended through all the finished rooms, and part of the rooms that were being extended. One machine was taken out of the territory and as the remaining machine drove the rooms next to the squeeze up near their distance, the

squeeze would start and run the men out of other rooms as well.

To correct this condition the next pair or cross-entries was made twice the length of the panels, plus 20 ft. The first pair of cross-entries was stopped entirely, and the second pair was converted into main entries on either side of the mine, new cross-entries beyond all development were driven through between them, and panels driven from these.

In the original plan, the men drove the main entries east and west, cross-entries north and south, and panels parallel to the main entries. Only the second pair of cross-entries on either side had been turned when the company decided to make the change.

In the new east and west development the original plan was followed but the distance between cross-entries was made to conform to the fourteen-room limit. That was simple, but in the north and south development the mine had virtually to be turned around. The first pair of cross-entries on either side was stopped, and the second pair on either side was converted into main entries. Cross-entries were driven through between them, from the 3rd and 4th South on the East, to the 3rd and 4th South on the West and panels were turned at regular intervals to the South from these.

WILL THIS SAVE SOME "DOOMED" HIGH-COST MINES?

THE number of men following each cutting machine is a basic element in laying out the system by which the mine is worked. Because someone didn't realize this, who operated a mine with fourteen-man units and tried to operate panels having thirty-three rooms, he lost much recoverable coal and spent a good deal of money to revise his system. However, in many an old and high-cost mine, the erratic plans can be revised as Mr. Anderson outlines in this article. A careful study of conditions and the adoption of a system similar to the perfectly balanced one described here, might help to keep certain mines in this country working during the coming year which now appear to be doomed. The subject of "mine balance" therefore is worth consideration.

New cross-entries were driven between the old ones when the new south mains had progressed far enough. The balance of the development conformed with the rest of the work. The layout was made the same way on the north side, and a model mine was the result.

All these changes were necessary because somebody overlooked the fact that fourteen men constituted a full complement for a machine at that mine. The size of the machine units was set by agreement between the company and the miners' union, yet thirty-three rooms were turned on the panels instead of fourteen.

To balance some other features of a mine a little care is also necessary. The length of the car will determine the width of the shaft, and the proper allowance for the buntons, guides and cages, and for the space needed for pipe and wire work will determine its total length.

The weight of the cage, plus the weight of the car will show the proper size of the hoisting rope by following this rule: "Add the total weight of the cage and loaded car. Multiply this by 7—the factor of safety—and divide by 50 (if the sum so obtained is above 50, whereas if it is below 50 it must be divided by 40). Finally extract the square root of the quotient." This

is the diameter of a plow-steel rope, having six strands of nineteen wires to the strand.

The height of the tippie is governed by the number of grades of coal that it is desired to make and upon whether gravity or mechanical screens are to be used, but I will not enter into a discussion of this question in this article.

The total weight of the coal to be hoisted—the cages and cars balancing each other—multiplied by the speed per minute, and divided by 33,000 will show the necessary horsepower of the engine. Friction of ropes and cages will also have to be added, and this figure will also show the power of the boilers necessary, unless other equipment using power from them is to be installed.

Thus it is shown that everything about a mine can be balanced and each department must be co-ordinated with all the others if lost motion is to be avoided. The general efficiency of the mine is affected by the efficiency of each department, and many times coal is mined at too high cost to be profitable because one or two departments are not functioning properly. Only a proper analysis will show where the trouble lies and relieve this situation.

Use of Rescue Apparatus and Gas Masks Increasing

One Hundred Apparatus Men at Recent Mine Explosion—Gas Mask Safe Where Enough Oxygen Is Present to Keep Safety Lamp Alight

INSURANCE companies, by offering a reduction in premium for each trained first-aid man employed by a mining company, are endeavoring to increase the interest of coal companies in first aid, said D. J. Parker of the U. S. Bureau of Mines in an address before a safety conference called at Pittsburgh on the occasion of the visit of two delegates of the British Government recently. In an address on "Developments in Mine Rescue and First Aid" Mr. Parker said that Dr. Holmes' dream of the spread of privately owned rescue apparatus is beginning to be realized. At a recent mine explosion in western Pennsylvania there were 90 trained apparatus men from near-by operations and only 10 from the U. S. Bureau of Mines, making what is believed to be the largest number of trained and equipped helmet men that has ever participated in rescue work following a mine disaster.

A. C. Fieldner followed with a talk on the "Use of Gas Masks in Mines," outlining the application and limitations of this equipment. Atmospheres in unsealed burning mines may, or may not, contain enough oxygen to support life and if they do not, a gas mask is valueless. It will change carbon monoxide to carbon dioxide so that the wearer will be saved from a death by poisoning only to die by asphyxiation. That the air in open mines with burning areas may be so greatly depleted of oxygen as to be irrespirable is a conclusion that has been reached by a research fellow at the Pittsburgh station of the Bureau who has been investigating that subject.

J. J. Walsh, state secretary of mines of Pennsylvania, said that the return air from five fires in anthracite mines on analysis was shown to contain 16½ per cent or more of oxygen. In three of these mines safety

lamps would not burn. This led State Inspector Richard Maize to say that gas masks were of little value if they could only be used where safety lamps would burn. The reply was that in case of a mine fire the suitable action of a safety lamp did not assure that conditions were safe, for such a lamp will burn in a percentage of carbon monoxide that would be speedy death to anyone breathing it.

Mr. Maize then asked what percentage of carbon monoxide in a mine atmosphere would make the use of gas masks dangerous. Mr. Fieldner replied that the limitations of the gas mask are fixed by the intensity of the heat generated. Enough heat is evolved in the canister by the oxidation of a 6 per cent mixture of carbon monoxide to melt the canister. Mr. Cotts of the Bureau remarked that a safety lamp cannot be burned in an atmosphere containing more than 2 per cent of carbon monoxide. A safety lamp will burn in a 2 per cent concentration. In such atmospheres a self-rescuer gas mask has been worn for 20 minutes. A number of samples taken in fire zones show that the quantity of carbon monoxide in the atmosphere is usually less than 1 per cent. Mr. Cotts declared that a gas mask will give proper protection wherever a safety lamp will burn.

Henry Walker, deputy chief of the Mines Department of Great Britain, said he was surprised to hear that 1,600 gas masks were available for use at United States mines. He added, "I didn't know that gas masks were in industrial use." Dr. J. J. Rutledge said that every state inspector in Maryland is equipped with a "self rescuer" gas mask.

THE HILLMAN COAL & COKE Co., sets a good example, continuing its plan of electrifying its old steam-equipped mines one by one, not delaying the program because of low coal prices. The job continues according to a schedule long ago determined. Low prices of coal do but make such economies the more necessary, cost of coal replacing volume of output as the essential element of profitable operation.



News Of the Industry



Coal Transportation in Foreground At National Capital

**Influences Work to Spread Movement Evenly Over Year—Lack of Orders
Now a Stumbling Block—180,000 Coal Cars Available—Inability
to Control Supply to Inefficient Operations an Obstacle**

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

With hearings in progress before the Interstate Commerce Commission on the Lake cargo rate case; with mine-rating and car-distribution rules about to be taken up for the consideration of proposed revisions and with Sec. 28 of the Merchant Marine Act under debate on Capitol Hill, matters involved in the transportation of coal promise to be on the tapis for some time to come. In addition, strong influences are at work in an effort to spread the coal movement as evenly over 1924 as was the case in 1923. *Railway Age* is alarmed by the recent abnormal decline in coal shipments and declares editorially that "if the present low rate of production continues, there later will be an abnormal increase in production and in demands upon the railways for transportation. This abnormal increase in the demands upon the railways will cause congestion in the handling of all traffic and abnormal and unnecessary operating expenses that the shipping public will have to pay."

First Move Up to Shippers

The editorial then proceeds to advise a resumption of shipments, but it places the burden of the obligation upon the shippers. The fact that shippers cannot ship until consumers place their orders seems to have been overlooked, as is indicated by this extract from the editorial:

"One of the principal reasons why the railways were able in 1923 to handle a record-breaking freight business without car shortages, congestions or delays, . . . was that shippers gave their freight to the roads in unprecedentedly uniform volume throughout the year. Fearing that there would be a car shortage when the peak of business was reached in the fall, many shippers . . . heeded the injunction to ship early."

"The movement of freight in 1924 already has been subjected to wide fluctuations and the seasonal fluctuations threaten to become as great this year as in years previous to 1923 unless more shippers can be aroused to the desirability of shipping early and avoiding the usual fall rush."

There has been no time in a decade that the producers of coal would rather

ship than at present. If some means can be devised to convince consumers that they should make purchases at this time, the producers would be as pleased as would the railroads were it possible to put into immediate service the 180,000 coal cars now standing idle.

There was advance announcement, and it has been reiterated frequently, that no adjudication of the Lake cargo rates would be made in time to have a bearing on this season's movement. For that reason it cannot be ascribed as a cause for the slowness with which the Lake business is getting under way. In February the Interstate Commission gave ten days of its time to hearing the complaint of the Pittsburgh and Pittsburgh No. 8 operators, who are seeking a widening of the differential between the short-haul rates from the Pittsburgh district and northern Ohio to Lake ports and the long-haul rates from West Virginia and other Southern fields.

After a recess of two months, the commission on April 22 resumed the Lake cargo hearings. As this is written the railroads are putting in their testimony. These witness will be followed by those of the Southern operators.

Judging from the evidence which has been taken thus far, it would seem that there is going to be great difficulty in proving that the long-haul rates are unreasonable. On the other hand, there is increasing reason to indicate that cuts more properly could be made in the short-haul rates. This is having the effect of lining up the short-haul roads against the Pittsburgh operators.

Of scarcely less traffic interest are the proposed changes in mine ratings. There is sharp cleavage between the coal operators on this question. Generally speaking, the larger operators favor the proposed changes which are avowedly aimed at the inefficient and uneconomical mine. Their feeling is that the consumer who contracts for his coal should be protected as against the consumer who does not provide in advance for his fuel. As it is, contract buyers, during periods of car shortages, frequently cannot get deliveries on their contracts because the mines of less efficiency come into production and dilute the car supply.

Kelvin Medal for Thomson

Elihu Thomson, one of the founders of the General Electric Co. and director of the research laboratory at the Lynn (Mass.) works, sailed for Italy, April 26, to be gone three months and tour several European countries. In England he will receive the Lord Kelvin gold medal, being the first American to be so honored. The medal award was established by British and American engineering societies.

The principal obstacle to the change seems to be a legal one. There is grave doubt as to the legality of denying transportation to a shipper because that shipper did not furnish tonnage during a period of car surplus. There are other objections, however. Some fear that the proposed rule would result in the sale of a large amount of coal at cost or even below in the effort to build up a commercial rating which would permit comparatively large shipments during the car-shortage period. Not only would this inject a new inducement to the speculator but some fear that it would give an additional advantage to the non-union mine.

Could Nullify Assigned-Car Ruling

With their longer operating time, it is feared that the non-union properties could build up a commercial rating which would give them an undue proportion of the cars during an emergency. It is thought in some quarters that the proposed rule would nullify any advantage which has come from the victory in the assigned-car case. The railroads as the largest single body of consumers would be in a position to get most of their coal again at cost because of the desirability of establishing a better commercial rating. The producers then would have to look to other consumers for all of their profit.

Much is being made of the contention that such a rule would give a federal bureau an important control over commercial transactions. It would make it necessary for the commission to take judicial notice of union and non-union mines.

Many hold the opinion that the railroads now are so well supplied with equipment and have their properties in such good condition that they will be able to continue to meet practically any demand that is put upon them. The policy of the railroads to require each line to own enough equipment to protect all freight originating on it is bearing fruit and is an important factor in the prevention of car shortages.

M. F. Burns Dies Suddenly At Age of 70

Michael F. Burns, president of the retail coal firm of Burns Brothers from its organization until his retirement, April 8, died suddenly last Monday at his home in New York City. He was about 70 years old. Mr. Burns had been one of the leading men in the retail coal industry of the United States for a generation.

From time to time during the last two years there was talk of a change in the management of the company, but nothing came of it until Mr. Burns presented his resignation, March 12, last, to become effective April 1. On April 8 the board of directors accepted Mr. Burns' resignation and appointed his son, Frank L. Burns, to the presidency of the company and elected the elder Burns chairman of a newly created advisory committee.

Shortly after the World War, at the time of the widespread discussion of high coal prices, Mr. Burns testified before the Senate committee investigating the situation. He stated that his company had made a profit the previous year of \$1,200,000, and would earn \$1,500,000 the succeeding twelve months. He said his own salary was \$50,000 a year. Mr. Burns also was a director of the Coal & Iron National Bank of the City of New York, president and director of the N. Y. & N. J. Real Estate Improvement Co., and a director of the U. S. Distributing Corporation. Mr. Burns was a widower.

"Serfdom" of Miner Is Past Says Civic Federation

Extracts from a survey made by the Department on Current Economic and Political Movements of the National Civic Federation into industrial, social and civic changes during the last several decades show some interesting sidelights on conditions in many industries.

In the preliminary report presented to the Federation at its meeting in New York City, on April 24, John Hays Hammond, chairman of the department, stated that the survey was taken to ascertain just what "lies back of the claims of the apostles of gloom that our country is going on the rocks."

The first field explored was that of "Labor," and the department appealed to the 115 national organizations affiliated with the American Federation of Labor, as well as to the railway brotherhoods, "with results a little less than astounding," says the report.

After setting forth wages in transportation lines, needle trades and other lines of industry the report has this to say of the mining field:

"Take the workers in the coal mines, comparing their conditions and wages back in the '80's and even the '90's with those of today. The following extract from the report of the A. F. of L. proceedings at its 1902 convention throws some light on this:

"For more than twenty-five years the conditions of the miners had continually deteriorated. Many of the miners had been often supplanted by

Mine Bosses and Foremen Liable for Gas Blasts

Mine bosses and foremen may be charged with manslaughter if coal miners lose their lives through failure of their superiors to prevent gas explosions, according to a decision by the Oklahoma Criminal Court of Appeals at Oklahoma City. The opinion was delivered in affirming the conviction and sentence to one year's imprisonment of Martin Clark, a pit boss in a Latimer County (Okla.) mine. Clark was on duty when an explosion killed ten men in the mine Aug. 21, 1920. The boss was found to have been negligent in taking proper precautions to warn the men of the presence of noxious gases in the mine.

others, and through a system of espionage, victimization and company stores, their organization was destroyed. No protection was, therefore, afforded to the miners to check the power and avarice of the mine owners. The misery and poverty obtaining in the region surpassed all descriptions disclosed during the contest of 1900. The miners were veritable serfs of the companies: they were unable to leave the region by reason of their never being in possession of current money."

"Take the case of the anthracite common and outdoor laborers, where, in 1895, drivers were getting \$1.10, furnace firemen, \$1.05, steam pumpers \$1.15 and so forth, and where in 1900 they worked only 150 days a year. Then consider that the recent anthracite contract, covering all the miners, gives 270 days of work and a minimum of \$4.62 for an 8-hour day. The contract miners receive a great deal more, frequently reaching the building-craft standard."

Henry Wants a Dock Now

The latest prospective purchaser for the 600,000-ton dock of the Superior Coal & Dock Co. at the Head-of-the-Lakes is none other than Henry Ford. In fact the deal has progressed so far that Mr. Ford has made a definite offer for the property of an amount sufficient to cover the investment value of the property, but there are certain obstacles to the sale which may be eliminated soon. If they are overcome, by midsummer Mr. Ford will have docking facilities which will be of value to him in handling coal produced at his own mines and hauled to the Lakes on his own rail lines for consumption by his own huge power plant at the Twin Cities. The Superior Coal & Dock Co. is a subsidiary of the Maynard Coal Co., now in the hands of receivers. The dock has been offered to various dock interests without awakening any interest.

Lull Before a Storm in Straight Creek Region

It is beginning to look like a lull before a storm at the plant of the Liberty Coal & Coke Co., on Straight Creek, near Pineville, Ky. There has been no shooting since April 3 but a good deal of ill feeling against the state troops has been worked up by men who refused to work at the reduced scale of wages. Evictions from company houses are due April 30. This may result in another flare-up.

On April 16 Frank Daugherty, State Attorney General, ruled on a request from Adjutant General Kehoe, holding that the Kentucky National Guardsmen could not be used in eviction of occupants of company houses, as they had no authority in the matter. Kehoe had informed Daugherty that in his opinion disorder was caused by persons illegally holding company houses and who had violated their leases with the company. Kehoe wished to know whether guardsmen, in order to prevent lawlessness, could legally arrest such persons as trespassers and subject them to forcible eviction.

Daugherty pointed out that the company had recently obtained a federal injunction prohibiting interference with its operations on the part of strikers, and as a result of that injunction the company must appeal to the federal court for relief from any violation of the injunction.

Keystone Employees Accept 20 per Cent Wage Cut

A 20-per cent wage reduction by the Keystone Coal & Coke Co., the largest independent fuel operator in Westmoreland County, Pa., became effective April 24. The cut is general, including all employees from day laborers up to coke drawers. Between 8,000 and 10,000 men are affected.

The Keystone company is operating on a three-day and four-day schedule at its plants, all men getting half-time or over each week. Inability to continue operations at the old wage scale was given as the reason for the reduction.

The men are taking the cut without complaint and full crews reported at all plants.

Coal Consumption by Utilities Drops; Power Output Up

Electric public-utility plants consumed 3,374,384 net tons of coal during February, according to a report just issued by the Geological Survey. This compares with 3,673,447 tons consumed in January and 3,394,877 tons in December. Fuel oil consumed by utility plants in February totaled 1,546,289 barrels, compared with 1,602,745 barrels in January and 1,472,946 barrels in December.

The average daily production of electricity by public-utility power plants during February was 168,300,000 kw.-hr., which exceeded all previous records, being slightly higher than that for January.

Accidents at Coal Mines
Killed 339 in March

Accidents at coal mines in the United States during March, 1924, killed 339 men, according to a report by the U. S. Bureau of Mines. Included in this number are 172 fatalities caused by an explosion at Castlegate, Utah, on March 8, and 24 fatalities resulting from an explosion on March 28 at Yukon, W. Va. The fatality rate for the month was 7.06 per million tons, based on an output of 48,023,000 tons, as compared with 2.69 in the previous month and 3.26 for March last year, based on a production of 56,184,000 tons of coal. During March, 1923, only one major disaster, a coal-dust explosion, occurred, resulting in the loss of 10 lives.

During the first quarter of the present year 750 men have been killed by accidents and 160,094,000 tons of coal have been mined, the fatality rate being 4.68 per million tons. During the corresponding period last year 692 lives were lost, the production of coal was 165,008,000 tons, and the fatality rate was 4.19. For bituminous mines alone, the fatality rate for 1924 to the end of March was 4.60 per million tons, as compared with 3.95 for the corresponding months of 1923; for anthracite mines the rate per million tons was 5.16, as compared with 5.49.

Explosions of gas and coal-dust and accidents by explosives show an increased fatality rate per million tons in 1924 as compared with the first quarter of 1923. Substantial reductions are shown in the fatality rates for falls of roof and coal, haulage ac-



W. W. Inglis

In a statement to a representative of *Coal Age*, W. W. Inglis, president of the Glen Alden Coal Co., declared that the work of preparing for operation the four Glen Alden mines recently flooded by the Lackawanna River will require nearly two months. One million gallons of water is being pumped from the operations daily, three shifts of workers being employed. The loss in production of hard coal is estimated at 2,000 tons a day.

cidents, and accidents due to electricity, as indicated by the following figures:

	First Quarter, 1923	First Quarter, 1924
Falls of roof and coal ...	1.775	1.718
Haulage .....	.618	.525
Gas and coal-dust explosions .....	.994	1.786
Explosives ....	.139	.163
Electricity ....	.103	.069

Report Shows Kentucky
Coal Is Taxed Aplenty

A report of a special commission to investigate coal-land taxation would indicate that Kentucky coal is now taxed aplenty, and that the defeat of the coal-tonnage bills in the General Assembly of 1924 was no more than just. The special commission with an appropriation of \$20,000 for 1922 and the same amount for 1923, made a report to Governor Fields which was made public on April 23.

The report showed that coal-land assessment had been raised 43.2 per cent in four years, and, according to John B. Lewis, chairman of the tax commission, may be increased in some counties next year. The increase in agricultural counties in the same period was but 7.1 per cent.

According to the report, during the four years the total (land, mine equipment and improvement) in coal-bearing counties shows a rise of 47.7 per cent.

Eighteen counties produce 85 per cent of the coal mined in Kentucky, with the following percentages of assessment increase in 1923 over 1919: Bell, 12.5; Clay, 17; Floyd, 102; Harlan, 90; Hopkins, 8; Johnson, 43; Knott, 52; Knox, 16; Laurel, 7; Leslie, 19; Letcher, 112; Muhlenberg, 29; Ohio, 31; Perry, 136; Pike, 102; Union, 9; Webster, 4; Whitney, none.

P. T. Colgan, Middlesboro, Ky., having twenty-five years' experience in the coal industries in eastern Kentucky and West Virginia, and J. L. Smith, Danville, with ten years' experience, with other engineers, made the report, Chairman Lewis said.

Coal-Mine Fatalities During March, 1924, by Causes and States

(Compiled by Bureau of Mines and Published by *Coal Age*)

State	Underground											Shaft				Surface				Total by States							
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1924	1923
Alabama	2		1										3												3	8	
Alaska																									0	0	
Arkansas																									0	0	
Colorado			1										2												2	5	
Illinois	10		4			1		1					16												16	10	
Indiana			1										2												2	5	
Iowa	1												1												1	1	
Kansas																									1	1	
Kentucky	6		3			2							11												11	10	
Maryland						1							1												1	1	
Michigan																									0	0	
Missouri																									0	2	
Montana	2												2												2	1	
New Mexico	2												2												2	0	
North Dakota																									0	0	
Ohio	3		2										5												5	8	
Oklahoma			1										1												1	0	
Pennsylvania (bituminous)	19	2	4	1				1					27												27	31	
South Dakota																									0	0	
Tennessee			1										1												1	2	
Texas																									0	0	
Utah	1		2		172								175												175	4	
Virginia	1												1												1	2	
Washington	1												1												1	1	
West Virginia	11	1	6	1	24	1				1			45										2	2	47	37	
Wyoming	3												3												3	2	
Total (bituminous)	64	3	26	2	196	5		2		1			300											2	2	302	135
Pennsylvania (anthracite)	16		3	5		7							2 33	1		1		2	2					2	2	37	48
Total, March, 1924	80	3	29	7	196	12		2		1			3 333	1		1		2	2					2	4	339	
Total, March, 1923	85	10	28	9	12	9	1	5		1			3 163	2	1	2		5	3	1	1		3	7 15			183



Lindon W. Bates

This internationally known hydraulic engineer, whose expert knowledge was manifested in the filling of the Kansas City Stockyards, the excavation of the Chicago Drainage Canal, the dredging of the Kaw, Mississippi, Scheldt, Volga and Danube rivers, the building of a harbor for Brisbane, Australia, and the raising above flood level of Galveston, Texas, died in Paris, April 22, from a stroke of paralysis. He was born at Marshfield, Vt., in 1858, and was a resident of Mount Vernon, N. Y. To mining men he is remembered as the inventor of colloidal fuel, a mixture of oil and pulverized coal, a dense and mobile fuel especially desirable for use on ships.

Wholesale Coal Convention Plans Nearly Ready

The Convention Committee of the American Wholesale Coal Association, of which J. W. Johns of Pittsburgh, Pa., is chairman, is rapidly concluding arrangements for the association's convention, to be held at the Greenbrier Hotel, at White Sulphur Springs, W. Va., June 3 and 4. The business sessions will be held in the morning of each day.

The committee announces the acceptance of invitations to address the convention by G. N. Snider, formerly freight traffic manager of the New York Central Lines and now general manager of sales of Dickson & Eddy, New York; Owen Meredith Fox, associate editor of *Black Diamond*, Chicago, and E. M. Platt, president of the Platt & Brahm Coal Co., Chicago.

West Kentucky Strike Drones Along Peacefully

Everything is quiet in the western Kentucky strike zone. The operators are making no effort to run their mines and there have been no clashes of any sort since the men laid down their tools on the night of April 15. Operators are not anxious to run in the face of the present market. A long drawn-out strike is in prospect. If there were any possibility of a stiff demand or better price for coal some operators might be willing to consider signing up. On the other hand a good demand at a better price probably would result in a number trying to run open shop on the 1917 wage scale.

Alberta Looks for Troubles In Its Coal Mining

Alberta coal reserves, systems of coal mining, methods of grading and of inspection, cost of production and the capitalization of companies and their profits are to be investigated by a royal commission appointed by the Government of the Province of Alberta. It was decided upon as a result of a motion by P. M. Christopher, M.L.A., the labor member from Rocky Mountain, which received the support of Premier Herbert Greenfield and the endorsement of the Legislature.

Premier Greenfield, speaking to the motion, said that transportation costs are Alberta's chief difficulty in the search for an adequate market for coal products, but it is not the only problem. There is the cost of production, which varies from approximately \$2.70 a ton, run of mine, at stripping steam coal mines west of Edmonton to \$6.50 for lump at the deep domestic mines at Lethbridge. At Drumheller the cost is \$4.50; at Edmonton, \$4, and at the Crows Nest Pass, \$4.25 a ton.

He said mine operators blame labor costs and the miners answer that because of intermittent employment they do not earn enough to keep their families in reasonable comfort. They argue that undue overhead costs and heavy capitalization of mining companies are important factors. The Premier thinks that something might be said for both points of view.

Discussing the capitalization of coal-mining companies in Alberta the Premier said that the total amount of securities issued by joint stock companies operating coal mines during the year 1921 was \$45,209,058. The production in 1923 was only 6,866,923 tons.

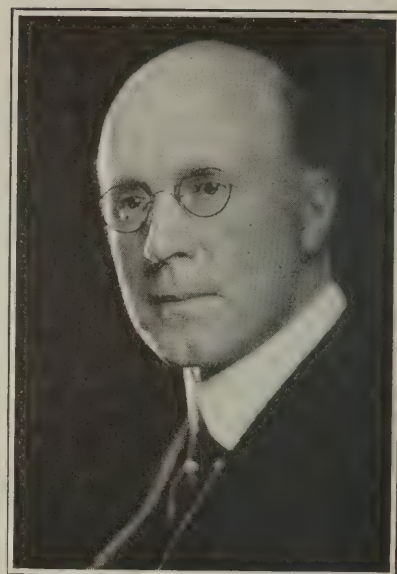
Heavy Loss in Abandoned Mines

Toward the end of 1919 it was estimated that \$18,795,755 had been invested in domestic mines in Alberta, of which \$4,378,500 was invested in mines since abandoned. At the same date it was estimated that \$18,315,000 had been invested in bituminous and anthracite mines, of which \$5,435,000 had been invested in mines since abandoned. Thus there was a total of \$9,813,500 sunk in abandoned mines.

In 1923 there were 362 mines operating in the province producing 6,866,923 tons, while in the Province of Nova Scotia 55 mines produced 6,500,000 tons. He maintained that high costs were due to some extent to the large number of small producing mines with the consequent multiplication of overhead and was of the opinion that this condition was the result of the ease with which leases of coal lands could be obtained under regulations of the Dominion Government.

Alberta had vast deposits of coal, it was said, but this was no excuse for wasteful methods of mining. He said that from 1905 to 1919 there had been blocked out for mining 102,603,927 tons, of which 54,379,081 tons had been extracted. Of the 48,226,846 tons still unextracted approximately 20 per cent would be recovered. This meant that 43,000,000 tons was lost.

"This matter of waste," he said, "has been engaging the attention of the



©Harris & Ewing

Senator Tasker L. Oddie

The Nevada Senator continues to advocate the creation of a department of mines and is at work on amendments to his bill which would apply to the coal industry. The new sections will provide for the appointment of advisory committees and the establishment of a bureau of coal economics.

Dominion Government, which is seriously considering the institution of a system of inspection of mines and mining methods in the interests of conservation. In Great Britain the proportion of coal salvaged is around 85 to 90 per cent. In Alberta the opinion of competent engineers is that the proportion salvaged is around 60 per cent all over the province."

Premier Greenfield closed with the statement that the Province of Alberta is negotiating with the Dominion for full control of her natural resources and that the Province has been endeavoring, in anticipation of the successful outcome of these negotiations, to obtain the fullest possible information regarding these resources.

To Study Mechanical Loading

A proposition is now before Director Bain which involves a study of mechanical loading by a fellowship research under the direction of the U. S. Bureau of Mines assisted by the Carnegie Institute of Technology, Pittsburgh, Pa. The Hillman Coal Co., Pittsburgh, offers to pay the way of a fellow to participate in the research; the Bureau is asked to furnish the services of an assistant mining engineer who will lead the work.

If the proposal receives the approval of the authorities in Washington—and most likely it will—the two men chosen for the work will go from mine to mine where mechanical loaders are used, observing performances and studying operating conditions. After an investigation of ten months, which will take them to all states mining coal, they will write a report of their findings and suggest methods and mine layouts for loading coal from the Pittsburgh seam with machihes.

More Than 100 Meet Death in Explosion In West Virginia Mine

Dispatch from Staff Correspondent

A violent explosion, in which, at the time this report was forwarded to *Coal Age*, 110 men were believed to have lost their lives, occurred at about 7:15 on the morning of April 28 in the Benwood mine of the Wheeling Steel Corporation, Benwood, W. Va., on the outskirts of Wheeling's industrial zone. The full force of men was at work, the man trip having entered the mine at 6:30 a.m.

The mine is a drift in the Pittsburgh No. 8 seam, from which about 900 tons are mined daily. It is very dry and is sprinkled daily in dry seasons. Few or no pumps are required in its operation. Open lights are used exclusively because the mine was never believed to be dangerous. The occasional pockets of gas found here, as also in most of the mines of the district, were never believed to make necessary any precaution other than ventilation and the regular inspection by firebosses.

The rescue crews are being hindered in their work by roof falls and deadly gases. About 1,400 ft. inside the drift mouth a big fall obstructs the entrance of rescuers. Consequently the base of operations is at the Browns Run air-shaft. This shaft, which was sunk to

facilitate ventilation, has been completed about five weeks. So far only thirty bodies have been recovered and little hope is entertained for the safety of the others. The ventilating fan was undamaged and is delivering 40,000 ft. of air per minute.

About three months ago a fireboss and two men were killed in this mine by the ignition of a pocket of gas. The cause of the explosion probably is, as usual, the ignition of an accumulation of gas and the extension of the explosion by coal dust. Federal Mine Bureau crews and those of the state and company are at the mine rendering assistance. Little progress has been made and consequently little is known regarding the condition of the workings.

Benwood mine adjoins several thousand acres of old abandoned workings. Probably much firedamp comes from these areas as a result of the destruction of stoppings and seals. While Pennsylvania state mine inspectors were in session in Pittsburgh discussing the advisability of rock dusting, rescue crews were at work in the Benwood mine searching for the bodies of men who had lost their lives in a coal-dust explosion.

North American Co.

Pays \$4,900,000 for

St. Bernard Mines

The North American Co., of New York closed an option April 26 on all the properties of the St. Bernard Mining Co. for \$4,900,000, according to advices from Madisonville, Ky. The new company will be merged with the West Kentucky Coal Co. under the latter name, and will be capitalized at \$15,000,000, of which \$6,000,000 is in preferred stock and \$9,000,000 common stock.

The new company will operate twenty-five mines, ten of them West Kentucky Coal Co. properties, with an annual output of 5,000,000 tons. The North American Co. controls the West Kentucky Coal Company, which is an organization with headquarters at Sturgis, where it operates coal mines as well as at Clay and Wheatcroft.

Negotiations for the consolidation have been in progress since January. C. F. Richardson, of Sturgis, president of the West Kentucky Coal Co., acted for the purchasers. The St. Bernard company was represented by F. D. Rash, Madisonville, president; J. R. Rash and M. K. Gordon, both of Madisonville, and Fustice A. Haile, of Nashville, Tenn.

An announcement from Madisonville was to the effect that there would be no change in the officers, personnel, policy or name of the St. Bernard Mining Co. It will operate, the announcement said, just as it has in the past and added that stock control is the only change in the ownership. Officials of the North

American Co. in New York City declined to make a statement.

Included in the deal are thirteen pit and strip plants, 44,000 acres of mineral rights, most of it timber land, all of the commissaries and tenant houses and the electric power plant at Earlington, which cost between \$740,000 and \$1,000,000.

Horrors! Bossy Competes With Coal Now!

The Rock Island R.R. has been mining its engine fuel from coal mines and oil wells mostly. But the other day it mined two tons from a dairy herd near Chicago and ran a five-car passenger train 20 miles on it. The fuel on the tender was dried and briquetted milk in white chunks fired from the tender by a hard-boiled fireman with a regular scoop into a regular firebox. And it made a fire so hot that the engine popped off most of the time—for the benefit of movie cameras and lots of spectators. The milk-fired run was engineered by the Chicago Health Department as a stunt to illustrate the fact that milk is such good fuel for human bodies that it will even run an engine. Since the famous milk run the Health Department has been trying to get Chicago to consume more good milk and the Rock Island has been trying to get the "goo" out of the flues of that engine.

House Committee Agrees to Defer Sec. 28 a Year

The House Committee on Merchant Marine recommended on April 26 that the operation of Sec. 28 of the Merchant Marine Act be deferred until May 1, 1925, and ordered a favorable report on the bill introduced April 12 by Representative Newton, of Minnesota. As originally drawn the bill would have postponed the effective date of the section until July 1 of next year.

Members of Congress believe that there is a chance for the Newton bill to be passed by June, and it is to be speeded. Mr. Newton said that he would ask for a special rule to give his measure preferential status. He will see Chairman Snell, of New York, chairman of the Rules Committee, this week.

Saturday's action was the result of protests from commercial interests in all sections of the country, who sent their representatives to go before members of Congress, the Interstate Commerce Commission and the Shipping Board. They declared that if Sec. 28 went into effect on May 20, as proposed under the order, it would demoralize the nation's industry, and in the terms of some of the witnesses, "make and unmake ports and industries."

The Interstate Commerce Commission decided, after a hearing, to postpone operation of Sec. 28 for thirty days, or until June 20, because the evidence showed that the railroads could not be ready by May 20 to put into effect the new preferential railroad rates on goods shipped for export on Shipping Board vessels, as proposed under Sec. 28.

Miners Oppose Concessions In Ohio Mines

A referendum of the miners in the southern Ohio field in the employ of operators connected with the Southern Ohio Coal Exchange, indicates, according to preliminary reports, that the miners are opposed to any concessions. When the scale in force during the past few years was affirmed for three years more as a result of the joint conference of operators and miners at conference at Jacksonville, Fla., it was understood that concessions in working rules might be made by which Ohio operators would get an advantage of 25c. to 50c. a ton, giving them much leeway in meeting competition of non-union mines in West Virginia and Kentucky. The exact status of the situation will not be known until the referendum vote is completed. The referendum vote is said to be very light.

A strike of a week's duration in the mines of the Pennsylvania Coal & Coke Corporation in Ehrenfeld, Cambria County, has been settled and the miners have returned to work. The trouble arose over the announced intention of the company of putting a night force to work in the mines. This the miners refused to sanction as not in keeping with the recently signed agreement. James Mark, vice-president of District No. 2, succeeded in adjusting the dispute.



Problems In Underground Management



Advice on Best Methods of Shooting Coal

Air Spaces Should Be Left to Spare the Roof and
Cushion the Blow on the Coal—Shearing
Sometimes Undesirable

IF ASKED what is the best explosive for coal mining I should be tempted to evade the question for want of detailed conditions, or else answer in a general way, that it is the explosive producing the results desired. The quantity and the size of coal produced is not dependent alone upon the kind of explosive. There are many other governing factors, such as the kind of coal, the depth of undercut, overcut or shear, the depth of the borehole, the quantity of explosive used and the tamping. Trials and tests will determine the best explosive and the best mining practice in any given mine.

GOOD TAMPING AFFORDS SAFETY

The only factor which is not variable is that of tamping. There is only one best method and that is to use stemming material which will pack solid, such as damp clay, and then tamp it tight right to the collar. Inflammable material such as "bug dust," paper or sawdust is banned. Good tamping not only provides safety in dusty and gassy mines, minimum of fumes and more efficiency from the explosive, but it also enables the powder to bring down a maximum percentage of the coal in desirable sizes.

Contributed by Atlas Powder Co.

The miner who uses a cheap explosive to save a few cents or who cuts fuse short to save a penny or two, or who to save a few minutes does not tamp a borehole is practicing a false economy. He saves about as much as the Hickville carpenter who spends an hour each day straightening bent nails to save buying new ones.

SLOW POWDER FOR BRITTLE COAL

In both bituminous and anthracite coal beds the quality of coal varies considerably. Some coals are hard and tough, and others are brittle. Even in the same mine the changing character of the coal sometimes necessitates different methods of operation. If a coal is easily broken, that is, brittle, a quick-acting explosive should not be used, as this will tend to shatter the coal and break it up into the smaller and less desirable sizes.

This is one of the reasons why many miners prefer blasting powder to dynamite; even to selecting a coarse-grained powder which is slightly slower in its action than a powder of finer grain. Large lumps of bituminous coal as a rule cannot be obtained with the quicker-acting explosives. The velocity of detonation for an explosive suitable for producing bituminous lump may run up to 8,000 or 9,000 feet per second, but for anthracite, explosives having higher velocities of detonation will work satisfactorily.

Undercutting, overcutting or shearing the coal helps materially in producing lump, and the extra face so reduces the resistance to breakage that much less explosive is required to bring down the same quantity of coal. Undercutting usually extends about 6 ft. deep from the face, but should be always a few inches deeper than the borehole. With proper undercutting, explosives are necessary to break

the coal into lumps small enough for the miner to handle.

Mining to obtain large lump may be overdone as when an easily broken coal is both undercut and sheared. A weak, slow-acting explosive in this case would be likely to produce a few large blocks which would have to be broken up later to loadable sizes. But this method of shooting down the coal almost unbroken and breaking it up after it has fallen does the least damage to a weak roof.

BREAKER SHOT THE HEAVIEST

The breaker shot, with undercutting, requires a heavier charge than subsequent shots. The first shot breaks against two free faces whereas subsequent shots are relieved by the extra face made by the breaker shot. If in a narrow bed the coal is sheared and the boreholes are placed midway between floor and roof, no extra free faces are obtained as each shot cleans out all the coal.

One of the Bureau of Mines requirements for a permissible explosive is that not over 1½ lb. (24 oz.) shall be used in any one charge. Tests in coal mines prove that this maximum charge suffices. A large number of tests show that the average loading is 14 oz. The depth of the borehole for coal mining runs from 4 to 6 ft. seldom exceeding the latter. The average depth of borehole over a series of tests was found to be 5 ft. 4 in. The average undercut with holes of this depth would be 6 ft.

The diameter of the borehole in general practice runs in sizes of 1½ in., 1½ in., 1½ in. and 2 in., the most popular diameter being 1½ in. With this size of hole, the average normal charge of 14 oz. (approximately two 1½ x 8 in. cartridges) will occupy when the cartridges are slit and well tamped, 13 in. of the bore hole. This leaves 4 ft. 3 in. of tamping, which sufficiently confines the charge.

Although blasting powder is fast, being replaced by permissibles, it is still used in large quantities, principally on account of its lower cost and the force of long practice among miners who are adept at rolling a paper shell and filling it with just the right quantity of blasting powder. Under the same conditions of blasting as with permissibles these cartridges of black powder would occupy from 22 to 34 in. of the borehole leaving only from 3 ft. 6 in. to 2 ft. 6 in. for stemming material, with a corresponding sacrifice of confinement. Laboratory tests made by the Bureau of Mines show that the more tamping used the greater the efficiency of the explosive, and they also show the superiority of moist clay over sand.

Miners are much more likely to over

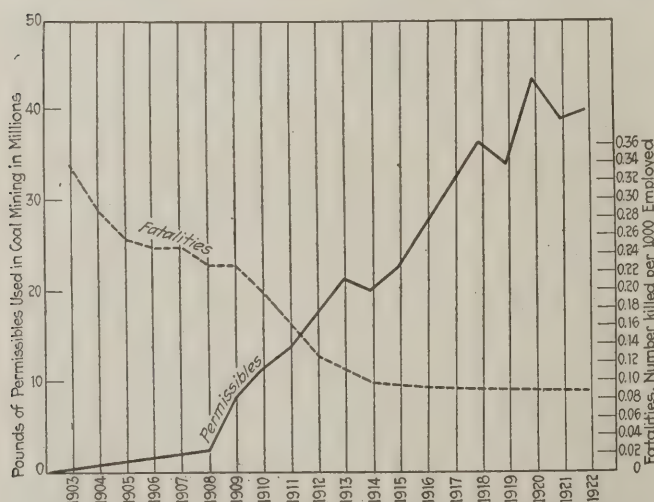


Fig. 1.—The More Permissibles the Fewer the Fatalities

Chart shows how the death rate from explosives has decreased with increasing use of permissibles. The fatality rate, however, since 1914 fallen but little, though the use of permissibles has greatly increased, suggesting that other causes tended from 1903 to 1914 to reduce fatalities from explosives.

charge a borehole than undercharge it. They know that an insufficient charge especially of blasting powder, will blow out of the hole much as a bullet is fired from a gun, bringing down little coal, if any, and resulting in a waste of powder and time. Miners who have changed from blasting powder to permissibles almost invariably over charge the holes.

When a charge of over 24 oz. of any powder is used it ceases to be a "permissible" and outside of the fact that such overcharges become dangerous in gassy and dusty mines, they also have a tendency to weaken the roof. Overloading may develop fissures in a roof which are not immediately noticeable to the miner but which may later cause a fall of roof. If the coal will come down only by heavy charges then it is better to decrease the quantity of explosive in each hole and increase the number of holes in the face.

Permissible explosives being stronger and quicker than blasting powder, their action is more centralized at the bottom of the borehole. If this hole is drilled slanting upward or "pitching" and so that the bottom of the borehole comes just under the roof a dense explosive is liable to do more damage to the roof than a bulky one, because with the latter the force will be exerted over a greater length of borehole. Hence the user of permissibles will often find the bulky powders the more satisfactory.

AIR CUSHIONS ADVISABLE

In some coals it is found that the charge shatters excessively. This has led to the practice of leaving an air cushion around the powder. If permissibles are used the cartridges are placed in the borehole without being slit. The borehole, being of larger diameter than the cartridge, leaves the necessary air space. With blasting powder a space of a few inches is left at the end of the charge by inserting a wad of paper the desired distance from the end of the charge and then following with the stemming material. With the development of permissibles the use of an air cushion is becoming obsolete.

After all is said and done the best way to determine the proper explosive is to ask the service department of the explosive manufacturer to send an expert to demonstrate in the mine. In this way the best mining practice and the best explosive for that particular mine can readily be determined.

Fig. 1 shows graphically the trend of practice with respect to the use of permissibles, and the relation of such practice to coal-mine fatalities. It will be seen that since the introduction of permissibles and their constantly increasing use the number of fatalities in coal mines due to explosives has been constantly decreasing. Every year

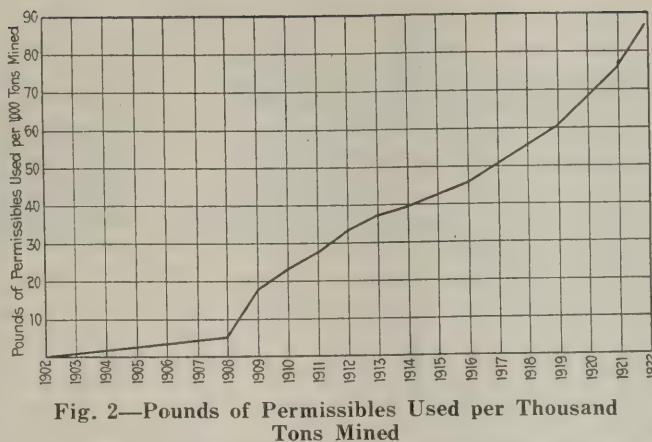


Fig. 2—Pounds of Permissibles Used per Thousand Tons Mined

This chart is based on the yearly sales of permissibles and the entire production of coal. It must be remembered that it does not indicate in any way the quantity of coal broken down by any given quantity of permissible explosive.

there is a greater proportion of permissibles used as is shown graphically in Fig. 2.

Twists Props Loose Instead Of Pulling Them

When Henry Walker, deputy chief mine inspector of Great Britain, addressed a meeting of anthracite coal men at Scranton he said that in England the modern way of loosening and recovering props was by twisting them loose and then pulling them out.

Consequently the description of the "Wrester" prop-drawing device contained in the *Iron & Coal Trades Review* recently is of interest. Where the prop is set firmly it may resist pulling and another setting of the post puller may have to be made. When this is being done the man has to return to the place of danger, which has been rendered still more dangerous by the attempt to withdraw the prop.

At the Sneyd collieries, Burslem, sixty, "Wresters" are being used. As will be seen in Fig. 1 the device consists of the lever *A* which turns on the fulcrum pin *B*, within the jaw of the collar *C*,

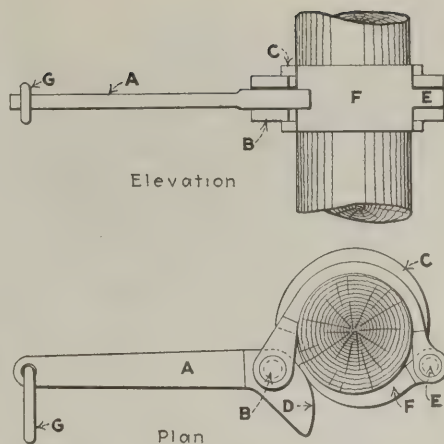


Fig. 1—Twisting Collar and Lever

The teeth in the curved member *F* bite into the prop when the lever end *D* presses on it as a result of the pull on the link *G*. Nothing is said as to the possibility of pulling the prop where it is of irregular form such as is usual in this country where props are frequently made of split timber.

which it will be seen is adapted to more or less encircle the prop to be withdrawn. The shorter arm of the level *D* is provided with a curved surface and the extremity of the lever is provided with a link *G*. The curved member *F* which is provided with teeth on its inner surface bite into the prop and prevent the collar from slipping when the link *G* is pulled. It will be observed that there are no loose parts to be lost or to get out of place.

In Fig. 2 can be seen the way in which the Wrester is operated from a distance. A chain is fastened to the link *G* and connected to a prop puller which is attached to a post at a distance from the one being pulled. Only one man is needed to put the Wrester and the prop puller in place. This same man pulls the prop.

The device is manufactured by the Atlas Mining Outfit Co. Ltd. of Birmingham, England. It is made in two sizes, one to draw 3½ to 5½ props and the other for props of a diameter of 5, to 7 in.

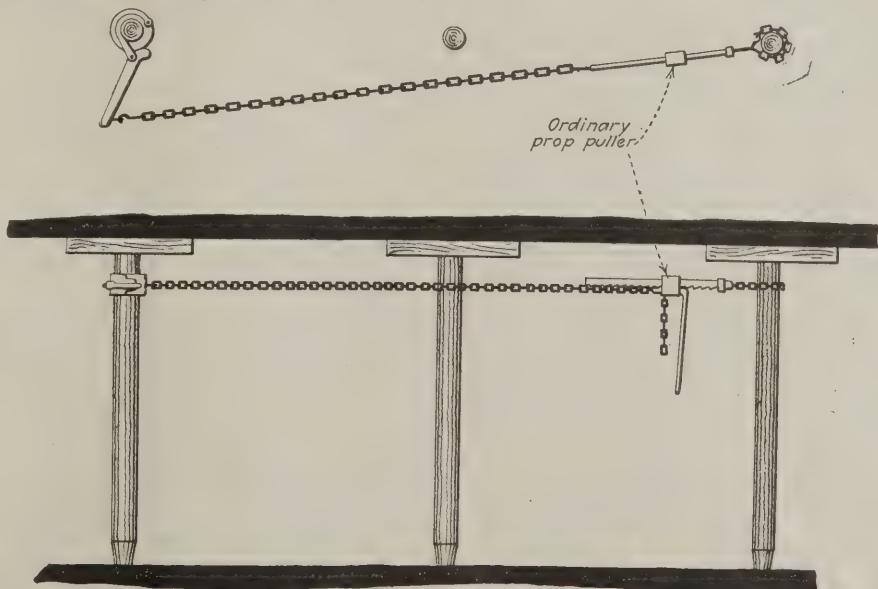
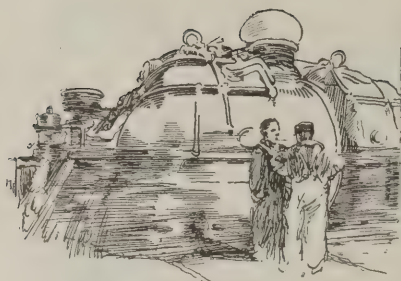
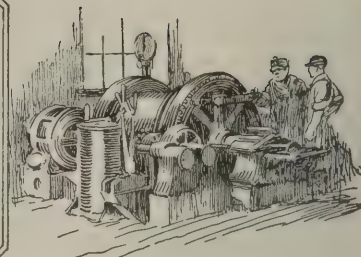


Fig. 2—How the Prop Is Twisted and Withdrawn from a Distance

With this device there is a leverage that makes pulling easier. Several props can be withdrawn without changing the anchorage. In a demonstration one prop was drawn that had no cap piece but was bedded in the roof. The props are not injured, it is said by this novel method of freeing and drawing them.



Practical Pointers For Electrical And Mechanical Men



What Means Should Be Taken to Keep Mine Locomotives Equal to Their Work

Switch in Series Position, Haul in Parallel—Run on Resistance Points
No More than Necessary—False Flangers Cause Vibration
And Destroy Switches and Crossovers

A MINE locomotive is a rugged piece of equipment, but like all machinery, it requires care, repair and intelligent operation. The average man can operate a mine locomotive successfully if he uses common sense and follows the instructions of the electrician. The motorman should know the track on his run and should be well acquainted with the mine. He is usually directly under the supervision of the trip foreman or of the mine foreman, but he should endeavor to follow the instructions of the electrician in operating his locomotive.

He should keep it oiled and greased, unless there is someone employed to do that work, and I believe it is the best practice to have a man for this purpose if there are many motors. The motorman should report to the repairman any defect that he has observed in the operation of the motor. All motormen should know that track switching should be done with the reverse handle in the series position and haulage with the handle in the parallel position.

SAND SHOULD BE USED SPARINGLY

A locomotive should not be run on resistance points any more than necessary because such operation heats the grids and causes burnouts and grounds. The controller handle should be moved to a full point or notch every time it is moved because if stopped between the notches on the star wheel the segments and contact fingers will be burned. Sand should not be used any more than necessary. If used sparingly the locomotive will pull more cars. I have known of cases where a locomotive was insulated from the track by use of too much sand. This, however, does not happen often. When it does, it is a good idea to remove the trolley pole from the wire and make some kind of temporary connection with the rail before again attempting to move the locomotive.

Some coal companies require the motorman to blow the coal, dust and trash off the lids and frame of the locomotive at the end of each shift. This is good practice, but it seems that the motorman should not be the man required to do this work because it can be done to better advantage by a repairman.

A mine that has a number of locomo-

tives usually has a force of repairmen for the upkeep of the traction equipment. Also a shop either inside or outside the mine, according to the ideas of the management and whether it is a shaft or a drift mine. Of course repairs can be more effectively made by daylight, but that does not mean that equipment cannot be successfully repaired inside the mines. There is one difficulty, however, and that is, securing material. The shop should have a pit or pits that will accommodate two or more locomotives and still leave room for a man to work with some degree of comfort. The pit should be about 4 ft. deep, and as wide as the track.

SHOP SHOULD BE WELL EQUIPPED

One or more chain blocks capable of lifting one end of the locomotive and a 2-ton chain block is handy for moving trucks, complete motors and other heavy parts. Screw or ratchet jacks should also be provided. Bars, chisels, sledges and the wrenches furnished by the locomotive manufacturer should be available. Slings made of steel or hemp and bands for handling the armatures should be provided. One or two extension cords with lamp guards are almost an absolute necessity.

The repair shop should be equipped with a compressed-air line. It should be roomy as possible and well lighted. A substantially built bench with a vise is also essential. Drawers and shelves for small supplies and for the mechanics' individual tools should be provided. Large tool boxes should be placed for the heavy tools or they eventually will be lost. Over the bench should be placed a test light with long leads or a portable test light can be provided. These lights offer the simplest means of testing for grounds, shorts and opens in the wiring of the motors. An emery wheel comes in handy but is not absolutely necessary. Of course ideal conditions cannot be attained around a mine but the nearer they are approached the better the repair service, and the fewer the delays. A shop should have tracks entering at each end, but sometimes this is not possible.

When a locomotive comes to the shop or barn it should be cleaned by means of moderate air pressure. Then while

the lids are off, the motor should be given a thorough inspection; it should be scrutinized closely for loose nuts, bolts, or screws. The wiring should be examined where it leaves the conduit, where it enters the motors and controller cases to see if the bushings are worn or lost and to see whether the insulation on the wire is worn.

Any lost or worn bushings should be replaced, and the wire taped with insulating tape at worn places. If the strands of wire have been broken or burned by grounding it is advisable to either splice in a new piece or replace the whole length. Sometimes a wire which has been cut or burned can be repaired by a screw or soldered connector.

SEE THAT BRAKES ARE ADJUSTED

The brake mechanism should be carefully inspected to see if the shoes line with the treads and that the pins and keys are in place. If shoes are worn they should be adjusted or replaced. The brake screw should be run up tight and then loosened to see if the mechanism binds and to ascertain the available take up of the brake screw. The brake studs should be examined to see if they are loose. If the brakes do not set up tight they can be adjusted by the adjusting rod or turnbuckle.

The journal boxes should be packed with wool waste and the bearings filled with engine oil, unless some special oil is specified. Both should be of good quality. Black oil is not suitable for anything but track switches and guard rails. A journal should not be allowed to wear too thin as a jar will cause it either to split or break, depending upon its composition. If any of the lids are gone from the axle journal boxes they should be replaced.

The adjusting collar on the drive axle should be set so that the pinion has about $\frac{1}{8}$ in. endwise play to insure a smooth, even wear of pinion and gear teeth. The pressed-on type of gear gives less trouble, but many good split gears are on the market. A false-flanged wheel should not be allowed on a locomotive as it not only causes excessive vibration to the equipment, but damages switches and crossovers. Flat spots on the treads should be ground down, whether caused by sliding or soft spots in the metal.

The motor suspension should be examined, gear cases aligned and tightened and any holes patched. The grease cups on armature bearings should be filled with a good quality grease. Practically all mine equipment now has either roller or ball bearings, which do not give as much trouble as sleeve bearings. All nuts and bolts on the motor case should be kept tight

and fastened with cotter keys. The motor cases are of two types, box and split frame. Both have their advantages and disadvantages, but of the two the split frame is easier for armature or field changing, more especially when a defective field is in the top half of the motor frame. The sand levers and valves should be kept in good condition. On straight track the sand spouts should line with the wheels. I have heard many persons theorize on the subject claiming that the sand rigging working on one side and not on the other was the direct cause of axles being twisted in two.

The trolley base should swivel freely, and on straight track the wheel should align with the wire. If there are no abnormal conditions the trolley should not arc on straight track. The terminal screws should be tight and the pole cable in good condition. Insulating straps of rubber or leather are a good means for holding the cable tightly against the pole. I have seen tape used for this purpose but believe it is a wasteful practice.

BACKPOLING IS DANGEROUS

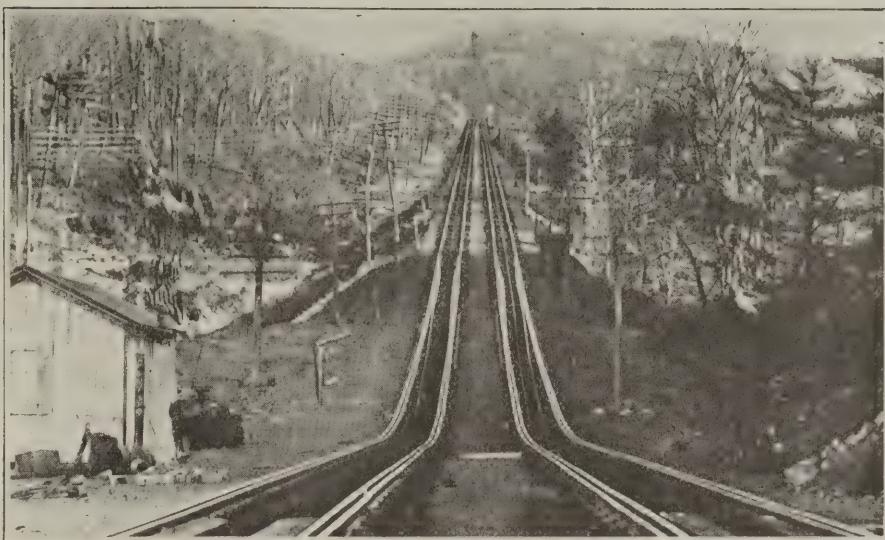
Poles should be of a soft wood which will split easily, because nearly all motormen occasionally backpole and a hard, unyielding pole is more dangerous than one of soft wood. Backpoling is a dangerous practice and should not be allowed. I have put on as many as three poles in one night, all broken by motormen who persisted in that practice. The cable socket should be carefully lubricated and examined to see that its contacts are not burned or pitted.

I know of one case where a pole caught in a frog and was jerked out of the pole socket. Instead of the cable pulling out of its socket it pulled the socket from its fastenings and jerked the motorman from his seat with the result that a trip of thirty cars passed over his body.

A locomotive repairman has a heavy responsibility. The controller which is always the brain of any electrical installation, when applied to mine locomotives is as simple as it can be made and still perform the necessary operations. It is substantially built of heavy contacts and arc protectors.

The more modern controllers have arcing tips that do not cost as much as the whole finger or segment. These can be renewed with a great saving in cost. Any accumulation of copper should be removed from the arc shields. The controller should be blown out with a moderate air pressure or a hand bellows and the contacts greased with commercial vaseline. Too much vaseline does more harm than good. The star wheel and the shaft bearings of both operating and reverse cylinders should be oiled occasionally.

The mine-locomotive motor is a product of years of study by the best mechanical and electrical engineers, and it is as well adapted to the mine conditions as any piece of machinery. Motors operated in the mines labor under disadvantages greater than in any other industry. Water holes, dripings from the roof, coal dust with carbon are present in nearly every



Ashley Planes Lift Coal at Low Cost

This is the longest railroad plane in the anthracite field and perhaps the longest in the world. A series of three planes nearly three miles long elevate coal cars over 1,000 ft. high from the valley near Wilkes-Barre, Pa., to the top of the mountain. The cost to elevate a ton of coal on these planes is 4c. With the best operating conditions it would cost 20c. to do this same work by means of a locomotive running over long winding tracks. More cars can be hauled up the planes in thirty minutes than the largest locomotive can pull on the tracks in twelve hours. The cables used on the planes are 2½ in. in diameter. These cables last from ten to seventeen months.

mine. The motors have few ventilation ducts because if they did water would get to the windings. Of course this is offset to a great extent by ventilating fans on the armature shaft.

INSPECT MOTORS CAREFULLY

Locomotive motors are not where they can be easily inspected and in some cases they operate almost continuously. In many mines the return circuit from the locomotives is bad and this causes the motors to heat abnormally. Motors should be carefully inspected for rough commutator, worn brushes, burned pigtails or shunts, high bars and open circuits. The brushes should be free in the holders and the holders tight on the rigging. The tension should not be too loose, a pressure of about 4 to 6 lb. per sq. in. being good practice.

If a motor shows abnormal heating it should be thoroughly tested for grounds and defective fields. Imperfect bonding will cause the motors to heat. In a split frame motor the lead coming from the lower half should be carefully inspected to see that it does not get caught between the two halves of the frame and become damaged or grounded.

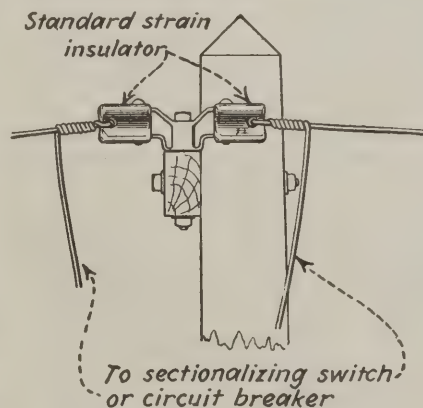
Last but not least the resistance banks should be examined for open circuits, grounds and burned or broken grids. All parts should be kept tight as loose grids cause burning which is the chief cause of grounds. If grids are loose they tend to chafe the mica-insulating tubes. Running the motors on the resistance points of the controller causes abnormal heating of the grids. Headlights must be kept in good condition at all times and the frame bolts, bumper bolts, etc., should be tightened at least once a week according to the service.

GRADY H. EMERSON.
Birmingham, Ala.

An Easy Method of Making Sectionalizing Taps

The small insulator and cross-arm fixture shown in the illustration demonstrates a convenient way to use standard strain insulators for taking off taps to sectionalizing switches on any kind of power, telephone, or signal circuit.

It is often convenient in such lines to have disconnecting switches that will sectionalize any troubles that may arise. When electricians are required to go over a line to locate trouble, it often is necessary for them to open up the circuits here and there and test in both directions for grounds and short circuits. The arrangement shown in the illustration is simple and consists of two standard porcelain insulators and a bracket which is attached to the cross-arm by a ⅜-in. bolt.



Strain Insulator Attachment
Sectionalizes Line

Two wet-ware porcelain insulators and a bracket provide an easy method for taking off taps for the sectionalizing of switches or circuit breakers.

Discussion

Railroad Rates Set for All Tidewater Coal Not Subject to Section 28

So far as coal is concerned the one matter of interest in the order of the Interstate Commerce Commission putting Section 28 of the Merchant Marine Act in force is whether this order will prevent tidewater transshipment bituminous coal rates from being applied on bituminous coal exported in ships of foreign register sailing from North Atlantic ports.

It is very doubtful whether the order will have this effect on export bituminous coal, because the tidewater transshipment tariff rates in no way differentiate between coastwise or export, cargo or bunker, coal and are not predicated in any way upon the rates for water haulage beyond the railroad terminals.

The rates were established in the first place to permit the movement of water-borne bituminous coal into the New England markets, and the use of

them on coal which has been exported has been entirely incidental and due solely to the fact that the rates have been published without any restrictions as to their use. They have not been based "in whole or in part" on the fact that any bituminous coal which may move on them is to be transported beyond the railroad in foreign water-borne commerce.

From 1896 to 1924, the total bituminous coal transshipped at tidewater at the North Atlantic ports grew steadily from eight million to twenty-eight million gross tons, and the New England tonnage grew from four million to twelve million. Meanwhile the export coal which totalled only one-half million in 1896 amounted to only four and one-half million in 1924.

General Manager, G. N. SNIDER.
Dickson & Eddy.

be at any time the cause of the death of a few or a thousand men. When a few men are killed where hundreds are employed it is not due as a rule to any precautions taken by the management.

The lesson to be learned from the recent explosions are first that the use of open lights in a mine requiring firebosses is a dangerous practice and that fencing and posting signs will not save us from disastrous explosions when working around falls and where there is a squeeze. Particularly is this true where the squeeze becomes so dangerous that fireboss' examinations cannot be made to warn the workmen of the true situation.

GEORGE EDWARDS.

Pikeville, Ky.

Many Peculiar Mine Names Near Portage

Answering the challenge in the issue of *Coal Age* of Dec. 27, p. 968, I present the following odd names for coal-mining plants: Starting at the foot of Martin's Branch of the Pennsylvania R.R. Co., running out of Portage, Pa., we have the following collection of ordinary and extraordinary names, given in the order of their occurrence along the branch: "Miller Shaft," "Red Bird," "Jail Bird," "Big Apple," "Fiddler's Green," "Robin's Nest" (now idle), "White Elephant," "Puritan Shaft," "Pearces," "Wild Cat," "Penker." Then come the two Budapest mines, one known as "Buda" and the other "Pest"; "New Drift." "PeeWee's Nest," "Last Chance," "White Weazel" and "Rojohn."

They tell the story hereabout of a salesman who was hunting for a mine and asked a man on the tippie where the mine belonging to a certain company was. The man replied that he did not know. But the fact was the salesman was then standing on the tippie of the company he named and the mine was the one for which he was looking. A little thing like a company's proper name does not worry the men here, just so payday comes regularly.

JEROME C. WHITE,
The Penker Coal Mining Co.

Portage, Pa.

Rock-Dust for Barriers from Cement Plants

On page 231 of *Coal Age* for Feb. 14, 1924, I note an editorial under the title "A New Use of Trade Associations," referring to the possibility of a number of mines combining together in order to obtain a sufficient quantity of ground shale or limestone for use in dust barriers in the mine.

It may interest you to know that some years ago while endeavoring to introduce the use of rock-dust barriers in Oklahoma mines, I found that the local portland cement plant was grinding shale and limestone which could be used for such barriers. From the investigations which I made at that time I feel quite sure that any portland-cement plant can furnish the material for rock-dust barriers.

J. J. RUTLEDGE,
Chief Mining Engineer,
State of Maryland.

Lots Should Be Drawn for Working Places

I read with interest the article by Alfred Jones, Wheeling, W. Va., in your issue of Jan. 3 entitled "Apportioning Working Places to Miners by Lot." Not only has this custom been in existence in the Durham mines for years, but it has regulated the distribution of working places throughout the whole of Australia, and New Zealand. I spent nearly seven years in Australia as a mine manager, and the system works works satisfactorily.

The practice is as follows: Eight days before the cavil is to be drawn the pitboss numbers all the places. The day before the cavil the pitboss and two miners appointed by the men inspect all places to be allotted. When the day arrives the same two men, with their checkweighman, the pitboss, mine manager and one of the office clerks, meet in the office to draw the cavil. All the men select their partners and hand their names to the checkweighman, who hands them over to the mine manager.

The names are all written off in pairs and put into a hat with little balls all numbered to correspond to the numbers of the places in the mine. After shaking, the hat is held above the heads of those present and drawing starts. One of the miners draws a ball and notes the number, say 36. The pitboss then draws a paper with the names on it, say J. Jones and R. Stewart. These names are put down to place No. 36, and so on. The names and the ball No. 36 are put aside and drawing continues.

When the drawing is finished the clerk has the completed list with the

names and numbers, and this is posted at the office where the men can see the numbers of the places they have drawn, and in the morning they know just where to move their tools, so that little time is lost in moving.

The miners clean off all their places the day of the cavil. In the place thus selected the miner works for three months when another cavil is held. The foreman cannot take the room away from him. If the foreman stops the place to get rid of the man it must stand till the next general cavil. He may make a change, however, with the consent of the miners themselves, the pit committee and the manager. If there are any places finished during the cavil, the men displaced must be given other places. For this reason there are always a few rooms kept empty. Should two or three places finish the same day, the miners must cavil for the places to be awarded them.

JAMES GRAY.

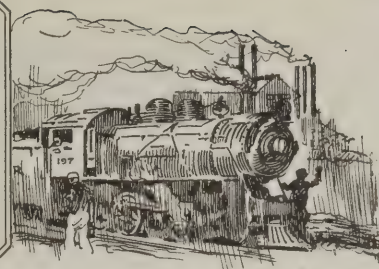
Newcastle, Wash.

Banish the Hazardous Open- Flame Lamp

At a large number of mines in this country where a little gas is found and open lights are used, firebosses are employed as a precaution, who examine the mine before the men enter and while they are at work. This plan is recognized as safe in some of our leading coal-producing states. The mystery of it all is that it has proved inadequate in so many instances and yet continues to be recognized as the best we can do. Recent explosions have proved to us again and again that a little gas now and then is a real menace and may



Production And the Market



Depression in Coal Markets Near End; Tendency Is Steadier, Undertone Hopeful

While there has been no pronounced recovery from the monotonous condition of dullness that has been prevalent in the bituminous coal markets it is probable that the bottom of the valley of depression has been reached. The Lake navigation season was ushered in last week with the arrival of three cargoes at the head of the lakes and several others are said to be on their way, but the movement is far from being under full headway. Operation at mines throughout the Central Competitive Field are at an exceedingly low ebb, production in the southern Ohio field being down to 10 per cent of capacity.

The consensus of sentiment seems to be that the trade is so flat on its back that the only direction in which it can look is upward. Though larger consumers for the most part still are averse to buying except for immediate requirements, contracts are being signed up here and there by railroads and industrials. The curtailment of output is having a steadying tendency, there being less glutting of markets with its inevitable accompaniment of distress coal. A number of producers and jobbers argue that many large users who have been living off their stockpiles will have eaten so deeply into their reserves soon that they will be forced into the market again.

Government to Encourage Early Buying

The Department of Commerce contemplates instituting in the near future a campaign to start domestic consumers of coal laying in stocks at this time. In announcing the plan last week the department stated that it is proposed to wait until domestic consumers have used up the remainder of their winter supplies and then show them that with the present favorable condition of transportation and the low price of coal, now is the propitious time to lay in supplies. Later on

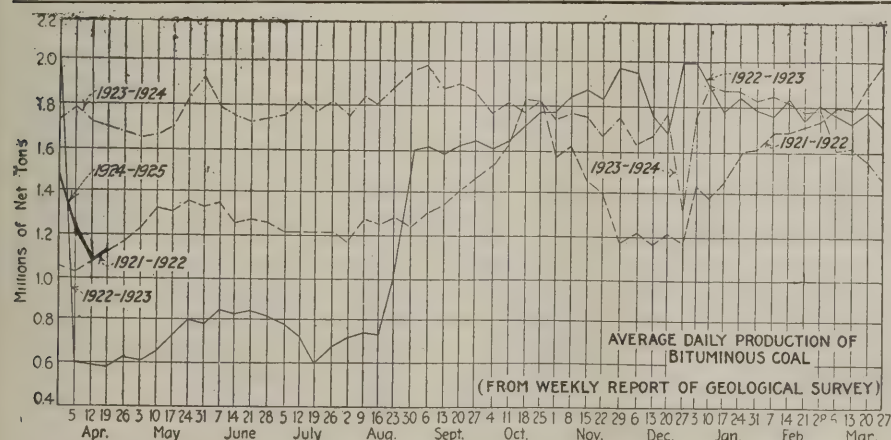
industrial consumers will be urged to place their orders for fuel, the scheme being designed to have one buying movement follow the other, in order to avoid traffic congestion and the possibility of undue effect on the market that might ensue if both classes of consumers began a concerted buying movement at the same time. The fact that the railroads had a surplus of 180,000 coal cars on April 14 is convincing proof that they are unusually well prepared right now for putting such a scheme into successful operation. All that is necessary to initiate the movement is some orders.

Coal Age Index of spot bituminous-coal prices registered a slight rebound during the last week, the April 28 figure being 171 and the corresponding price \$2.07. This compares with \$2.04 on April 21 and \$2.71 a year ago.

Activity in the export field was less marked during the last week; nevertheless total coal shipments from Baltimore for foreign ports during the first twenty-four days of April were greater than for the full month of either January, February or March. Italy was the largest purchaser, with France second. Porto Rico has been a steady buyer in small quantities.

After a prolonged period of decline the production of bituminous coal recovered slightly during the week ended April 19 when, according to the Geological Survey, the output totaled 6,945,000 net tons, compared with 6,834,000 tons during the preceding week. Anthracite output was 1,623,000 net tons, a decline of 233,000 tons from the previous week.

Demand for anthracite is somewhat stronger, which with the lessened output has tended to make independent prices firmer on domestic sizes. This is attributed in part to end-of-the-month buying in anticipation of a possible advance in prices, as the cuts at the beginning of the month were announced as for April only.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
April 5.....	9,629,000	6,826,000
April 12 (a).....	10,401,000	6,834,000
April 19 (b).....	10,221,000	6,945,000
Daily average.....	1,704,000	1,158,000
Cal. yr. to date (c).....	166,933,000	155,632,000
Daily average to date.....	1,782,000	1,665,000

ANTHRACITE

April 5.....	1,602,000	1,548,000
April 12.....	2,067,000	1,856,000
April 19.....	2,065,000	1,623,000
Cal. yr. to date.....	31,602,000	28,428,000

COKE

April 12 (a).....	421,000	265,000
April 19 (b).....	436,000	254,000
Cal. yr. to date (c).....	5,942,000	4,457,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Midwest at a Standstill

A practical standstill has been reached in the Midwest. The time of the year is about right for such a standstill, and the market conditions are at their worst for the time being. Stocks on hand in consumers' piles are disappearing, however, for most big buyers are confident coal will not be high at any time this year and are disposing of their storage fuel as swiftly as possible so as to enter the market about midsummer. A few small contracts are written day by day, but no heavy contracting is wound up.

Indiana and Illinois mines are working at low ebb—probably the lowest in history. The movement of large sizes is practically stopped and all mines have a certain number of "no bills" in those sizes, even though the mines may have been down for several weeks. Screenings continue in fair demand and light supply but without price changes from last week. Pocahontas is the only Eastern coal reaching the Midwest just now and that is coming in small volume at a mine run price declining from last week's spread of \$2@\$.25. The May price may run under \$2.

In southern Illinois fields a little railroad tonnage is moving and the strip mines are working fairly well. This seems to be principally on railroad coal. The mines continue to shut down until further advised and there is con-

siderable dissatisfaction among the miners, who are hopeful that the west Kentucky strikers will win out and thereby give southern Illinois a better chance in the open market.

In the Mt. Olive district there is no change from last week, excepting in the matter of screenings, which are quoted at \$2. In the Standard district it is hard to move anything, with the exception of screenings and small nut.

It is reported that the Rock Island contract was let at \$1.78 for Standard mine run. The mines fortunate enough to run are getting one to two days a week and this is principally on railroad coal.

St. Louis domestic business is at a pause. The dealers are buying a little anthracite and that seems to be all. They all have a little coal in the yards that they are trying to clean up. Wagonload steam is easy and continues to ease off. Country domestic business is dead but there is some steam business, principally on screenings and small sizes.

West Kentucky Sells Some

As a result of the coal strike in the larger section of the western Kentucky field the mines in the unaffected sections including non-union mines, independents, strips and union mines which have a year's contract still in effect, are getting a very fair business. The West Kentucky Coal Co.,

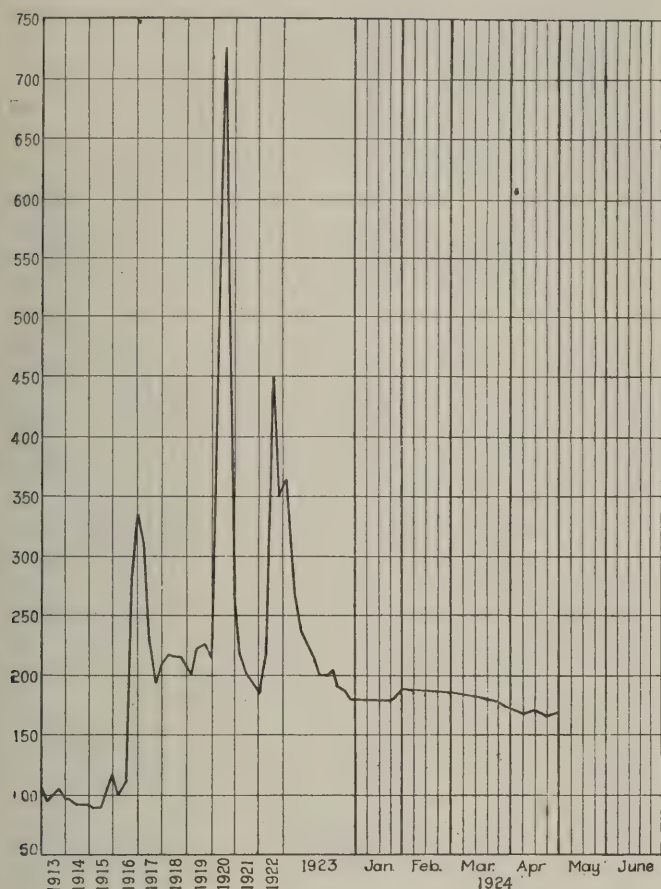
Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
	Market Quoted	Apr. 30 1923	Apr. 14 1924	Apr. 21 1924		Market Quoted	Apr. 30 1923	Apr. 14 1924	Apr. 21 1924
Smokeless lump	Columbus...	\$6.10	\$3.35	\$3.35	\$3.30@	Chicago...	\$3.65	\$2.85	\$2.75
Smokeless mine run	Columbus...	4.10	2.25	2.25	2.20@	Chicago...	3.10	2.35	2.35
Smokeless screenings	Columbus...	4.00	1.85	1.85	1.75@	Chicago...	1.85	2.15	2.15
Smokeless lump	Chicago...	6.10	3.10	3.10	3.00@	Chicago...	2.70	2.60	2.60
Smokeless mine run	Chicago...	3.85	2.10	2.10	2.00@	Chicago...	2.10	2.10	2.10
Smokeless lump	Cincinnati...	6.00	3.25	3.35	3.50	Chicago...	1.55	1.90	1.90
Smokeless mine run	Cincinnati...	3.85	2.10	2.05	2.00@	Chicago...	3.35	2.85	2.85
Smokeless screenings	Cincinnati...	3.85	1.80	1.75	1.75@	Chicago...	2.85	2.35	2.35
*Smokeless mine run	Boston...	6.35	4.20	4.20	4.40@	Chicago...	1.85	1.95	1.95
Clearfield mine run	Boston...	2.60	2.05	2.00	1.75@	Chicago...	2.85	2.35	2.35
Cambrist mine run	Boston...	3.35	2.55	2.50	2.25@	Chicago...	2.10	2.10	2.10
Somerset mine run	Boston...	3.00	2.35	2.15	2.00@	Chicago...	1.55	1.80	1.80
Pool 1 (Navy Standard)	New York...	4.00	2.85	2.85	2.75@	St. Louis...	2.85	2.85	2.75
Pool 1 (Navy Standard)	Philadelphia...	4.05	3.00	3.00	2.75@	St. Louis...	2.50	2.50	2.50
Pool 1 (Navy Standard)	Baltimore...					St. Louis...	1.50	1.50	2.00
Pool 9 (Super. Low Vol.)	New York...	3.10	2.20	2.20	2.00@	St. Louis...	2.50	2.35	2.35
Pool 9 (Super. Low Vol.)	Philadelphia...	3.10	2.20	2.20	2.00@	St. Louis...	1.85	1.95	1.95
Pool 9 (Super. Low Vol.)	Baltimore...	2.90	1.80	1.80	1.75@	St. Louis...	1.10	1.20	1.85
Pool 10 (H.Gr. Low Vol.)	New York...	2.60	1.85	1.85	1.75@	St. Louis...	2.60	2.25	2.25
Pool 10 (H.Gr. Low Vol.)	Philadelphia...	2.50	1.85	1.85	1.70@	St. Louis...	1.95	1.70	1.60
Pool 10 (H.Gr. Low Vol.)	Baltimore...	2.50	1.65	1.65	1.60@	St. Louis...	1.85	1.60	1.60
Pool 11 (Low Vol.)	New York...	2.10	1.60	1.50	1.40@	St. Louis...	2.60	2.25	2.25
Pool 11 (Low Vol.)	Philadelphia...	2.10	1.50	1.50	1.30@	St. Louis...	1.80	1.60	1.60
Pool 11 (Low Vol.)	Baltimore...	2.15	1.50	1.50	1.50	St. Louis...			
High-Volatile, Eastern					South and Southwest				
Pool 54-64 (Gas and St.)	New York...	1.80	1.50	1.45	1.40@	Big Seam lump	Birmingham...	2.50	2.60
Pool 54-64 (Gas and St.)	Philadelphia...	2.05	1.55	1.55	1.45@	Big Seam mine run	Birmingham...	2.10	2.00
Pool 54-64 (Gas and St.)	Baltimore...	1.95	1.60	1.60	1.50@	Big Seam (washed)	Birmingham...	2.35	2.20
Pittsburgh sc'd gas	Pittsburgh...	2.85	2.40	2.40	2.30@	S. E. Ky. lump	Chicago...	3.75	2.25
Pittsburgh gas mine run	Pittsburgh...		2.25	2.10	2.00@	S. E. Ky. mine run	Chicago...	2.85	1.60
Pittsburgh gas mine run (St.)	Pittsburgh...	2.00	1.85	1.85	1.75@	S. E. Ky. lump	Louisville...	4.00	2.60
Pittsburgh slack (Gas)	Pittsburgh...	1.60	1.30	1.30	1.35@	S. E. Ky. mine run	Louisville...	2.75	1.60
Kanawha lump	Columbus...	3.60	2.55			S. E. Ky. screenings	Louisville...	2.25	1.25
Kanawha mine run	Columbus...	2.25	1.55			S. E. Ky. screenings	Cincinnati...	3.50	2.25
Kanawha screenings	Columbus...	2.10	1.20			S. E. Ky. mine run	Cincinnati...	2.25	1.25
W. Va. lump	Cincinnati...	3.75	2.35	2.25	2.25@	S. E. Ky. screenings	Cincinnati...	2.00	1.00
W. Va. gas mine run	Cincinnati...	2.40	1.30	1.30	1.35@	S. E. Ky. mine run	Kansas City...	3.85	4.50
W. Va. steam mine run	Cincinnati...	2.40	1.30	1.30	1.35@	Kansas mine run	Kansas City...	3.25	3.25
W. Va. screenings	Cincinnati...	2.25	1.05	1.00	1.00@	Kansas screenings	Kansas City...	2.60	2.50
Hocking lump	Columbus...	2.85	2.45	2.40	2.25@				
Hocking mine run	Columbus...	2.00	1.60	1.60	1.50@				
Hocking screenings	Columbus...	1.70	1.30	1.30	1.25@				
Pitts. No. 8 lump	Cleveland...	2.85	2.35	2.35	2.00@				
Pitts. No. 8 mine run	Cleveland...	2.15	1.80	1.80	1.80@				
Pitts. No. 8 screenings	Cleveland...	1.80	1.30	1.40	1.50@				

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	April 30, 1923		April 21, 1924		April 28, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken	New York		\$2.34		\$7.75@	\$8.35	\$8.00@	\$8.65	\$8.00@
Broken	Philadelphia		2.39		7.90@	8.10	8.50@	8.65	8.50@
Egg	New York		2.34	\$8.50@	\$11.00	8.00@	8.35	\$8.25@	\$8.65
Egg	Philadelphia		2.39	9.25@	9.50	8.10@	8.35	8.25@	8.65
Egg	Chicago*		5.06	12.00@	12.50	7.20@	8.25	7.59@	7.72
Stove	New York		2.34	8.50@	11.00	8.00@	8.35	8.25@	8.85
Stove	Philadelphia		2.39	9.25@	9.50	8.15@	8.35	8.60@	9.50
Stove	Chicago*		5.06	12.00@	12.50	7.35@	8.25	7.90@	8.03
Chestnut	New York		2.34	8.50@	11.00	8.00@	8.35	8.25@	8.75
Chestnut	Philadelphia		2.39	9.25@	9.50	8.15@	8.35	8.60@	9.50
Chestnut	Chicago*		5.06	12.00@	12.50	7.35@	8.35	7.72@	7.95
Range	New York		2.34		8.30		8.50		8.50
Pea	New York		2.22	6.30@	7.25	6.00@	6.30	5.50@	6.00
Pea	Philadelphia		2.14	7.00@	7.25	6.15@	6.20	5.25@	6.50
Pea	Chicago*		4.79	7.00@	8.00	5.49@	6.03	5.13@	5.55
Buckwheat No. 1	New York		2.22	2.25@	3.50	3.50@	4.15	2.25@	2.75
Buckwheat No. 1	Philadelphia		2.14	3.00@	3.50			2.75@	3.00
Rice	New York		2.22	1.75@	2.50	1.75@	2.25	2.00@	2.25
Rice	Philadelphia		2.14	2.00@	2.50	2.00@	2.25	2.00@	2.25
Barley	New York		2.22	1.00@	1.50	1.50@	1.75	1.50@	1.75
Barley	Philadelphia		2.14	1.15@	1.50		1.50		1.50
Birdseye	New York		2.22		1.60		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in *italics*



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924 April 28	1924 April 21	1923 April 14	1923 April 30
Index	171	169	172	224
Weighted average price....	\$2.07	\$2.04	\$2.08	\$2.71

This diagram shows the relative, not the actual prices, on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Sturgis, non-union, is able to load out a big tonnage, and is handling a good deal of coal just now. The strippers and other operating companies are enjoying the removal of competition from the mines that are down. Production of operating mines has been quite fair.

Movement is principally on mine run and screenings, there being light demand for prepared sizes, which is resulting in relatively small supplies of screenings being produced and a relatively high price. Screenings and mine run are both selling at \$1.60@1.75. Nut coal is \$2@2.25, and all other sizes, \$2.25@2.50, including egg, lump and 6-in. block.

Louisville jobbers and producers of coal report that demand is generally quiet. The strike in western Kentucky has resulted in better movement of eastern Kentucky screenings into Louisville, there being a difference in price sufficient to absorb the 43 to 53c. higher freight rate from eastern Kentucky. Eastern Kentucky screenings are selling at \$1@1.25, as against \$1.60@1.75 for western Kentucky.

Little Action in Northwest

Navigation opened on Tuesday of last week with three cargoes received at Duluth-Superior. The Northwestern Fuel Co. got the first cargo at its Superior (Wis.) dock and the Inland Fuel Co. received two cargoes about half an hour later. Several more cargoes are reported on the way from the Sault, and it is thought that before the week is out all docks will have received coal.

Great rejoicing is evident among dock men at the recent decision of the Interstate Commerce Commission raising the hard-coal rate from mines to Twin Cities \$1.05 on net and \$1.16 on gross tons. This brings the freight back to

\$8.50 again, which will allow the docks to compete not only in Twin Cities but also in North Dakota and similar states. The new decision may see a resumption in anthracite activity, which will mean that the usual tonnage will be brought up this year.

Prices are the same in anthracite as last reported, and the list in bituminous is holding, but several docks are reported to be cutting 25c. a ton lump Youghiogheny, Hocking and splint for spot delivery. The docks are not contracting ahead at present prices, as they assert that coal costs them \$5 laid down here, without local dock charges. On the other hand, buyers are in the market for nothing but spot coal, and are not interested in contracts. They look for another drop. Consequently everything is lovely. A little more coal is moving to public-utility plants and open-pit iron mines, because of the absolute failure of water supply. The situation is unprecedented.

With new coal being unloaded onto fairly well filled docks and with almost a total lack of demand, the coal situation at Milwaukee at present is exceedingly dull and unpromising. The only feature of the market worth noting is the tightness of soft-coal screenings. April coal arrivals by lake thus far aggregate 10,000 tons of anthracite and 22,975 tons of soft coal. A number of additional cargoes are on the way.

West Is Quiet Too

The Kansas City market remains quiet. Little progress has been made in the joint conference of scale committees of operators and United Mine Workers. Such Kansas coal as is available, most of it the product of mines independent of the Southwestern Interstate Coal Operators' Association, is quoted at \$4.50 for lump, \$4 for nut, \$3.25 for mine run and \$2.50 for slack. Henryetta (Okla.) coal is \$5.50, \$3.75, \$3.50, and \$2.50.

The coal market in Colorado remains practically the same as last week inasmuch as the mines worked on an average of twenty-three hours per mine for the week. A number of unbilled loads of domestic sizes were reported on track last week. Operators report 35 per cent of the working time lost last week on account of "no market." Prices are unchanged.

In Utah the coal business is referred to by operators and retailers as "Rotten!" Mines are working around two days a week. Industries are buying very little and the domestic consumption has fallen off as a result of the ideal spring weather which prevails. The slack situation is easier due to a falling off in demand. The chief coal railroad in the state has written the operators using its line begging them not to load any more "no bills." Mine prices have taken another drop, but retail prices remain firm. The new mine prices are: Lump, \$3.50; domestic lump, \$3; stove, \$2.75; egg, \$2.50; nut, \$2.25; screen slack, \$2@2.25; slack, \$1.50.

Cincinnati Discerns Better Feeling

A much better feeling is evident below the surface in the Cincinnati market. Consigned and distressed coal has virtually been wiped off the slate. Practically all of the low-priced slack has been wiped out, run of mine quotations are firmer and even the makers of sized coal have caught the fever. Smokeless is even stronger than the others. Specialized coals are quoted as follows: Block, \$2.75@3.50; egg, \$2@2.75.

A slightly improved feeling is developing in the Columbus market. While prices have not advanced, the tone is stronger and operators and wholesalers believe that the worst of the slump is over. Some contracting of commercial tonnage is reported, but mostly on a tentative price basis. Railroad contracts have been attracting attention and several large agreements have been closed, it is reported, with the price of Hocking mine-run around \$2. There is not nearly as much distress coal on the market. Retailers are cleaning up stocks and in doing so are often cutting prices. Retail prices are generally irregular. Pocahontas and some of the West Virginia grades are showing slightly more strength. Some inquiries have been made as to lake tonnage but no contracts of consequences have been entered into. Conditions are not favorable for an early opening of the lake trade. Uncertainty as to rates and other conditions are holding up contracts. Little tonnage from the Hocking Valley field is expected to be moved to the head of the lakes during the present season.

Production in the Southern Ohio field is settling down to

around 10 per cent or less of capacity. In the other Ohio fields a better output is reported, but it shows a falling off from the figures of previous years.

Operators and jobbers say that aside from inquiries for slack, there is no significant change in the lethargy which has held the Cleveland market in its grip since the latter part of March. There are reports of additional mines closing, and one large company operating seven or eight mines in the eastern Ohio field has closed all its mines except one. The smaller mines are practically all closed. Aside from some shipping by operators who have dock interests at the head of the Lakes, the shipping of coal from the mines to the lower Lake docks has not yet begun.

The market at Pittsburgh has sagged even further. There is practically no demand at all and prices in general are unchanged, save for a slight advance in slack. Line consumption is decreasing, the outlook being distinctly poor in the steel trade.

The situation at Buffalo does not change much. Though bituminous output is declining fast, it has not yet reached a level low enough to affect prices.

There is little activity in the soft coal market at Toronto. Pennsylvania smokeless is selling at \$7.30, and steam lump at \$7.40, delivered. Slack is rather scarce, and brings \$6.40. The market for anthracite still continues firm, many people buying with a view to laying in a supply for next season.

New England Notes Firmer Tendency

In New England there are indications of firmer prices on the smokeless coals from West Virginia. Accumulations at Hampton Roads have steadily diminished until there is only a moderate tonnage on wheels in excess of orders in hand. Deliveries on contract are being made in reasonably good volume, and on the whole there is a slightly better tone to the market.

Buying, however, shows no improvement. The textile, shoe and machinery trades are still suffering from dull business, with prospects not favorable for the next few months. In the cloth trade there is depression due to competition from English mills, and large numbers of plants here are operating at a loss. Reserve stocks of coal are as large as early in the year, the "bargains" of the past few weeks having induced consumers to replace actual consumption, in many instances.

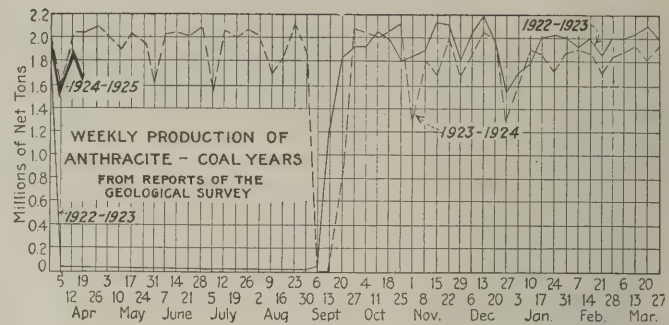
For distribution inland from Boston, Providence, and Portland there has also been an appreciable lift in spot prices. Quotations of \$5.35@5.50 per gross ton on cars have now lapsed, and the asking figure has advanced to \$5.75@6, with sales reported at \$5.65@5.85.

At Norfolk and Newport News the spot range has slowly advanced from \$4.25 to \$4.40 and \$4.50 per gross ton, f.o.b. vessel for No. 1 Navy Standard Pocahontas and New River. No. 2 coals have advanced similarly from \$4.10 to \$4.25.

Meager Movement to Seaboard Markets

The lessened movement of coal to the New York market has served to maintain prices on about last week's level, for demand is still slack. Not much coal is being forced on the market unless the producer is compelled to get rid of it. Line demand continues dull but there was a trifle more activity at this tidewater. Loaded boats are gradually disappearing. Contractors continue to hold off for the most part and go into the open market to replenish their reserves.

Business in the Philadelphia market has slumped a little more. Conditions at the mines do not improve and there is



more idleness now than actual work. Market prices manage to hold firm, but even at the present level there is not much stability, and there is no telling what price the consumer might get on a good sized block of coal. Of course a large share of the business is on lots of one to five cars and on these the prices have not changed.

In the face of the cut in soft-coal production there has been no material stiffening of the market at Baltimore. At present demand for both steam and gas coals is at a minimum and prices continue on the same low level maintained for the past few weeks.

General dullness continues to prevail throughout West Virginia, with such mines as are able to operate at all limited to about two days a week. Prices are so low that in some sections of the state at least producers are making no effort to operate unless they have contracts.

Although there has been little or no improvement in actual business in the Birmingham market, conditions in some respects are more healthy. There is little surplus coal, which has had a tendency to stabilize prices and remove under-cost selling to a great extent. Spot business is still light in volume and contracting is rather slow, though renewals are negotiated in most cases with the expiration of old agreements.

Anthracite Business Shows Firmness

Prices for independent domestic coals at New York are slightly firmer, demand having increased. Some of this increased activity was attributed to buying in anticipation of a 10c. advance by the producers. Stove coal continues to be the most popular size, though egg is in good demand in the New York market, call for this size showing much more action than a couple of weeks back. Chestnut size does not move as freely, but is in good demand. The past week has been a busy one for retail dealers. There was a little less activity in the steam coal market due to more seasonable weather, but not sufficient to show any surplus in any of the sizes.

Unusually cool April weather at Philadelphia has served to keep up a good current demand and business in a retail way is really good for this time of year. The Easter vacation of the miners has also had a strong effect on market conditions, and with the exception of nut coal, and the steam coal sizes, the operators are having very little trouble to move the output. The anthracite situation in Baltimore has resolved itself to a fairly settled basis. While some individual decisions may be made as to selling prices at retail, pending a more or less settled policy resulting from meetings of the coal exchange, it seems likely that the trade as a whole will continue the present schedule of prices at retail up until July 1.

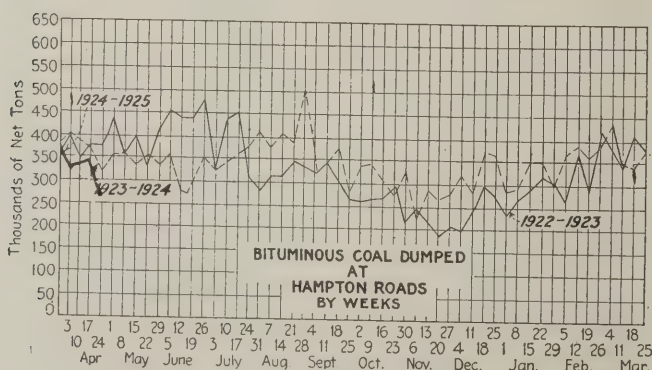
Coke Market Dormant

The coke market continues practically stagnant, there being scarcely a ripple from sales or even inquiries. Output of beehive coke during the week ended April 19 was 254,000 net tons, according to the Geological Survey, compared with 265,000 tons during the previous week.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended April 12	881,299	127,792
Previous week	862,096	123,220
Same week in 1923	946,871	182,602

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
April 14, 1924	305,981	180,620		
Previous week	278,724	159,438	551	
Same date in 1923	14,241	3,259	48,584	21,025



Foreign Market And Export News

British Prices Weaken with Waning of Strike Menace; Output Lower

Recovery from the usual holiday lull in the British coal market is gradual. With the waning of the strike menace prices are weaker in the South Wales trade and demand is slack.

The market at Newcastle also is weaker, and prices are declining. Present activity is entirely confined to filling orders booked some weeks ago.

A substantial increase in the German coal output, especially from the occupied district, in the last few months serves to aggravate the situation for British coal interests. The Ruhr is the key to the coal trade position today, the latter say, and the more coal produced by Germany the less will the leading Continental markets require from Great Britain.

A cable dispatch to *Coal Age* states that British coal mines produced 5,843,000 tons of coal during the week ended April 12, according to provisional official reports. This was a decline of 9,000 tons from the output of the preceding week.

The court of inquiry appointed to investigate wages and living conditions of coal miners has begun work. As the old contract expired April 17, the miners are working on a day-to-day arrangement pending the outcome of the inquiry.

Demand Keeps Pace with Output In French Markets

Demand for coal in the French markets is keeping pace with offerings, both in industrial and domestic fuels. Output is sold one month in advance; disposals are few and new business exceptional. The British market has been stronger due to the menace of a strike. Prices show a tendency to advance, as the demand is very strong.

With the continuance of cold weather, activity in the sale of household coal is holding above the level usually recorded at this time of the year. Owing to the rise of salaries and transport costs, dealers in the Paris area

have decided not to alter their quotations during the month of April. It is probable, however, that summer prices will be applied in May, which will show a cut in quotations.

Output of coke during April is averaging about 19,400 tons daily, which is far in excess of that prevailing before the occupation. Owing to the recovery of the franc, the price for indemnity coke has been placed at 145.25 fr. on trucks frontier, Sierck, for the first two weeks of the month. To this will be added 0.50 fr. per ton, representing the expenses of administration of the O.R.C.A.

The rolling stock situation has improved slightly, but it is still far from normal.

Trade Slumps at Hampton Roads; Prices Rise as Supplies Fall

Business at Hampton Roads has slowed down, although prices are stiffening as result of reduced supplies at tidewater. Mines serving the port report shutdowns, due to overproduction, and the supply of coal on hand is dwindling.

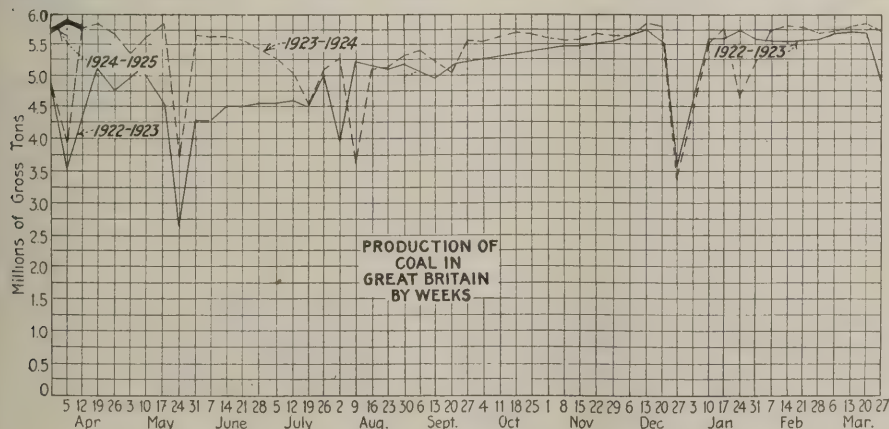
Hampton Roads piers are running on part time, with indications that April will be one of the duller months of the year. Foreign movement is fairly brisk, coastwise trade is dull and bunker business fair.

United States Domestic Coal Exports During March

	(In Gross Tons)	1923	1924
Anthracite.....		399,563	311,431
Value.....		\$4,405,493	\$3,303,127
Bituminous.....		1,219,970	1,111,752
Value.....		\$7,880,657	\$5,560,759
Coke.....		97,521	112,048
Value.....		\$1,124,789	\$516,733

British Coal Exports in March

	March, 1924	February, 1924	March, 1923
Tons.....	5,190,000	5,075,000	7,180,000
Value.....	£6,391,000	£6,201,000	\$8,818,000



Export Clearances Week Ended April 25, 1924

FROM BALTIMORE		Tons
For Algeria:		
Br. Str. Siltonhall.....		9,081
For France:		
Br. Str. Ikala.....		6,541
Br. Str. Saxilby.....		5,921
For Porto Rico:		
Am. Str. Gov. John Lin.....		765
Am. Str. Jacob W. Hook.....		891
Am. Str. Delisle.....		815
For Italy:		
Ital. Str. Giovanni.....		9,913
Ital. Str. Giovanna Florio.....		7,353
Gk. Str. Michael L. Embiricos.....		7,675

FROM HAMPTON ROADS

For French West Africa:		
Ital. Str. Valtellina for Dakar.....		8,218
For Brazil:		
Amer. Str. Chinha Rio de Janeiro.....		8,214
Ital. Str. Emanuele Accame for Porto Ferrajo.....		11,228
Br. Str. Mabriton for Rio de Janeiro.....		8,833
For Bermuda:		
Amer. Str. George W. Elzey, Jr., for Hamilton.....		1,010
For France:		
Fr. Str. P. L. M. 24 for Marseilles.....		7,935
Jap. Str. Spain Maru for Cherbourg.....		8,104
For Jamaica:		
Nor. Str. Gefion for Kingston.....		2,011
For Newfoundland:		
Br. Str. Hardanger.....		3,041
For Italy:		
Jap. Str. India Maru for Venice.....		7,807
For Uruguay:		
Nor. Str. Hesperos for Montevideo.....		6,505
For West Indies:		
Nor. Str. Bjornefford for Curacao.....		5,499
Nor. Str. Halse for Port of Spain.....		3,028

FROM PHILADELPHIA

For Canada:		
Am. Str. Robert M. Thompson for Chicoutimi, Quebec.....		
Am. Str. Ruby for Chicoutimi, Quebec.....		

Hampton Roads Pier Situation

	April 17	April 24
N. & W. Piers, Lamberts Pt.:		
Cars on hand.....	1,473	1,617
Tons on hand.....	87,456	98,836
Tons dumped for week.....	118,343	106,026
Tonnage waiting.....	23,000	12,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	861	1,114
Tons on hand.....	58,950	73,600
Tons dumped for week.....	106,808	64,516
Tonnage waiting.....		2,576
C. & O. Piers, Newport News:		
Cars on hand.....	948	1,228
Tons on hand.....	48,325	64,012
Tons dumped for week.....	86,219	65,849
Tonnage waiting.....	575	

Pier and Bunker Prices, Gross Tons

PIERS		April 19	April 26†
Pool 9, New York.....	\$4.65@ \$4.90	\$4.75@ \$5.00	
Pool 10, New York.....	4.40@ 4.75	4.40@ 4.75	
Pool 11, New York.....	4.25@ 4.50	4.25@ 4.50	
Pool 9, Philadelphia.....	4.80@ 5.20	4.70@ 5.05	
Pool 10, Philadelphia.....	4.35@ 4.90	4.45@ 4.80	
Pool 11, Philadelphia.....	4.35@ 4.65	4.30@ 4.55	
Pool 1, Hamp. Roads.....	4.35@ 4.45	4.35@ 4.60	
Pool 2, Hamp. Roads.....	4.15@ 4.25	5.15@ 4.30	
Pools 5-6-7 Hamp. Rds.....	4.00@ 4.15	4.00@ 4.15	
BUNKERS		April 19	April 26†
Pool 9, New York.....	4.95@ 5.20	5.05@ 5.30	
Pool 10, New York.....	4.70@ 5.05	4.70@ 5.05	
Pool 11, New York.....	4.55@ 4.80	4.55@ 4.80	
Pool 9, Philadelphia.....	5.10@ 5.55	5.00@ 5.40	
Pool 10, Philadelphia.....	4.90@ 5.20	4.75@ 5.00	
Pool 11, Philadelphia.....	4.65@ 5.00	4.50@ 4.80	
Pool 1, Hamp. Roads.....	4.45	4.35@ 4.60	
Pool 2, Hamp. Roads.....	4.25	4.15@ 4.30	
Pools 5-6-7 Hamp. Rds.....	4.00@ 4.15	4.15	

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to <i>Coal Age</i>		
Cardiff:	April 19	April 26†
Admiralty, large.....	30s. @ 31s.	29s. @ 30s.
Steam smalls.....	23s. 6d.	21s.
Newcastle:		
Best steams.....	27s. @ 27s. 6d.	25s. 6d. @ 27s. 6d.
Best gas.....	25s. 6d.	25s. @ 25s. 6d.
Best bunkers.....	25s.	24s. 6d. @ 25s.

† Advances over previous week shown in heavy type declines in italics.



News Items From Field and Trade



ALABAMA

A. A. Fendley has been elected president and Ed. H. Rauwald secretary of the **Blount County Mining Co.**, of Oneonta, which was recently incorporated and has 300 acres of coal land under development.

ARKANSAS

Production of coal in the mines at Branch during the week of April 12 was the **highest of any week** since the local field was opened. A total of 886 narrow-gage cars was loaded into 72 standard gage cars. The record shows that 1923 was the best year for Branch since the railroad was built, the shipments totaling 1731 standard cars of coal.

COLORADO

The **Cliente Coal Co.** has been incorporated in Walesburg, with a capital stock of \$50,000, by R. L. Snodgrass, S. M. Thompson and G. McNally.

During the month of March Colorado produced 894,262 tons of coal. This was an increase of 17,724 tons as compared with the same month last year. A total of 12,044 men was employed in and about the mines.

ILLINOIS

An official of the Union Colliery Co., of St. Louis, Mo., states that **but one man suffered a broken leg in the falling cage accident at the Kathleen mine** of that company April 10 at Dowell. A number of men were given attention at the Marshall Browning Hospital at DuQuoin, but the broken leg was the most serious injury.

The **Pike County Collieries Co.**, 1141 North Vermilion Street, Danville, has been incorporated with capital of \$62,500 to own, lease and operate coal mines. The incorporators are H. C. Adams, Thomas J. Hawkins and Charles F. Shannon.

Holly Stover, Inc., the Stover Coal Co., the Stover Elkhorn Coal Co. and the Star Coal & Coke Co. have removed their offices from the McCormick Building to suites 910-912, Straus Building, 310 South Michigan Ave., Chicago.

A number of important improvements are soon to be made at Zeigler No. 1 and Zeigler No. 2 mines, in Franklin County, of the Bell & Zoller Coal Co., of Chicago. At old No. 1 mine three steel stacks, one of which blew down early in April, and four boilers, all of which were nearly twenty

years old, are to be replaced. A big concrete stack is to replace the steel ones. The main shaft will be retimbered. At No. 2 mine a crusher is to be installed and a new docking table for egg coal with conveyors to and from it are to be bought. This will necessitate an addition to the steel tipple.

INDIANA

All bids for providing the state's coal for next year have been rejected by the Indiana State Purchasing Committee. Fred B. Robinson, secretary of the committee, said the committee regarded the prices as excessive. The committee will ask for new bids at once. It is expected that the new proposals will be opened some time late in May. The lowest bid submitted for mine run coal, Fourth Vein, was \$2, while Fourth Vein strip coal was bid at \$1.98. Bids on Fifth Vein coal ranged from \$1.75 to \$2.25 for mine run. A number of bids submitted for eastern Kentucky, West Virginia and Illinois coal were not given serious consideration because of prohibitive freight rates.

The **Otter Creek Coal Co.**, of Brazil, has been petitioned into bankruptcy by the First National Bank, Kattman & Tillet, and the Citizens Telephone Co., all of Brazil. The petition says the indebtedness totals \$16,975.

KANSAS

The **Kansas first-aid and mine-rescue meet**, which was to have been held in Arma, May 17, **has been postponed** because mine idleness has taken so many men out of the field. If a contract for the Southwest is made soon enough to permit training, the state meet will be held a short time before the national meet at Huntington, W. Va., in September.

Ouster proceedings against Leon Besson, state mine inspector of Kansas, were instituted in the state Supreme Court April 21 by Attorney General C. B. Griffith. The Attorney General contends Besson is not qualified for the position because he has not complied with the state law requiring the state mine inspector to pass an examination before the state mining examining board.

KENTUCKY

John C. Smith, superintendent of the **Black Mountain Mining Co.**, of Harlan, on April 16 **denied reports** carried in the press to the effect that the company was planning to start up its mines

non-union, as a result of a walkout of 500 men on April 1, when a reduction in wages was refused by the workers. Press reports were to the effect that trouble was brewing, and that troops would be in readiness. Smith replied to this by stating that the company had no intention of running unless it came to some sort of an agreement with the union.

Through the efforts of coal interests, headed by a western Kentucky coal operator in the last session of the Legislature, a bill was enacted whereby an armory commission was created, which is now obtaining armory connections for state troops in various sections of the field. This will result in more numerous enlistments, greater interest and better drilled troops, which will have more equipment and know how to use it. It will also mean troops available for labor and other disturbances on short notice. Contracts for housing have been completed at Carlisle, Covington, Winchester, Williamsburg, Poorfork, and are pending at Barbourville, Harlan and London, while arrangements will be made at Whitesburg, Hazard, Jackson, Beattyville, Booneville, Richmond, Monticello, Springfield, Hopkinsville, Mayfield, Bowling Green, Russellville and Livermore, which will give better protection in a number of isolated districts.

On April 18 Judge John L. Srout, referee in bankruptcy at Bowling Green, named M. M. Ennis, of Bowling Green, as receiver for the **Drakesboro Coal Co.**, of Drakesboro, which had previously filed a voluntary petition in bankruptcy in the Western District U. S. Court, at Louisville, listing assets of \$11,080 and liabilities of \$13,105.07. Assets include a twenty-three year lease on 300 acres of coal land, with free use of rail connection to the Louisville & Nashville R.R., tipple, mine equipment, etc. Ennis will serve pending election of a trustee, after a settlement with the striking coal miners of Western Kentucky.

It is reported from Middlesboro that **mines in that section are operating on the 1917 scale or below**, and that the Southern Railway Co. has increased coal purchases by 40 per cent, which is resulting in about two days a week added to running time over a dull period.

It was reported from Harlan on April 18 that **J. O. Carey**, superintendent of the **Intermountain Coal & Lumber Co.**, at Putney, was instantly killed by a sawlog when a log train on which he was riding was wrecked.

The Hombre Coal Co., at Coolidge, in Perry County, has been purchased by Henry Dabb and coal interests of Norton, Va., resulting in changing of the name of the company to the Coolidge Coal Co., with main offices at Norton.

NEW YORK

The Virginia Iron, Coal & Coke Co., reports for the quarter ended March 31, 1924, a net income of \$5,792 after charges, against \$75,371 in the previous quarter and \$243,559 in the first quarter of 1923. The net income of \$5,792 for the first quarter of 1924 is equal to 11c. a share on the \$5,000,000 preferred stock against \$75,371, or 12c. a share, on \$10,000,000 in common for the previous quarter and net income of \$243,559, or \$1.81 a share, on common in the first quarter of 1923.

The Board of Directors of the Pennsylvania Coal & Coke Corporation on April 22 declared the regular dividend of \$1 per share of the accumulated earnings and surplus of the company, payable on May 10, 1924, to stockholders of record at the close of business on May 5, 1924. The company reports for the month of March a deficit of \$11,774 after ordinary taxes, depreciation and depletion and other charges, but before federal taxes. This compares with a surplus of \$122,444 reported for the corresponding month of 1923. For the first quarter of this year the surplus was \$1,001, against \$394,217 in the first quarter of 1923.

OHIO

Representatives of some fifty mines in the Kanawha fields of West Virginia met at the Sinton Hotel in Cincinnati on April 24 at the call of D. C. Kennedy, secretary of the Kanawha Operators Association, to consider the juggling of freight rates by the Interstate Commerce Commission at the behest of union operators to the north of the Ohio River. Efforts have been made in Washington to raise the West Virginia and Kentucky lake and rail rates and lower those from the Ohio mines. Determined opposition to such a plan was voiced by those present and legal as well as association representation before the commission was authorized. No further action was taken regarding the shutdown of the Kanawha mines, which would indicate that the operators intend to sit still on this question until some definite move urges them to action.

Papers have been filed with the Secretary of State, authorizing the increase in capital stock of the Doanville Coal Co., of Nelsonville, from \$10,000 to \$30,000. A. D. Knight is president and George E. Johnson, secretary.

Sunday Creek Mine No. 21, located in the Sugar Creek field, has been closed until market conditions improve, throwing out of employment about 600 miners

The 1,500,000-ton contract of the New York Central Lines, including all of the western divisions of that system, is attracting considerable attention among Columbus producers and

distributors. While all of the contract has not been closed it is reported that the George M. Jones Co. received 600,000 and the Sunday Creek Coal Co. 400,000 tons. The price was \$2 for mine run. Others are bidding on the tonnage, but the official award will not be made for a week.

Charles J. Albasin, commissioner of the Pittsburgh Vein Operators' Association, reports that 64 mines in the eastern Ohio field have been closed down because of lack of demand, between 7,000 and 8,000 miners having been thrown out of employment as a result. A portion of the miners are working part time, however. Production in the district is at the lowest point in years, according to reports received from all sections of the producing field.

G. C. Weitzell, president of the New Pittsburgh Coal Co., Columbus, a subsidiary of the Pittsburgh Coal Co., has returned from a three months' vacation trip spent in California and the Hawaiian Islands.

Sealed proposals will be received May 9 by the Board of Education of Columbus for 7,000 tons, more or less, of bituminous run of mine; 8,000 tons, more or less, bituminous lump; 2,000 tons, more or less bituminous nut, pea and slack, to be delivered to the various schools.

Sealed proposals were received April 16 by the City Board of Purchase of Columbus and contract awarded to the Sunday Creek Coal Co. on a bid of \$1.45 f.o.b. mines for coal as follows: 5,000 tons of Hocking nut, pea and slack for the Municipal Light plant; 3,500 tons Hocking nut, pea and slack for the Water Works Department and 2,000 tons Hocking nut, pea and slack for the Garbage Disposal Plant.

The Cedar Heights Clay & Coal Co., Oak Hill, has been chartered with a capital of \$25,000 to mine and sell coal. Incorporators are James G. Morgan, Margaret J. Morgan, Anna Marie Kern, Roscoe Kern, Effie C. Howell and Alonzo E. Howell.

PENNSYLVANIA

The H. C. Frick Coke Co. has closed down ten plants in the Connellsville district and most of the others are running four or five days per week. The Oliver & Snyder Steel Co. coke plants are operating about 20 per cent. The Monessen Coal & Coke Co., a subsidiary of the Pittsburgh Steel Co., is operating about 50 per cent. The Buckeye Coal Co., a subsidiary of the Youngstown Sheet & Tube Co., has closed down its Brier Hill coal plant, and during the shutdown is changing from its steam plant to power purchased from the West Penn Power Co. The Republic Iron & Steel coal and coke operations are operating about 40 per cent. The Hillman Coal & Coke Co. is operating about 60 per cent. W. J. Rainey, Inc., continue to operate about full time.

Conferences with mine inspectors and colliery superintendents upon the subject of safety are to be conducted throughout the summer by Joseph J. Walsh, Secretary of Mines.

The monthly accident report of the Bureau of Workmen's Compensation of the State Department of Labor and Industry shows that during March there were 94 fatal accidents in coal mines of the state.

J. M. Sloan, secretary of the Anthracite Forest Protective Association, and fire wardens in the Hazleton district have been kept busy with a series of forest fires. Collieries and coal banks in several sections were menaced. A large gang of men extinguished a raging fire near Grape Run, which was rapidly approaching the refuse and coal banks at the Spring Mountain operations of the Lehigh Valley Coal Co. Brush fires to the east and south of Eckley were numerous. Several occurred near Highland. A serious fire burned at Evergreen Valley for several days.

Indications that the strike at the Lehigh Valley Coal & Navigation Co. in the Panther Creek Valley will complete its third week were manifest when Thomas Kennedy, district president of the United Mine Workers, announced that suggestions for a settlement by J. B. Warriner, general manager of the company, had been rejected. Several conferences were held between officials of the union and company heads.

An active campaign waged by United Mine Workers officials of District No. 1 for David Fowler for the Republican nomination for Congressman for Lackawanna County was unsuccessful. With every district heard from Fowler lost to Laurence H. Watres by nearly 5,000 votes. Fowler obtained the Democratic nomination, but being a Republican since he entered politics, little hope is held out for favorable support from the Democratic party leaders. Mr. Fowler is an international organizer of the United Mine Workers.

On April 21 Judge Thompson, of the U. S. District Court at Philadelphia, appointed William O'Malley temporary receiver for the White Ash Coal Co., Minersville, and for the Marshfield Coal Co., of Tremont. Bills in equity were filed by Thomas F. O'Malley, a creditor of both companies. The two companies are owned and managed by the same interests. June 18 was fixed by the court for a hearing to make the receivership permanent.

Thomas Elliott, of South Brownsville, president of the Lilly Coal & Coke Co., of West Brownsville, Pa., returned home last week from a trip of several months to Europe for rest and recreation.

The Oak Hill coal breaker and separating plant of the Pine Hill Coal Co., Minersville, was destroyed by fire recently, causing a loss of about \$100,000, including equipment.

Stream pollution due to wastes from coke-oven plants in the western part of Pennsylvania has virtually disappeared, according to Dr. Charles H. Miner, Secretary of Health and a member of the State Sanitary Waters Board. All of the large coke plants have installed apparatus, at the suggestion of the State Health Department, to arrest the flow of trade wastes into the Ohio,

Allegheny and Monongahela rivers. "As a result of this action upon the part of the large coke manufacturers in the western part of the state," said Dr. Miner, "Pennsylvania is far ahead of both West Virginia and Ohio in the matter of elimination of trade wastes from the waters of the state." The states of Ohio, West Virginia and New York are now endeavoring to co-operate with Pennsylvania in the drafting of a program for uniform anti-pollution regulations on interstate streams, such as the Ohio and the Delaware rivers.

VIRGINIA

At a meeting of the board of directors of the Pocahontas Coal & Coke Co. held April 22 A. C. Needles was elected president of the company, effective May 1, 1924, in succession to N. D. Maher, retired.

WEST VIRGINIA

In future trials of those implicated in the Logan "armed march" cases of 1921, the state will be represented by Harold A. Ritz, just designated by Governor Morgan to serve in that capacity. In the cases already tried, counsel for the defense have always laid stress on the charge that the state was not represented in the prosecution but that outside attorneys were employed by members of coal operators' associations. Judge Ritz formerly was on the West Virginia Supreme Court bench, retiring a year or so ago to engage in private practice in Charleston.

The Maryland-New River Coal Co., of Philadelphia, has a newly completed tippie, erected at a cost of \$100,000, at its mines on Keeney Creek. It is one of the largest in the New River field, its equipment including screening facilities, loading boom, etc. The new structure is of wood and will take the place of two old tipples at the Rothwell Smokeless mines, the output of both workings being dumped over the new Tipple. The saving in labor costs, it is estimated, will amount to \$100 per day.

The Buffalo Valley Collieries Co. has just been launched with a view to operating in the Brooke County section of the northern Panhandle of West Virginia; capital, \$150,000; headquarters, Wellsburg. Chiefly interested in the new concern are Daniel Reamer, Fred Cooper, George S. Shrader, John S. Duvall, of Monessen, Pa., and W. W. Luce, of Vernon.

The Logan Eagle Collieries Co. has been authorized to change its form of capitalization from 5,000 shares of preferred stock at \$100 and 20,000 shares of no par value stock to 7,500 shares of common stock of a par value of \$100.

The Betty Ann Collieries Co., of Putnam, will soon install shaker screens in its mine at that place. Other improvements will be made to the property. The exclusive sales contract for the product of this company has been taken by the Wheeler Coal & Coke Co., of Columbus, Ohio. William Jones is manager of the Betty Ann Collieries Co.

A total of 3,424,144 net tons of smokeless coal was produced during February, as against 3,282,518 net tons during February, 1923. The Pocahontas field produced 1,637,925 net tons as against 983,625 tons in February, 1923. New River production amounted to 719,712 tons as against 551,513 tons in February, 1923. Winding Gulf produced 642,767 tons as against 471,060 tons in February, 1923. Tug River produced 423,740 tons, as against 276,320 tons in February, 1923. Of the total smokeless produced, the Norfolk & Western handled 2,061,665 tons, the Chesapeake & Ohio 753,025 tons and the Virginian 609,454. Total coal shipments in February by the Chesapeake & Ohio were 3,322,596 tons, as compared with 3,041,365 by the Norfolk & Western and 694,216 by the Virginian.

Only five new coal companies were organized in West Virginia in March, a much smaller number than usual, due in large measure to the depressed state of the coal market. The five companies organized—all resident—had an aggregate capitalization of \$410,000. Included in the list were: Thomas & Wilson Coal Co., of Buckhannon, which will operate a lease on Cabin Creek, \$50,000; Big Otter Collieries Co., of Wheeling, with a capital of \$30,000; Banfi Coal Co., of Follansbee, with a capital stock of \$25,000; Kentucky Coal & Land Co., of Wheeling, with a capital of \$25,000; Nonsuch Pocahontas Coal Co., of Iaeger, with a capital stock of \$10,000.

The Deaker Hill Coal Mining Co., operating near Kingwood, in Preston County, has been placed in the hands of a receiver on an order of the Circuit Court of Preston County. W. P. Walker of Akron, Ohio, and James W. Flynn, of Kingwood, were appointed receivers by Judge Hughes.

The Interstate Coal & Coke Co. has filed a certificate of dissolution. The Mack Coal Co. has changed its form of capitalization from \$150,000 to 1,000 shares of preferred stock at \$100 and to 1,500 shares of no par value.

The Wilbur Fuel Co. has increased its authorized capital stock from \$500,000 to \$1,000,000.

WASHINGTON, D. C.

The U. S. Supreme Court has granted a motion to advance the case of *Davis, Director General, vs. the Corona Coal Co.* Argument has been set for May 5. In this case the Director General of Railroads sued the coal company for damages to a wharf owned by a railroad under his jurisdiction at New Orleans when a tug of the coal company collided with it. The Louisiana courts held that the suit had not been brought within a year, which was the time limit for such actions under Louisiana law. The Director General appealed on the ground that he was not subject to the state law in such suits.

The Civil Service Commission announces examinations for junior engineers, to be held throughout the country May 9. The optional subjects include the following divisions of

engineers: Aeronautical, agricultural, ceramic, chemical, civil (general), electrical, electro-chemical, fisheries, hydraulic, materials, highway, industrial, irrigation and drainage, mechanical, mining, petroleum, radio and structural. The Bureau of Mines will name several junior mining engineers and has one opening at present.

The Roslyn Coal & Coke Co., of Tacoma, has been incorporated by A. F. Plant and George H. Reed for \$50,000.

CANADA

The British Columbia Electric Ry. has let contracts exceeding \$400,000 for improvements to its gas plants at Vancouver and Victoria. Among the improvements to the Vancouver plant is a coke briquetting plant of a capacity of 25 tons per day.

Pattison & Bowns, Inc., of New York City, has acquired an interest in the St. Lawrence Importing & Distributing Co., Ltd., of Canada. This company has been for some time past engaged in the sale of anthracite and bituminous coal in Canada, with offices in the Royal Bank Building, in Toronto, Ontario. George S. McSweeney, formerly connected with the Century Coal Co., of Montreal, has become affiliated with the St. Lawrence Company as general manager and will have his headquarters in Montreal. Pattison & Bowns, Inc., is a subsidiary of the United States Distributing Corporation.

More than 100,000 tons of coal has been contracted for in Newfoundland for delivery this summer from the Dominion Coal Co. Of this amount between 50,000 and 60,000 tons will be taken by the Newfoundland government to be used by its boats, railways and other services. The balance has been sold to local dealers at St. Johns.

Keen competition has set in at Montreal between the dealers handling Welsh and Scotch anthracite and those selling the American product. The price of American anthracite has been reduced from \$17 a ton to \$15.25. The price of coke has been lowered from \$14 to \$12.50 per ton due to competition from Nova Scotia coke.

W. Donaldson, lessee of the Donaldson-Tennant coal mine near Lethbridge, where a strike of miners is in progress, has subleased his mine to the miners. It is the first effort since the strike started, April 1, to operate any of the mines in the district. Officers of the United Mine Workers have ordered heavy picketing of the mine and proclaim the workers as strike breakers.

Practically all the United Mine Workers' locals in Pictou County, Nova Scotia, have passed strongly worded resolution urging the government to increase the duty on American coal to \$2 per ton. Pictou County collieries are working only two to four days a week, and this probably will continue until after the opening of navigation. The local unions also urge on the Dominion Government a reduction in freight rates on the Canadian National Ry., so that Nova Scotia coal may enter the Quebec and Ontario markets.

Traffic News

Northwest Hard-Coal Rate Favors the Docks

The decision of the Interstate Commerce Commission on the matter of withdrawing the joint freight rate on hard coal all-rail from Buffalo to the Twin Cities was exceedingly quick. The decision was something of a compromise in that it refused to allow the rate to become the sum of the locals, and further agreed with the objectors that the long-haul rate need not be based upon the distance wholly. But two-thirds of the proposed increase of \$1.66 was allowed, or \$1.16, which will become effective with the filing of new tariffs and the customary period of notice. This will mean, unless there is some further interference, that the all-rail rate will be increased by \$1.16 about May 29. Under the old rates, all-rail hard coal had an advantage over the laid-down dock coal price of about 35c. The increase will give a handicap of 81c.

The dock concerns insist that the change will make no difference in their prices. The independent retail concerns which fought the new rates insist that it gives the dock trade a practical monopoly of the hard-coal business, as the handicap forces the independents to buy from them and also prevents bringing all-rail coal through in an emergency. They predict that it is only a matter of time when the dock price will be increased by \$1.16, as a result of doing away with the all-rail competition.

Dismiss Complaint Against Pennsy

The complaint of the Lackawanna Steel Company against coal and ore rates from points in Pennsylvania to Buffalo, N. Y., was dismissed April 25 by the Interstate Commerce Commission. The complaint was filed against the Pennsylvania R.R. and charged that rates on coal and coke from Reynoldsville, Pittsburgh and Connellsville, Pa., to iron and steel manufacturers at Buffalo were unreasonable and that rates on ores shipped from lower Lake Erie ports to competing interior iron and steel manufacturers were unreasonably low.

Two Roads Pay; One Escapes

In the case of the Midland Coal Co. against the Midland Valley R.R., the Interstate Commerce Commission has been called upon to prorate the amount of reparation due the coal company on certain shipments from Williams, Okla., to Kansas City. The coal moved over the Midland Valley, the Missouri, Oklahoma & Gulf and the Frisco. In a previous decision the commission awarded reparation with interest against the three carriers. The Missouri, Oklahoma & Gulf was sold under foreclosure. The purchaser, the Kansas, Oklahoma & Gulf, bought the line with the condition that all claims against the property must be pre-

sented within ninety days after the sale. As the amount of reparations owed by the one carrier could not be collected, the examiner has found the amounts chargeable to the two other carriers and recommends that they be instructed to make such payments to the coal company.

Finds Indiana Rates Reasonable

Rates on bituminous coal in carloads from the Brazil-Clinton and Linton-Sullivan mine groups in Indiana to various Indiana points are not unreasonable, in the opinion of Interstate Commerce Commission Examiner Carter. In his report to the commission he recommends that the complaint against these rates be dismissed. The complaint was filed by a number of retail coal dealers in Indiana.

Coming Meetings

Chamber of Commerce of the United States. Twelfth annual meeting at Cleveland, Ohio, May 6-8. Secretary, D. A. Skinner, Mills Bldg., Washington, D. C.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

West Virginia Coal Association. Annual meeting May 13-17, Cincinnati, Ohio. Secretary, W. H. Cunningham, First National Bank Building, Huntington, W. Va.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

Mine Inspectors Institute of America. Annual meeting, Sinton Hotel, Cincinnati, Ohio, May 14-16. Secretary, Martin Bolt, State House, Springfield.

Retail Coal Dealers Association of Texas. Nineteenth annual convention, May 20 and 21, Vernon, Texas. Secretary, C. R. Goldman, Dallas, Texas.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

West Virginia Coal Mining Institute. Annual meeting June 3 and 4, Elkins, W. Va. Secretary, R. E. Sherwood, Box 1026, Charleston, W. Va.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

New Equipment

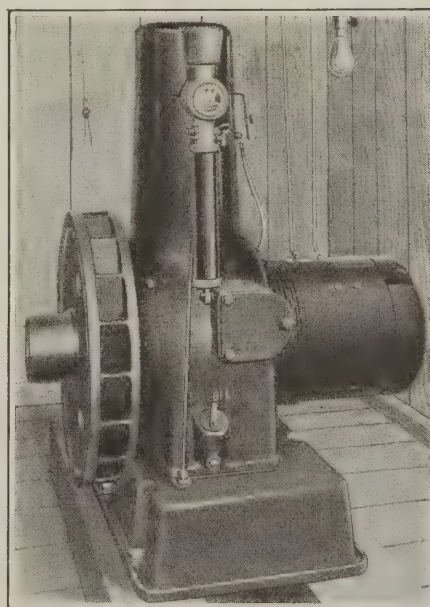
Small Light-and-Power Plant

A small kerosene or natural-gas light-and-power plant for use without a battery has been developed by the Westinghouse Electric & Manufacturing Co. for service wherever the current can be turned directly into the line. The absence of the battery adds greatly to the ruggedness and portability of the plant, and it is particularly well suited for direct service or for auxiliary or standby service to supplement existing generating equipment in such places as mines and quarries, construction camps, pumping stations, barges, boats and dredges.

The plant has a capacity of 1,500 watts at 110 volts. It consists of a gasoline engine and an electric generator built into a single compact unit. The engine is air-cooled, which makes it possible to install it in unheated places, economical in oil and fuel consumption, ruggedly constructed, and operates at a slow speed. It has a capacity of sixty 25-watt lamps or about 1½ hp.

A distinctive feature of the plant is the ease with which it can be operated. There are no complicated adjustments or operations necessary to start or stop it, and no other attention is necessary while it is running except to keep the fuel and oil tanks supplied. The single-cylinder, four-cycle engine has a 3½-in. bore and 5-in. stroke. A fan in the flywheel draws air into the cylinder dome and over the cylinder fins, assuring cool operation under all conditions.

The engine is lubricated by a splash-feed system which supplies the proper



Small Generating Unit Which Requires No Battery

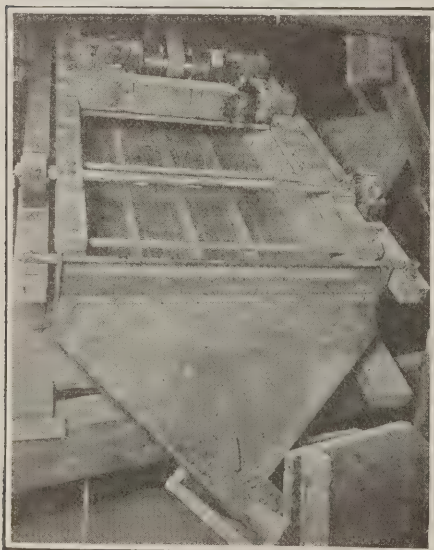
The engine operates on kerosene or natural gas. Fuel is supplied by a Venturi mixing valve. The generator will supply energy to a 1½-hp. load.

quantity of oil to the moving parts at all times regardless of the depth in the crankcase. This is accomplished by an oil-carrying gear that dips into the oil in the crankcase and carries it to a pan keeping the oil in this pan at a constant level. A simple Venturi mixing valve is used instead of the usual complicated carburetor. Fuel is drawn by suction to this valve from the 6-gal. tank built into the base of the unit. A simple mechanical governor controls the speed of the engine by regulating both the fuel and the air. The complete unit conforms to the requirements of the Fire Underwriters.

Vibration Prevents Screen From Gumming

A vibrating screen designed to separate fine particles of byproducts, coke, coal and limestone has recently been placed on the market by the Link-Belt Co., Chicago, Ill. Provision has been made to provide uniform vibration over the entire screening box. The screen is vibrated by the action of an unbalanced pulley which is supported on the screening frame and rotated at high speed. The unbalanced pulley may be adjusted to impart to the main screen box rapid vibrations of the proper intensity and direction to screen many different kinds of materials. The pulley is provided with a bushing and is lubricated automatically under forced-feed. The screen box is arranged for one, two, or three screen decks, depending upon whether two, three, or four sizes of material are to be produced. The screen cloth is mounted on a movable frame carried within the box, each provided with means for stretching the cloth. The box is clamped rigidly to the hollow stationary shaft carrying the vibrator pulley. The vibrations are imparted directly to the box and screen cloth.

The screen box with feed hopper and discharge chute is suspended from two hollow cross shafts, the ends of which are carried on flat spiral springs on the supporting structure.



Screen Sifts Fine Materials

Vibrations are produced by the action of an unbalanced pulley rotated at high speed. It is claimed that all parts of the screen surface are uniformly vibrated.

Arcwall Coal-Cutting Machine Approved

The latest addition to the list of permissible coal cutting machines, approved by the U. S. Bureau of Mines, is a Jeffrey direct-current arcwall coal-cutting machine. Two approvals were issued by the Bureau covering the 250-volt and 500-volt design.

The complete machine consists of a self-propelled truck having a turret mounted on its front end which carries the cutter bar and the motor driving the cutter chain. The motor which drives the cutter chain also supplies power for turning the turret.

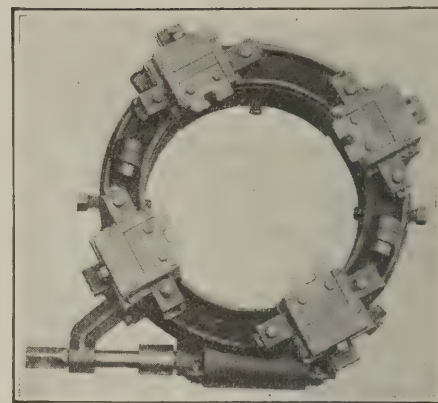
A second motor having a controller and resistance serves to propel the truck and raise and lower the turret. The cable reel, fuse and switch compartment are mounted on the rear of the truck. If desired, a headlight mounted on the turret, is furnished, but only on a 250-volt machine. The wiring between compartments is run in flexible armored conduit, except that to the turret which is run in armored hose.

The various compartments containing electrical parts were tested in explosive mixtures of Pittsburgh natural gas and air, and all passed successfully the required examination.

Square-End Pipe Cutters

Three new cutters, suitable for use on pipes ranging in size from 2½ in. to 12 in. have just been placed on the market by the Borden Co., of Warren, Ohio, manufacturers of the Beaver pipe cutters and dies. Though the same knife construction and automatic feed used on smaller sized cutters are provided on these latest types, the driving pinion remains stationary, rotating the cutting knives by means of an inclosed worm gear.

The adjustment to various sized pipes is made quickly—the same knives cut all sizes—and as no feeding is required while cutting, the tool works rapidly. It is claimed that the knives



Cutters for Large Pipes

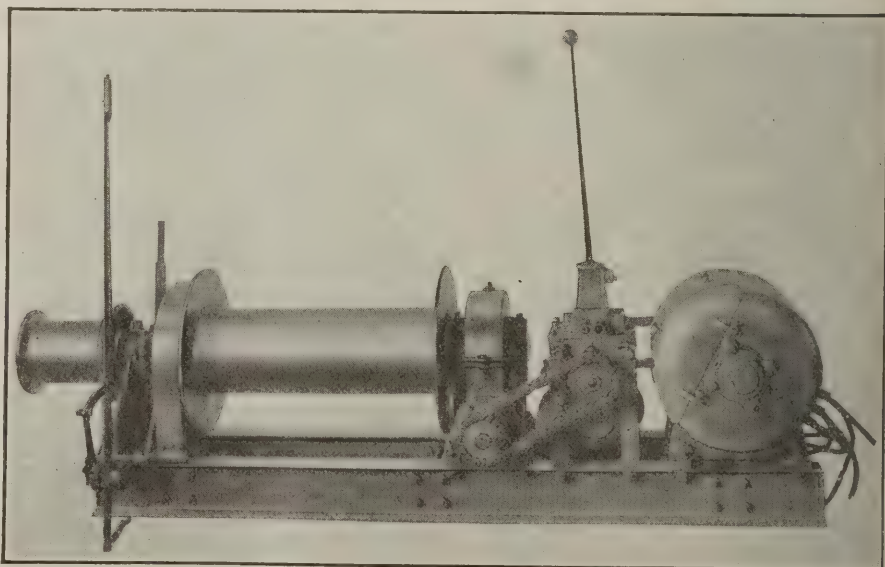
It is easy to cut almost any size pipe with this new cutter. The ratchet handle permits the use of the cutter in the most confined places.

and other parts will not break. These new cutters may be operated in any position on the pipe, either by hand or mechanical power.

The cutters are made of high-speed steel and malleable iron. The device is easily portable and readily placed on pipes of greatly varying size.

Four-Speed Hoist

Here is a hoist with a four-speed gear reduction particularly suitable for very long hauls on steep inclines. It is provided with a long, wide drum equipped with deep flanges. The speed reductions are accomplished by means of a transmission gear unit very similar to that used on automobiles. The design of the hoist is such that it can be operated from an alternating or direct-current constant speed motor. A large heavy brake suitable for holding any load up to the full capacity of the machine is provided on each hoist. The operation of the brake is made very efficient and yet easy by means of a long lever-type brake arm. The complete unit is the product of the Silent Hoist Co., of Brooklyn, N. Y., and is suitable for rope pulls up to 12,000 lb.



Utility Hoist Specially Suitable for Locating Mine or Railroad Cars

Speed control can be obtained through a four-speed gear shift, thus this hoist may be used to move heavy loads at slow speeds, or light loads at high speeds. The whole unit is mounted on a common I-beam base and may easily be shifted about the mine yard for moving timber or cars.

COAL AGE

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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

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Why?

MANY coal companies are at their wit's end to keep from bankruptcy at present prices. Others neighboring to these are producing coal from similar seams at prices 50c., or more, lower. Some say the difference is nearer \$1. There are two reasons—one is that the distressed companies are too poor to buy the necessary machinery and the other is that they are too conservative to fall into line with progress. Either reason is a heavy indictment of the coal industry.

A number of companies will attempt this year to get among the low-cost producers. If they will not or cannot they would do well to commit suicide according to forms provided by law. They merely prolong their agony by refusing to use the means of rejuvenation which other companies have adopted.

Too Much Mine

TOO many mines is hardly worse than "too much mine." Most of the slackness in supervision, most of the idleness of day hands, most of the aimlessness in operation, most of the irregularity of mine-car service is chargeable, and indeed is frequently charged, to the hopelessness of co-ordinating the activities of a big mine with only a small output over which to spread the supervisory costs. Fortunately every mechanical advance makes concentration of operation more possible. Let every effort be made to work intensively, to shorten up roadways, to reduce the length of airways, to decrease the mileage of track, of trolley wires, of timbered roads and other expensive items.

It is better to save the costs of track, power, trolley and pipe lines, pumps and timber and put this money into mining, loading and conveying machinery. Men have been described as "land poor" and in a similar sense coal companies may be said to be "mine poor" and "entry poor." A rambling mine like a rambling manorial mansion is costly to maintain. Close up your many storied, multi-corridorred residence and live in a cottage with but one floor and few rooms. With adequate facilities you will get just as much coal from the smaller mine.

Can the Union Fields Compete?

FORTUNATELY for the union fields of the bituminous industry, the non-union fields cannot supply the whole market any more than the big anthracite concerns can supply the entire demand for hard coal. As a result of this inability of the large anthracite firms to provide at times all the anthracite needed, the independents are able frequently to sell at a higher price than is set by the larger anthracite firms. The anthracite business is, therefore, in a degree non-competitive.

In a similar way the union fields will not in a certain sense have to compete with the non-union, for the latter fields cannot supply all the coal needed. There are too many restricting conditions. The railroads in most non-union regions are already grievously overloaded. New and better equipment will help, especially electrification, but, nevertheless, the railroads will be unable to afford the necessary service. Then again, men will be scarce at the coal mines. The restrictions of immigration lay a heavy hand on advancing coal territory and press far less heavily on coal fields that are declining. Mines in union territory are usually so circumstanced that they can draw from other industries if they need the men, whereas those in non-union fields can do so only by colonization, and the men colonized who cannot revisit their friends and who find the scenery different and urban conditions lacking are liable to be discontented. Furthermore, freight rates which favor non-union fields in certain directions hamper them in others, often not in proportion to the distance to the market, but enough to give the union in its own natural field, an advantage partly counterbalancing the greater cost of production.

So there will still be some hope, not much perhaps, for union fields; and those mines that distance others in efficient low-cost production may get such a generous measure of the business available to union mines as to remove them from the list of the impoverished and complaining. In fact, the bad roof in some non-union mines will make complete modernization slow and difficult, and the advance of the industry may make it questionable whether they, despite their low wage scales, can compete in a market dominated by machine-loaded coal, union and non-union.

New Problems in Merchandising

A FEW years ago the temperatures in furnaces were low and coal was sold on the number of British thermal units. Even that quantity was seldom determined. Then suddenly we heard about the fusing temperatures of ash. It is not so long ago that the president of a bituminous mining institute and a leading operating man, learned for the first time that the ash of the coal he was producing and marketing had an unusually high fusing point. He had never realized before that he had in that fact a favoring condition. He doubtless realizes it now.

At first the reactions to this unknown variable were somewhat strange and even today they are not marked by any proper comprehension. Companies producing coal with varying fusing points desired to operate their mines incognito, so to speak, so that they could supply their customers from any mine they preferred. They did not agree to send the coal from any specific mine or any given bed. Where all the mines of any company

produced coal from the same bed the effect was not particularly detrimental. A little more or a little less impurity is not so distressing as a greater or lesser fusibility of the ash.

Where, however, this latter quality is important by reason of the type of stokers employed and the customary over-rating of the boilers it was suicidal to ship coal from a mine the ash of which had a low fusing temperature to a customer who had a high-temperature furnace and a stoker ill-suited for handling clinker.

It is still customary, we are informed, in the anthracite region for large companies to sell their steam sizes without agreement to ship from any one mine or any certain groups of mines. It is still the plan to mix, in the breakers, coal from different seams, mines and culm banks. Perhaps these practices are justified, but the small company with a favorable fusing point and but one mine has sometimes a considerable advantage. It gets to be known as the producer of steam sizes not likely to give trouble when the fires are forced.

The problem of the mixing of coals and the selling of the output from all the mines of a company without discrimination is one that is worthy of consideration. It may pay to say that Buckwheat No. 3 is just that and nothing more or it may pay to say it comes from seams or mines that produce a coal having an ash which does not fuse at a low temperature. This introduces complications in producing, cleaning, storing and selling, and complications in these departments in themselves are not desirable. They militate against economy in producing and handling but perhaps they might help in marketing.

This suggestion is given in the hope that it may receive consideration. The validity of the proposal depends on the character of the product of the mine. Some companies may be able to produce and sell their output without any discrimination other than that of size, but others may do well to segregate the product and place it where it will do the best work.

Larger Coal

MINERS, now that their compensation is based on the quantity of mine-run coal produced, shoot it without mercy or judgment, with the result that much of it is merely stoker fuel. Some operators are trying to instruct and coax their men into adopting better methods, but the effort, though commendable, is not productive of good results. Even the present low prices and poor market do not make the miners realize that on the quality of their product depends the ability of their employer to provide them with work.

The article by Charles H. Thompson in the "Problems in Underground Management" section of this issue calls attention to one way in which the problem may be met, not so much by intention as incidentally. In a truly mechanically operated mine the operations at the face fall into the hands of three classes of operatives—the mining-machine men, the men who drill and shoot down the coal and the machine loaders.

It is not feasible to give any two of these jobs to the same crew. Consequently, those who drill and shoot holes for mechanical loading will be so few that it will be possible to select and train these men to such a degree that large coal will be obtained. They will drill a sufficient number of light shots to break up the coal into

sizes large enough to be saleable and small enough to be readily handled, at the same time leaving the impurities in the coal in sizes large enough to be extracted readily at the picking table and leaving the roof unshattered by excessive, improperly placed shots. Given machine drills this part of the work can be performed with minimum labor and yet with such effectiveness as to achieve the best results. Shot drillers also who are well trained and well equipped, can be relied on to shoot the coal in such manner that coal-dust explosions are less to be feared.

Accordingly, without design, the mechanical loader may help to solve four of our most difficult problems—fine coal, excessive ash, bad roof and dust explosions.

Walking Around the Block

THOSE who criticize the inefficiency of mine operations frequently draw their conclusions from some particular instance of waste which has come under their observation, but like all opinion based on superficial surveys, their judgment is often erratic.

However, any engineer, even one unfamiliar with mining conditions, upon entering almost any mine could quickly and accurately come to the conclusion that the direct-current power losses are unusually great. But he would make a grievous error if he decided without inquiry that the electrical engineer did not know his business.

Company organizations and the laws in many states are such that supervision of all inside mine equipment, after being placed in service, is directly under the mine foreman. In most cases, as it rightly should be, the first duty of the mine foreman is to get out coal. This he does, but unfortunately those men who have been placed on his pay roll to maintain the track system, to repair feeders and to install rail bonds are too frequently taken away from their regular work to "push the coal." Consequently, the power-distributing system of the mine soon becomes so bad that flagrant wastes of power become apparent. Whenever a locomotive passes, the leaky and corroded insulators, grounded feeder circuits and sparking rail joints remind us of an old-fashioned Fourth of July celebration.

Most every mine electrical engineer has had a keen realization of these conditions and has tried many plans which he thought might possibly correct the evils. Not much success has been attained because, although the work is strictly an electrical matter, he must deal with it indirectly through the mine foreman.

Now, some resourceful electrical men are getting around this obstacle by considering the repair of the feeder and return circuits adjacent to any new electrical installation a part of their work. Others are moving the power-converting equipment into the mines where it will be near the load center. Thus the feeder and return circuits are repaired or changed and given a new lease on life and are at least temporarily shortened so greatly that the power losses are largely reduced.

A NEW MACHINE enables strip-mine men to cut coal like ice. Now where's the machine that will enable them to sell it like ice, in hot weather.

WELL, ANYWAY, neither the G.O.P. steamroller nor the Democratic undercutter is a coal burner. There are other fuels.



Stone Dusting by Compressed Air

Stone Dusting:

A Means of Safety Which Helps Britain to Keep Fatality Rate One-Third as Large as Ours

Stone Dusting Is a Legal Requirement—Floors, Ribs and Roof Alike Must Be Treated—Stone-Dust Zones and Barriers Not Considered Effective Alone—Methods Employed in Dusting

BY J. A. S. RITSON

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SOON after the erection in 1908 of an experiment station at Altofts, England, at the expense of the Mining Association of Great Britain, two facts were thoroughly demonstrated. These were: That coal dust might form an explosive mixture with air, and that fine stone dust acts as a barrier to the spread or propagation of a coal-dust explosion.

It had long been known that the fine coal scattered along haulage roads and elsewhere throughout the mines often became ignited during a gas explosion, and it was believed that it constituted a certain factor contributing to both the propagation and violence of such explosions. The experiments at Altofts, and later those conducted at the Government Station at Eskmeals, furnished data for the 1914 report of the Explosions in Mines Committee. This report stated substantially: That (1) the

maintenance throughout the haulageways of such a proportion of incombustible dust in a finely divided state as would, with the coal dust present, form a mixture containing at least 50 per cent of ash, or (2) the maintenance of at least 30 per cent of water intimately mixed with the dust along the road, or (3) a combination of these methods would prove highly effective in diminishing the force of an explosion, if not even entirely preventing its spread.

Section 62 of the Coal Mines Act of 1911 provides that: In every mine where the roof, ribs and floor are not naturally wet, (1) coal dust so far as possible must be prevented from entering the downcast shaft. In new installations, the preparation screens must be kept at least 240 ft. from the air intake. (2) Cars must be built and maintained as nearly dust-tight as possible. (3) Roads must be systematically cleaned and accumulations of coal dust prevented. (4) Systematic measures must be taken to prevent the initiation of explosions and their propagation along roads. (5) Roads

NOTE—In the headpiece a man is shown introducing stone dust into the ventilating current by means of an injector operated from the power air line. This injector much resembles the device employed for handling water. It sucks the dust from the mine car and discharges it in a cloud. This is taken up by the ventilating current and deposited on all surfaces of the heading.



Fig. 1—A Dust Barrier or Barrage

Shelves are placed along the sides of the heading as well as troughs extending across this passage just under the roof. Such barriers are often placed at the entrance to each section of the mine.

must be examined daily by a competent official who shall report the result of such examinations in a book kept at the mine for that purpose.

The "Explosives in Coal Mines Order" forbids the use of any but "permitted explosives" in mines that are dry and dusty. Furthermore, a shot may be fired only when adequate precautions have been taken to deal with any inflammable gas or coal dust that may be present.

ALL SIDES OF ROAD MUST BE TREATED

The General Regulations of July 30, 1920, in enumerating the precautions to be taken against coal dust specified:

(1) The floor, roof and sides of every road or part of a road that is accessible must be treated with incombustible dust in such a manner and at such intervals as will insure that the dust on the floor, roof and sides throughout shall always consist of a mixture containing less than 50 per cent of combustible matter. Water added to the coal dust or naturally present may be reckoned as so much incombustible.

(2) Incombustible dust used for this purpose shall contain not less than 50 per cent by weight of material capable when dry of passing a sieve with 200 meshes to the linear inch. If a larger proportion of incombustible dust is employed, however, the percentage of material of this fineness may be decreased, but must never fall below 25 per cent.

(3) The incombustible dust used must not be injurious to the health of those working in the mines.

(4) The term road as here used includes all roads from the shaft or portal to within 30 ft. of the working face.

(5) Representative samples of the mine dust must be taken by the management at least once each month and the result of the analysis posted at the mine mouth.

(6) Methods to be followed in taking and analyzing samples are legally prescribed.

These, briefly, are the chief legal requirements governing stone dusting in the mines of Great Britain. One important detail worthy of particular notice is that "floor, roof and sides" must be treated with equal care. It is not sufficient to treat merely the floor.

Stone dust is used in three ways in British mines: (a) A 50 per cent or greater mixture of incombustible matter is maintained throughout the roadways of the mine, (b) stone-dust zones to extinguish a mine explosion and prevent its propagation are provided, and (c) stone-dust barriers or barrages are installed. Legal

requirements demand that the first method shall be adopted, and as a result, it is the only one extensively employed. In many mines, however, either the second or third method of employing stone dust is used in addition to the first, because it is recognized that the first means does not or may not secure complete immunity.

Research has shown that under certain conditions an explosion can be propagated through a "50/50 mixture," but that it is difficult to initiate an explosion in dust containing 50 per cent of incombustible matter. "Incombustible dust is more effective in preventing the ignition of coal dust than in checking an inflammation that has started."

Methods *b* and *c* mentioned above do not prevent the initiation of an explosion, but will stop its spread through the mines. Throughout Great Britain the belief is general that it is wiser to prevent the initiation of an explosion than to rely on stopping one after it has started. Consequently, an attempt is made to keep 50 per cent or more of incombustible dust on all roads.

It is realized that the two chief causes of colliery explosions are defective safety lamps and shotfiring. As a result every effort is being made to improve the safety and illuminating power of the inclosed-flame lamp and to regulate shotfiring in dangerous mines until (if ever) a safe mine explosive shall be produced. Electric hand lamps are being more extensively used each year, but until a satisfactory device for gas testing, other than a flame safety lamp is produced, this latter device must continue to be used. The ancient proverb running to the effect that "prevention is better than cure" underlies present-day British practice.

DUSTING IMPROVES ILLUMINATION OF MINE

One of the results secured from the first method of stone dusting has been improved illumination of the roadways. The light-colored stone dust adheres to the sides and roof of the road and naturally reflects more light than the somber coal and roof rock. It is hoped that this may alleviate nystagmus. It has been shown by Llewellyn that the increase in illumination afforded by rock dusting varies from 100 to 400 per cent, the untreated surface reflecting 10 per cent, and the treated surface up to 55 per cent of the incident light.

The conditions which cause coal dust to be formed in the mines of Great Britain differ largely from those which cause the presence of coal dust in the mines of the United States. British mines are, as a rule, deeper than American and for the most part are worked by longwall methods. Consequently, the floor creeps and the tracks are uneven. As a result, more coal is spilled in British mines than in American during the journey from the face to the shaft bottom. Where the roof is bad, a single track is maintained and fast main-and-tail-rope haulage is employed. The speed varies from 4 to 10 miles per hour. When a full trip is coming out at, say, 8 miles per hour on the intake airway, much small coal is blown off the tops of the cars, settling on the floor, roof and sides.

The cars used in English mines are usually small and are frequently loaded well above the top of the sideboards. Attempts have been made to render these cars dust-tight, but in practice this is rarely attained. The quantity of fine dust actually produced varies between wide limits in different localities, so that whereas 2 lb. of stone dust per ton of coal hoisted is sufficient to maintain a 50/50 mixture in one district, in another it might require 10 to 12 lb.

Again, English mines are not subject to as wide variations in temperature between winter and summer as are American operations. Consequently, although the ventilating current during the winter months renders the mines drier than in summer, the difference is not as pronounced as in America. As a result, the coal dust in American mines is drier, particularly during the winter, than it is in Great Britain.

Various dusts are being employed for mixing with the coal, but Fuller's earth, shale and limestone are the more common. The Seventh Report of the Explosions in Mines Committee runs in part as follows: "Shale dust may be used with safety and powdered clay or chalk (free from flint or grit) is also practically harmless. On the other hand, there are two varieties of dust, the use of which may be injurious to health, namely, (a) dust from such rocks as ganister or sandstone that contains a large proportion of free crystalline silica which forms fine sharp-edged particles, and (b) dust of a gritty nature, such as powdered slag, clinker, flue dust and the like, which, while possibly not injurious to the lungs when mixed with coal dust, may irritate severely the eyes and throat and predispose those who breathe it to bronchial ailments."

FINENESS OF STONE DUST HIGHLY IMPORTANT

Leaving aside the considerations of health, however, this committee stated that: "The fineness of incombustible dust rather than its chemical composition affords a measure of its probable effectiveness in preventing the ignition of coal dust with which it may be mixed." Haldane has stated that "his investigations showed the dust of argillaceous shale, such as is found inter-stratified in the coal measures in most mines of the United Kingdom and which is being extensively used for coal dusting, although it contains silica, is not liable to prove a danger to health."

It is the general practice for colliery companies to install crushing machinery at the mines and pulverize coal shale to the necessary fineness for use underground. Some, however, still buy Fuller's earth or ground limestone considering it more suitable because it contains no silica.

One decided advantage possessed by limestone dust is that carbon dioxide is liberated from it by the temperature of an explosion, thus assisting in quenching the flame. In some regions, instead of crushing the rock at the individual mine, a central plant has been erected where the material is pulverized and delivered to several

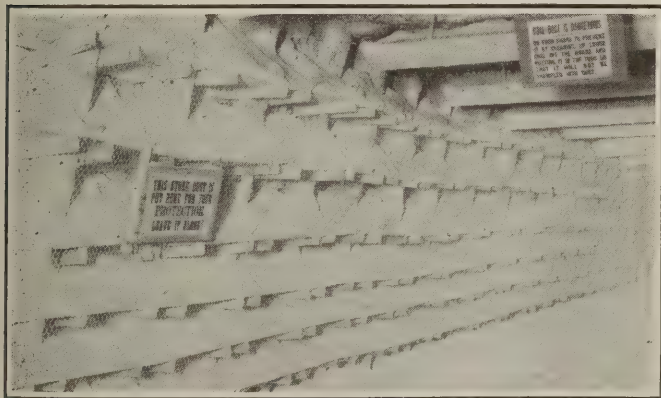


Fig. 2—Side View of a Dust Barrier

Although many dust barriers are employed in British mines they are considered as aids to explosion prevention only, chief reliance being placed on the stone dust deposited on main roads.



Fig. 3—Improved Lighting Due to Stone Dusting

White dust made by pulverizing worn-out plaster of Paris molds from potteries, is blown into the ventilating current by air pressure. This is deposited upon all the roadway surfaces and whitens them.

collieries. The choice between these systems is a purely financial consideration.

In its Sixth Report, the Explosions in Mines Committee states that: "Any incombustible dust used to raise artificially the ash content of the dust on roadways should be composed so far as possible of particles capable of passing through the gauze of a safety lamp (28 S.W.G. or 784 meshes to the square inch). Shale, limestone and other dusts that have been ground so fine as to pass through a safety lamp gauze normally contain a large proportion of much finer particles, the inclusion of which is important. Experiments have shown that unless there is present approximately 50 per cent by weight of particles capable of passing through a 200x200 sieve, more than one part of incombustible dust to one part of coal dust is required to prevent the ignition of a coal-dust mixture produced by a cannon shot."

It follows, therefore, that the incombustible dust used to mix with fine coal must all pass through a 28-mesh sieve, and at least 50 per cent of it must be capable of passing a 200-mesh sieve if a 50/50 mixture is required. If less than 50 per cent passes a 200-mesh sieve, the proportion of incombustible to combustible matter must exceed 50 per cent, but that portion passing a 200-mesh sieve must in no case fall below 25 per cent.

This size of dust is obtained by grinding the materials in mills of various kinds, but usually those of the impact type. Many different varieties of pulverizing machines are on the market, such as the impact, ball, tube, pestle-and-mortar, etc. Their capacity varies from 100 lb. to 3 long tons per hour, and the horsepower required ranges from 1 to 50, depending on the quantity of material and the percentage of dust that must pass a 200-mesh sieve.

THREE METHODS OF DUST DISTRIBUTION ARE USED

In general rock dust is distributed in English mines by means of three distinct methods—hand, the ventilating current or mechanical means. In the hand method, the dust sent into the mine in bags or cars, is carried by a workman who travels with the ventilating current and throws it either with his hands or by means of a small shovel onto the sides and floor of the road. Comparatively coarse dust is thrown with considerable force so as to dislodge any fine coal with which it may come in contact. The object sought is to fill all crevices and cover all ledges with stone dust lying at its natural angle of repose, so that coal dust may not lodge upon

it but will fall to the floor where it may be swept up. In this respect the stone dust acts as an effective cleaning agent.

Fine stone dust on the other hand may be carried over appreciable distances by the ventilating current and deposited on the sides, roof and floor of the road. In many districts the shotfirers are provided with brushes. Before shooting, they sweep the roof, sides and floor to remove the fine coal dust and then apply a dressing of stone dust.

Distribution by means of the ventilating current is fairly satisfactory if the velocity of air is high. It is open to the objection, however, that a large proportion of the dust is deposited near the point where it enters the ventilating current and only a comparatively small quantity is carried an appreciable distance. According to Lovatt, a test at Birchenwood showed that 124.7 gr. of dust were deposited per square foot per hour at a distance of 60 ft. from the distributing station, whereas only 1.584 gr. were deposited at 360 ft. A larger proportion was deposited on the roof and sides at the greater distance than at the shorter.

Various methods are employed in introducing rock dust into the air current. One of these is to take advantage of the high velocities of air passing through regulators. This is satisfactory if the velocity is high enough. Only a small quantity of dust at any one time is introduced into the air current and the operation repeated until the required quantity of dust has been applied. In some instances as much as 200 lb. or more can be distributed in this manner in five minutes.

Another expedient is to place small trapdoors in the main separation doors. These trapdoors are opened and dust introduced into the air current as previously described. Still another method is to employ pipes through overcasts. The dust is introduced into these pipes and is sucked into the return airway and thus distributed.

Distribution by mechanical means is one of the most

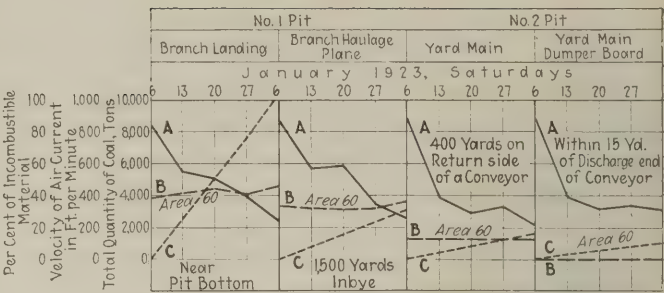


Fig. 5—Coal-Dust Deposition in Various Districts of a Typical Colliery

Weekly observations are recorded in this instance. The graphs for each district show a marked similarity to the analogous graphs for the others. Graph A shows the percentage of incombustible material, graph B the velocity of the air current in feet per minute and graph C the total quantity of coal in tons.

common forms of spreading stone dust throughout the mines. It is, however, open to an objection that is common to all schemes which employ the ventilating current as a carrier of the dust, namely, that a large percentage of the dust is deposited near the distributing point. If, however, the dust is very fine and dry and the air current moves at a high velocity, the dust may be carried for considerable distances. Thus in South Wales instances are recorded where distinct traces of stone dust were detected 3,000 ft. from the injector. Under such circumstances as these, the stone dust is distributed in a manner quite similar to that which distributes the coal dust.

Unless the dust is extremely fine, this method is applicable only in roads less than 7 ft. square, as the velocity of the air current in larger passages would be insufficient to carry even the finest particles to any appreciable distance. As the quantity of fine dust is comparatively small in any case, it follows that the area from 150 to 300 ft. from the injector will receive an excess of the dusting material, although traces of it may be carried for as much as 1,000 yd. The quantity

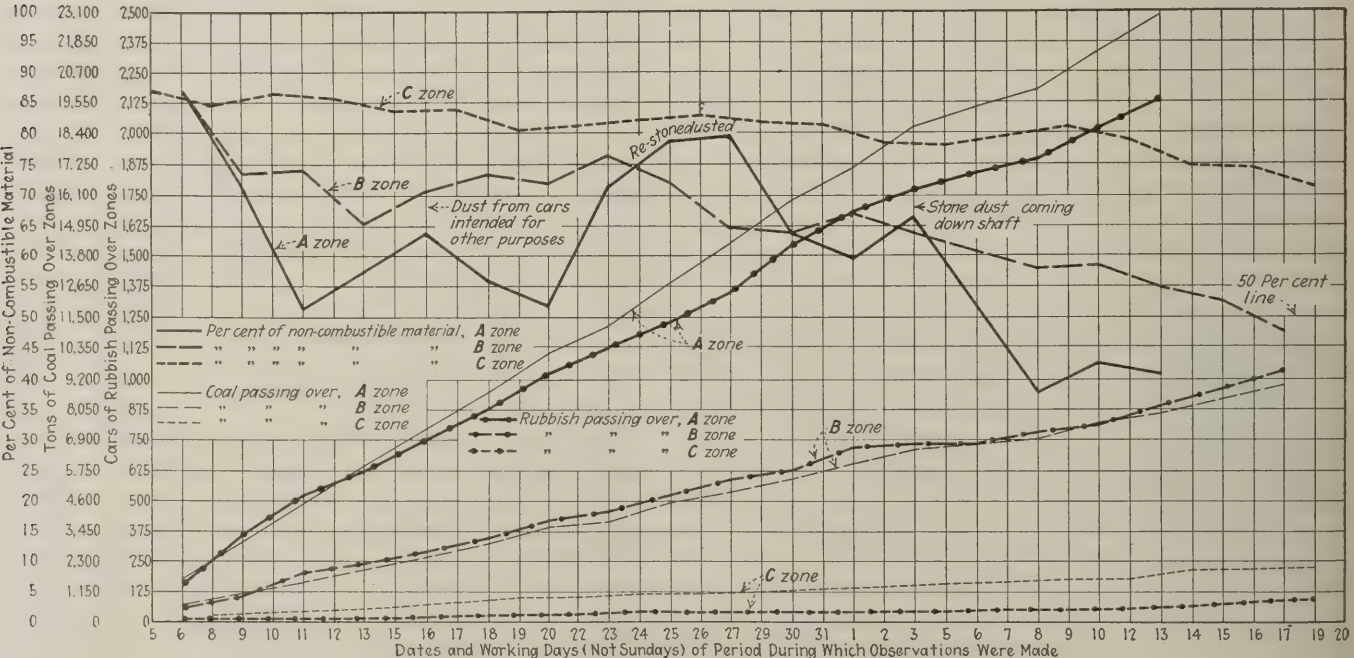


Fig. 4—Rate of Coal-Dust Deposition at a Typical British Colliery

Graphs show the result of day-to-day records and analyses on three typical mine passageways. A stone crusher is located within a few yards of the downcast shaft. This accounts for the sudden upward bend

at one point in the graph for Zone A, much stone dust having fallen down the shaft and increased the percentage of incombustible dust on roof, sides and floor. Many trains of stone dust were taken over the

three zones between tests, the greatest number passing over Zone A. The velocity of the air on Zone C is only 100 ft. per minute, which is too slow to carry stone dust for any great distance.

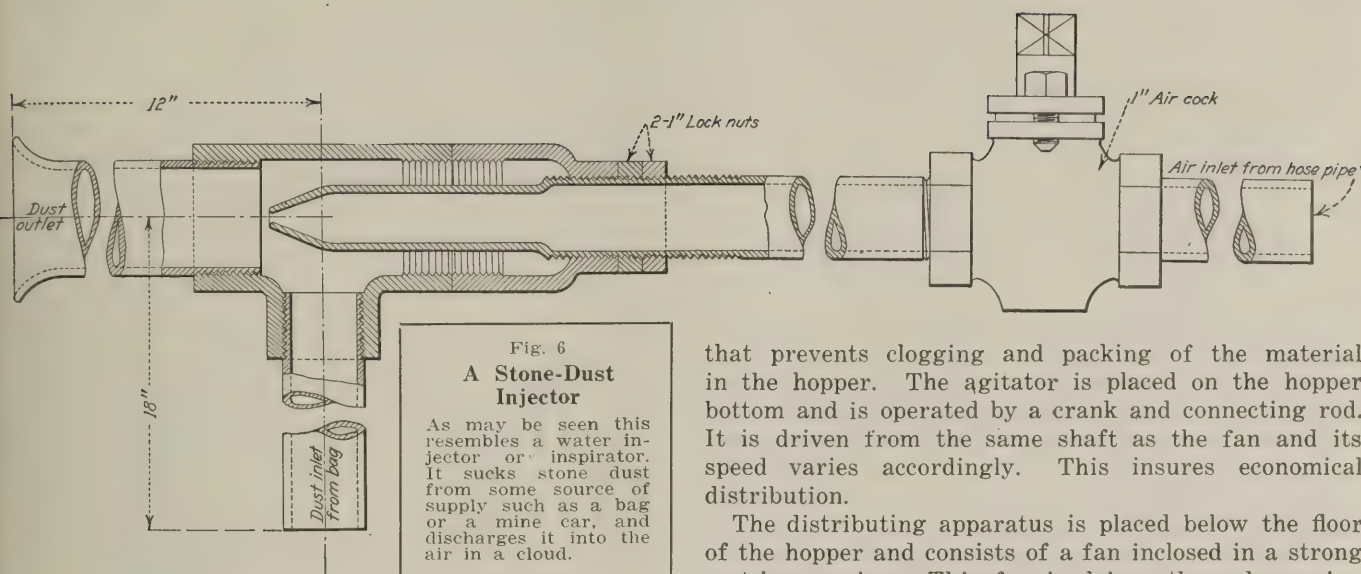


Fig. 6
A Stone-Dust
Injector

As may be seen this resembles a water injector or inspirator. It sucks stone dust from some source of supply such as a bag or a mine car, and discharges it into the air in a cloud.

deposited at such distances as this, however, is too small to be of any value.

The common form of fixed distribution apparatus consists of a hopper placed at the side of the road and filled with stone dust. In its bottom is a compressed-air injector which, when the air pressure is turned on, forces a stream of air and stone dust into the ventilating current, which carries and deposits the dust along the road. In order that this method may be of greatest efficiency, it is first necessary to remove the coal dust from the road. No satisfactory mechanical means have yet been found for performing this operation.

In South Wales compressed air has been employed to blow the coal dust from the roof and ribs. A series of fine water sprays collect the combustible dust thus dislodged. Although a large proportion of the dust was caught and brought down by these sprays, to be shoveled up later, much of the finer and consequently more dangerous particles passed through them to be deposited further inbye. Until a satisfactory means for collecting coal dust from the roadways has been devised, it is questionable if any type of stone-dusting appliance depending on the carrying power of the ventilating current will be effective. Before stone dusting is applied, the roads should be cleaned, but this frequently means only that the finer coal dust is stirred up to settle somewhere else.

INJECTOR BLOWS DUST INTO VENTILATING CURRENT

Recognizing the fact that the ventilating current forms an effective dust-carrying medium for distances less than 100 yd., an adaptation of the injector apparatus above described consists in placing distributing stations every 50 to 100 yd. Into the hoppers of these stations a bag of stone dust is poured and distributed into the air current by an injector. Another adaptation is to mount the whole apparatus on a car, which, being capable of ready transportation from place to place, is fairly satisfactory.

Yet another device which is extremely useful, particularly in mines where compressed air is not employed, is a dust distributor wherein a small fan driven from the wheels of a car forces a cloud of dust through a suitable nozzle. Probably the best known machine of this type is the Oldham stone duster. In this device the dust is carried in a steel hopper in the bottom of which is a reciprocating agitator fitted with a dust web

that prevents clogging and packing of the material in the hopper. The agitator is placed on the hopper bottom and is operated by a crank and connecting rod. It is driven from the same shaft as the fan and its speed varies accordingly. This insures economical distribution.

The distributing apparatus is placed below the floor of the hopper and consists of a fan inclosed in a strong cast-iron casing. This fan is driven through gearing from the wheel hub, a clutch being so arranged that the driving mechanism may be thrown into or out of gear at will.

DUST DISTRIBUTED INTO ROADWAY BY FAN BLAST

A dust-regulating valve is fitted to the bottom of the hopper and as the agitated dust emerges it is caught by the fan blast and distributed all over the roadway. The car may be drawn along by a pony or by mechanical means.

Table I shows the results of a test conducted with this apparatus when operating under the following conditions: The average height of the road way was 5 ft. 6 in., and its width 11 ft. The velocity of the air current was 7 ft. per second, or 420 ft. per min. The length of roadway tested was 1,200 ft.

Samples of the dust were taken from the roadway every 150 ft., as follows: First set, eight samples before dusting; second set, eight samples after the machine had made two trips, both in an outbye direction; third set, eight samples taken after the machine had made two more trips, one inbye and one outbye; fourth set, eight samples taken after the machine had made a further trip inbye. The results of the analyses set

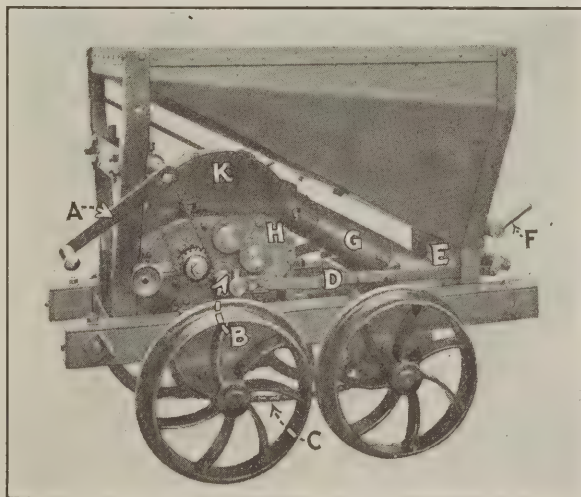


Fig. 7—The Oldham Stone Duster

This dust car may be operated either by hand or by power from the wheels. A is the lever or crank for hand operation, B the agitator crank, C the chain drive from the wheels, D the agitator connecting rod, E the nozzle pipe, F the dust control, G the distrance piece or air delivery pipe, H the gear casing, and K the fan casing.

Table I—Summary of Tests on Stone Dusting

No. of Trips of Stone Duster Along Road	Total Average Combustible Matter Present Per Cent	Total Average Reduction in Combustible Matter Present Per Cent
0	58.3	
2	46.3	12
4	35.7	22.6
5	28.2	30.1

forth in Table I, show the reduction in the quantity of combustible matter in the mine dust after two, four and five trips of the duster respectively.

As may be seen, therefore, in a roadway that had not been previously treated in any manner the dusting machine after traversing the roadway only twice reduced the combustible matter in the mine dust from an average of 58.3 per cent to 46.3 per cent. After traversing the roadway four times the combustible content of the mine dust fell to 35.7 per cent, and a fifth trip brought it down to 28.2 per cent.

HAND METHODS OF DUST SPREADING PREFERRED

Opinions differ as to which method of stone dusting is the most efficient. It is probable, however, that most people prefer hand methods, though there is much to be said in favor of traveling machines, especially where the air velocity is high. The chief advantage of hand dusting is that dust may be thrown forcibly against the ribs and roof, displacing coal dust that may be lodged there. As its angle of repose is greater than that of coal dust, both the material dislodged and the coal dust carried by the air current falls to the floor where it may be gathered up. Before attempting to remove the coal dust lying on the floor, however, it is advisable to dampen it, as otherwise a large portion of it is liable to blow away.

The provision in the Mine Regulations that "representative samples of dust from the floor, roof and sides shall be taken over a section of road not less than 50 yd. in length" is highly ambiguous and might be construed in any one of several ways. The interpretation generally accepted, however, is that this refers to an average piece of road 50 yd. in length. At 5-yd. intervals along this stretch of roadway the whole of the



Fig. 8—Front View of Oldham Machine

This car may be drawn or pushed along the track emitting its cloud of dust as it goes. This dust cloud is caught up by the ventilating current, carried along the heading or roadway to settle everywhere upon roof, ribs and bottom. Although this method of stone dusting would appear highly effective many operators prefer hand methods of dust distribution, chiefly because in hand spreading, dust may be thrown violently against the surfaces to be treated, thus displacing any coal dust that may have lodged there.

dust from a strip 6 in. wide and extending entirely around the perimeter of the passage is collected. The sample thus secured is intimately mixed and quartered down to a suitable size. Next, it is passed over a screen of 28 meshes to the linear inch, and only that portion of it passing through, retained. This is then analyzed for moisture and combustible matter in the usual way.

Special tests have been prescribed for (a) dust mixtures that contain carbonates, (b) moist dust mixtures that cannot be screened and (c) dust mixtures that contain gypsum.

In addition to the monthly samples collected by the management, the government mine inspectors take samples at nearly every mine they visit in order to to

Table II—Cost of Stone Dusting in British Mines

	Collieries		
	A	B	C
Output of coal (gross tons) during period under consideration	11,500	194,935	3,500
Gross tons of stone dust used during same period	25	367	4
Stone dust used per ton of coal produced	4.9 lb.	4.21 lb.	2.5 lb.
Cost of stone dust per ton	\$4.86	\$1.02	\$3.54
Cost of handling and distributing stone dust per ton	\$2.25	\$9.54	\$3.63
Cost of stone dusting per gross ton of coal produced	1.64c	0.426c	0.811c

satisfy themselves that really representative samples are being taken by the mine authorities.

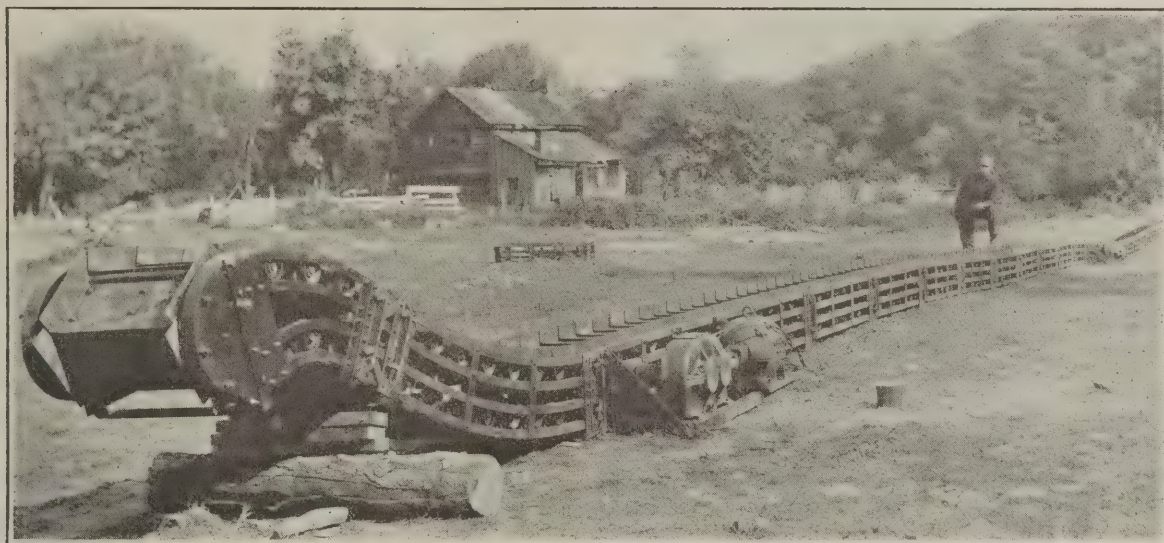
It is difficult to state average costs of stone dusting, as conditions vary widely. The actual expense is influenced by the following factors: Length of road, quantity of coal passing over it, nature of coal and rate of deposition of coal dust, which itself is influenced by the type of car, condition of track, kind of haulage and the method of working the mine. On the basis of coal output, some mines require only 1 lb. of stone dust for each ton of coal produced, whereas others require from 10 to 12 lb. It will be seen, therefore, that costs may vary between wide limits. Some typical costs, however, are set forth in Table II.

PRIMARY CONSIDERATIONS OF STONE DUSTING

To summarize, the most important points observed in British stone dusting practice may be enumerated under the following eight headings:

- (1) The fineness of the stone dust used is the most important factor.
- (2) At least 50 per cent incombustible matter should be maintained in the dust of roadways.
- (3) No dust dangerous to health may be employed.
- (4) It is better to prevent the initiation of an explosion than to concentrate efforts on stopping it after it has once started.
- (5) Careful attention should be paid to methods of shotfiring and the type and condition of safety lamps used.
- (6) Dust should be regularly cleaned from the roads.
- (7) Stone dust should be distributed regularly either by hand or mechanical means.
- (8) Regular and systematic sampling and analysis should be practiced in order that the condition of the roads and traveling ways may be at all times known.

Ballistic Mortar Tests.—A ballistic mortar, with aluminum suspension plates of the type generally used by explosive manufacturers, has been installed at the explosives' laboratory of the Bureau of Mines at Pittsburgh, Pa. This apparatus will be used to determine the deflective force of commercial and military explosives, and to correlate the results obtained with the Bureau of Mines' type of mortar with results obtained by manufacturers.



Rugged All-Steel Sectional Portable Conveyor Co-ordinates Mining and Haulage

Constructed in Short Sections Each of Which Can Be Carried by Two Men—Pins Are Used Instead of Bolts as Fastenings—Several Motors Used When Long Conveyor Is to Be Driven—Machine Easily Shifted

MECANICAL loaders capable of handling coal within the mine at capacities up to 4 tons per minute, have caused operators to begin search for some kind of continuously-moving mechanical device capable of transferring this coal from the shovel at the face to the room neck, to a sidetrack or even to the tippie itself. By means of a suitable mine layout and the aid of conveyors, they hope to keep their loading machines in operation during a far larger percentage of the time than hitherto has been possible. This would increase the efficiency of labor and limit the area of live workings. The conveyor described in this article forms a connecting link of any desired length between the loader in the room and the mine car in the heading.

Several years ago Walter D. Stockly, now general manager of the American Mine Equipment Co., of Pittsburgh, Pa., on behalf of a large coal company, investi-

NOTE—Headpiece shows a 200-ft. conveyor fitted with two driving sections, each equipped with a 5-hp. motor. The uneven meadow land upon which this unit is set up clearly demonstrates its flexibility.

gated the performance of an electric loading machine in operation in one of the coal company's mines. He found that the machine itself was correctly designed, well built and when in operation handled coal cheaply and at a rate exceeding a ton per minute. So much time, however, was lost in switching cars to and from the machine and so many other delays and expenses were encountered that the coal loaded mechanically cost as much as that loaded by hand in other parts of the mine.

Heretofore, this has been the chief obstacle to machine loading. After this investigation much thought was expended on ways and means for surmounting the difficulties encountered. It became obvious that if a suit-

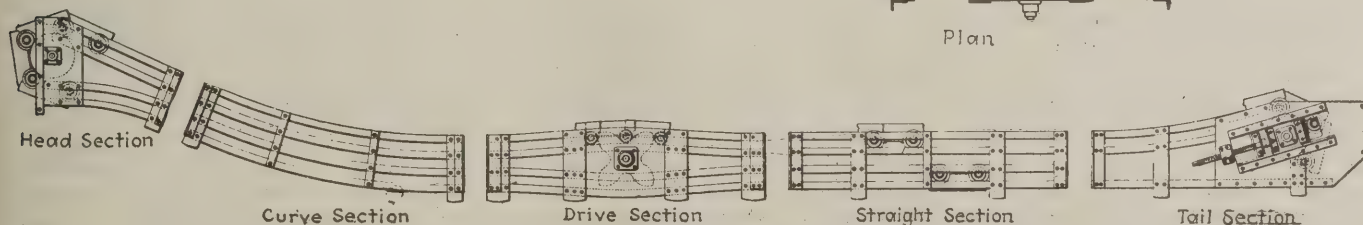
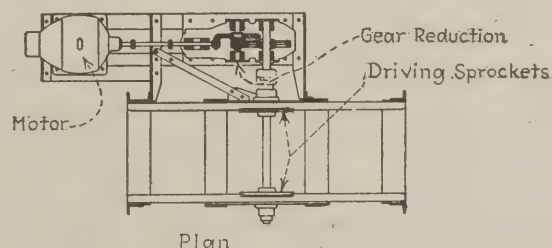


Fig. 1—Typical Conveyor Sections, for Receiving, Transporting and Discharging Coal

Each conveyor unit consists of one head, one curved, and one tail section together with as many straight and drive sections

as may be necessary to attain the desired length and to actuate the unit. Note the contour of the teeth of the driving sprocket.

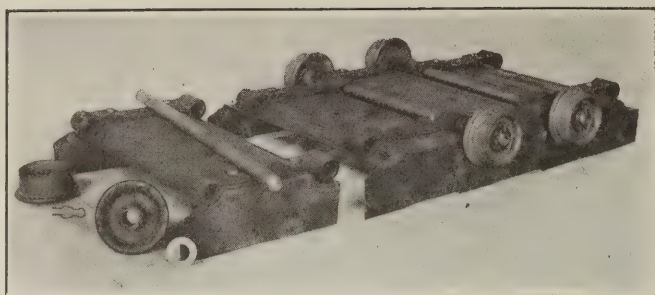


Fig. 2—Details of the Pan Belt

Hinge bars or links riveted to the bottoms of the pans are pinned together by means of the axles. Washers and spring-clip retainers hold both wheels and axles in their proper positions.

able portable conveyor could be designed that would remove the coal as fast as a shoveling machine could handle it, the cars could be loaded in the heading and the filling of cars would become much more nearly a continuous operation. A smaller crew would be necessary, and costs would be decreased.

Learning after a time that the West Virginia Coal & Coke Co., of Elkins, W. Va., was working upon a similar idea and attempting to produce coal by modified longwall operation by the aid of conveyors, Mr. Stockly joined his efforts with those of this coal company. Basic designs of what is now known as the Movor conveyor were thus developed. This device was mentioned in the Feb. 7 issue of *Coal Age*, p. 197, in describing what is known as the V-system of mining.

A PORTABLE CONVEYOR IS DEVELOPED

The Movor conveyor is of the pan-belt type, built entirely of steel and is portable, because it is sectional. A unit must comprise four parts: a head, a curved, a drive and a tail section. As many straight sections may be added as are needed to secure the desired length. If, however, the number necessary is more than can be actuated by one drive section, additional drive sections may be added at will.

All sections, except those forming the head and tail of the conveyor, are interchangeable so that a unit of any length may be built up. If greater rise is required at the delivery end than is afforded by the curved section, one or more straight sections may be interposed between it and the head section, so that any height of discharge may be attained.

In short, the design of this conveyor is such that great flexibility is obtained. All motors normally used for driving the conveyor on level ground, regardless of its width or capacity, are of 5 hp. Such a motor is capable of actuating about 100 ft. of 20-in., or 70 to 80 ft. of 36-in. pan belt. Conveyors longer than those mentioned require two or more drive units, each operating independently of, but in synchronism with the others.

Each section of this conveyor is complete in itself. This greatly facilitates the assembly or transportation of a unit. Two elements are common to all sections, namely, the frame (the shape of which differs for each type of section) and the pan belt which is of standard design and common to all sections. The frame elements are built up of angles and plates securely riveted together. They are joined end to end by means of slotted pins fitted with wedge shaped keys, the details of which may be clearly seen in several of the accompanying illustrations.

The belt is composed of pans, pressed from $\frac{1}{2}$ -in. steel plate, to the back of which are riveted or bolted two flat steel hinge bars or links; axles passing through the eyes of these bars couple adjacent pans together. These axles carry the supporting flanged wheels which run on tracks attached to the frame. Each wheel is held in place by a washer and a spring clip that fits into a suitable groove in the axle. The belt is driven by sprockets acting on the wheels.

This construction entails the use of a minimum number of parts. The axles serve as pins joining together the hinged bars which in turn form part of the pan. The wheels support the load, hold the axles in position and are acted upon by the driving sprockets. The spring-clip retainers fastening the wheels in place can be quickly applied or removed without the use of tools.

For use in rooms and other places where the quantity of coal to be handled does not exceed 100 tons per hour,

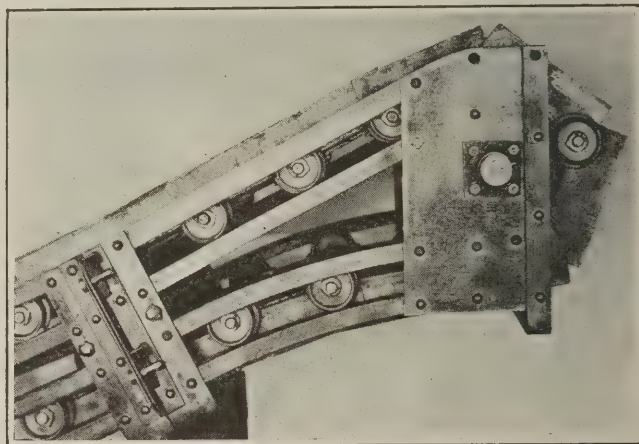


Fig. 3—Head or Discharge Section

The pans make the turn at the end of the conveyor by passing around suitable sheave or turn wheels. The bearing and return tracks on this section are somewhat divergent to enable the belt to make the turn.

the conveyor pans are 20 in. wide, 4 in. high and have a pitch of 9 in. Such a conveyor has a calculated capacity, when carrying loose coal, of 1 ton per hour for each foot of conveyor travel per minute. At a speed of 100 ft. per min., therefore, such a conveyor has a calculated capacity of 100 tons per hour. In performance, however, the capacity actually obtained is somewhat greater than this. For ordinary use, the speed of travel is reduced to 50 ft. per minute, giving a corresponding capacity of 50 tons per hour.

WIDE UNITS USED ON HEADINGS

Main-line units that receive coal from a number of 20-in. feeders are made 36 in. wide and have sides 6 in. high. Aside from the increased width and height of such conveyors, all elements and parts, such as wheels, wheel retainers, motors and speed reducers are the same on the large units as on the small ones and are interchangeable with them. The capacity of a wide unit, however, is roughly eight times that of the small or auxiliary unit.

Even when carrying this heavy load little spillage occurs, only an occasional lump rolling from the moving pile which is $1\frac{1}{2}$ to 2 ft. high at the center of the pan belt.

Tracks on the head section diverge sufficiently to permit the belt to round the sheaves or turn wheels, as may be seen in Fig. 3. Next to the head section normally is placed a curved section which differs from a straight

one only in that by it a gentle change in direction of the track is obtained. This is necessary in order to gain the necessary headroom for the discharge of the coal. As may be seen in Fig. 4, the head and curved sections are supported in normal position by means of timber blocks.

A head section placed as has just been described gives a proper elevation for discharge into a main-line conveyor. If the coal is to be discharged into a mine car, a straight section is interposed between the curved and the head sections. When this is done, the conveyor is sufficiently flexible so that a foot or more of difference in elevation above or below the normal discharge position may be obtained.

HEIGHT OF CONVEYOR ONLY EIGHTEEN INCHES

Little need be said as to the straight sections, for Fig. 5 shows much of their detail. In any ordinary conveyor the number of these sections employed predominate, and fortunately they are the simplest in both design and construction. The height of these sections is 18 in., making the conveyor suitable for use in a 3-ft. coal bed.

A typical drive section is illustrated in Fig. 6, and Fig. 1 shows it in both plan and elevation. Drive sections are interchangeable with straight ones. In a section of this kind, however, the upper track is humped slightly upward and the lower one has a similar curve, but in an opposite direction so that room is made between them for the driving sprockets which engage the wheels of the pan belt. The drive mechanism is simple, both in design and operation. The contours of the driving-sprocket teeth are true involutes, imparting a uniform movement to the pan belt with little of the jerk and slap inherent to conveyors driven at one end.

Both upper and lower runs of the pan belt are engaged by the sprockets simultaneously, and as the belt is adjusted by a take-up on the tail section, there is little slack at either end. Consequently, wear on the hinge bars and axles due to rounding the end sections does not exceed that in traveling horizontally.

By relieving the tension at the ends of the conveyor excessive wear is eliminated, and the maintenance cost is thereby reduced. Because of the smoothness of the drive, this conveyor can be operated at high speed. Application has been made for broad patents covering the drive and other details.

Two or more drive sections embodied in a single unit function as smoothly as one. When properly placed,

each takes an equal portion of the load and the stresses on any part as compared with those existing in a conveyor of equal length provided with only one drive, are reduced to a fraction, of which the numerator is one and the denominator the number of drive sections employed. Apportioning the load on a long unit to two or more drive sections, reduces the size and weight of each, thus giving portability to the entire equipment.

The gear reductions employed on the drive sections are equal in quality to the transmission of a high-grade

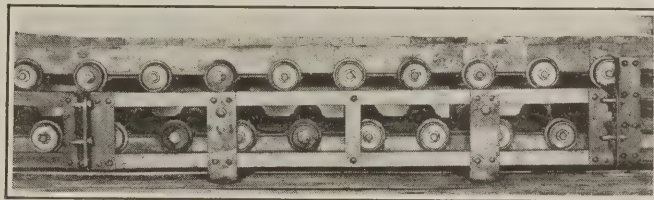


Fig. 5—Straight Entry and Face Sections

The central section shown in this illustration is the type employed on entries. Its frame carries two angle irons which serve as bearing and return tracks for the pan wheels. The section on the right is intended for use at a face. The frame of this section carries two additional angle irons that retain the wheels and prevent derailment in case of a fall of roof or coal.

automobile. Gears and gear shafts are made of carefully heat-treated alloy steel. They operate in oil-tight housings and are carried on high-duty precision roller bearings.

The tracks on the tail section like those at the discharge end of the conveyor are made slightly divergent to facilitate the transfer of the pan belt from the lower to the upper run, as may be seen in Fig. 7. The tail sections are also provided with suitable sheaves or turn wheels. Unlike the head sections, however, the tail sections are provided with take-ups not only to compensate for the elongation of the moving parts as the result of wear but also to facilitate the insertion or removal of various sections by taking up or paying out slack in the pan belt.

This conveyor is of simple design and rugged construction. The two primary objects sought were low maintenance cost and the expenditure of the least possible time and effort in assembling or dismantling a unit. Every man experienced in underground management knows that bolts and nuts, exposed to the humid atmosphere encountered in the mine, as well as to the acid water dripping from the roof or collecting in pools on the floor, should be avoided if possible.

BOLTS AND NUTS CONFINED TO DRIVE SECTION

He knows full well the state of mind of a workman who encounters a nut which is rusted fast to its bolt or has been cross-threaded upon it; he has often heard the outbursts of "cussing" as such a man attempts to manipulate two wrenches, one to hold the bolt from turning and the other to remove the nut. Skinned knuckles or bruised hands are liable to result. In the Movor conveyor, bolts and nuts are confined to the drive section. It is necessary to remove only a few of them in dismantling prior to moving the conveyor. These are of such large size as not to be lost or misplaced easily.

For the addition or removal of one or more sections of the conveyor, a crew of only two men is required. When the unit is to be lengthened, one man works on either side of the conveyor. First the take-up screws on the tail section are backed off to give the pan belt a certain amount of slack. Then the spring clips retaining a



Fig. 4—A Typical Curved Section

When one conveyor discharges onto another a curved section is adjacent to the head section: when however discharge is made to a mine car a straight section is interposed between head and curved sections. This is done in order to gain the necessary height for the coal discharge. Note the slotted pins and wedge keys holding the frames of adjoining sections together.

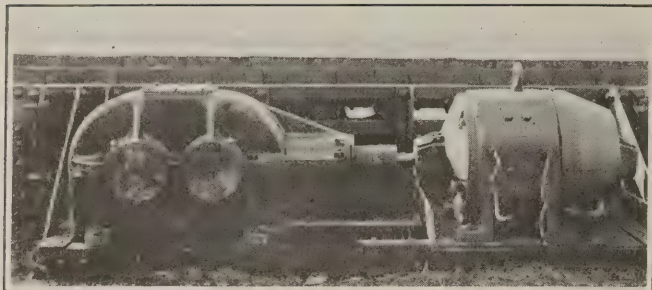


Fig. 6—A Conveyor Drive Section

In moving a conveyor unit each drive section may be separated into five elements. These are: Motor, speed reduction gear, bracket, frame and pan belt. Each may be handled separately.

wheel on both the loaded and return strands of the pan belt are removed from one side of the conveyor and the axles are pulled out by the man on the other side. Next the wedges are knocked out of the slotted pins fastening the tail section to the adjoining section, after which the tail section is pulled away a sufficient distance to accommodate as many additional straight sections as are desired. These, together with a strand of pan belt on both the upper and lower tracks, are then pushed into place. The frames of the various sections are fastened, end to end, by means of the slotted pins and wedge keys; the ends of the pans are brought together; axles, wheels and spring clips are replaced, and after the take-up screws have been tightened to afford the proper tension, the conveyor unit is ready for operation. Substantially the reverse procedure is followed in shortening a unit. One straight section can be added or removed by experienced men in 15 min. or less.

AN UNCOUPLED UNIT IS EASILY MOVED

The ruggedness of this conveyor does not detract from its portability in sections or in elements. When assembled, so flexible a unit is formed that it may be shifted bodily throughout short distances, either sidewise or endwise, without injury to any part. For this purpose, a block and tackle, a post puller or the chain or cable of a mining machine may be used. Shifting either endwise or sidewise is facilitated by two U-shaped steel straps forming part of each section. These pass under the frame, and the weight of the conveyor rests upon

them. In making a shift, they serve the same purpose as the runners on a sled.

When a unit must be moved from one face to another, or from entry to entry, it must of course be dismantled and the transfer made in sections and elements. The head and tail sections are respectively $3\frac{1}{2}$ and $5\frac{1}{2}$ ft. in length. All other sections are 6 ft. long. The frame elements of the head, tail, straight and curved sections weigh about 200 lb. each and are thus a load for two men. The pan belt proper is removed from the frame and moved separately. One man can handle 3 ft. of it weighing about 120 lb. The heavy elements of the drive section, such as the frame, motor and gear box weigh from 300 to 600 lb. each and consequently require a truck for moving over any great distance. Several thousand feet of this conveyor in an old section of a

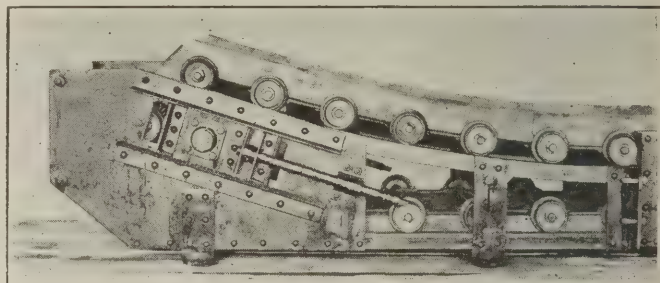


Fig. 7—Tail Section of the Conveyor

In appearance the tail section much resembles the head section. The tail section however is provided with a pair of takeups to permit of quickly adjusting the tension on the pan belt.

mine has been dismantled, moved a distance of 2,000 to 3,000 ft. to a new location, and assembled again, all within the space of two days.

Not only is this conveyor suitable for transporting coal over level ground, but it may be used on slopes as well. A unit 500 ft. long on a 30-deg. pitch will have a rise of about 250 ft. Eight drive sections at intervals of 60 ft., each equipped with a 25-hp. motor will move the coal at the rate of 500 tons per hour. The cost of this equipment, for a slope of the characteristics outlined, is less than that necessary for shaft equipment of equal capacity.



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RALPH E. BECKER,
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Vice-Chairman, Program Committee

Three of Those Active in Cincinnati Convention

What Anthracite Region Is Doing to Make Fine Sizes of Coal More Readily Salable

Jigging, Tabling and Floating Are Cleaning Processes in Use—Jigs Now Operate Without Suction and Stratification Occurs in Quiescent Liquid—Whole Art in State of Flux

BY FRANK H. KNEELAND
Associate Editor, *Coal Age*.
New York City

“HOW to dispose of the small sizes,” said a hard-coal man recently, “is the nightmare of the anthracite operator.” Every little while the problem seems nearer solution, but a new factor will enter to make success less certain. It is true that the finer sizes can be used today more widely than ever before. Automatic stokers have made them available for industrial use. Special devices have enabled householders and apartment-house keepers to use them for domestic heating. It has been demonstrated also that, after pulverizing, this coal can be burned suspended in air, and briquetting has furnished another means of using anthracite fines.

During the war the use of bituminous coal in place of anthracite was greatly extended, better combustion and coal shortage making municipal authorities lenient. Oil, coke, gas and even bituminous coal commenced to drive out anthracite and those enterprising persons who were disposed to adopt a new and cheap fuel like buckwheat were lured, in many instances, to other fuels promising some advantage or convenience.

MUST FREE FINE SIZES OF IMPURITY

Anthracite small sizes have therefore a hard fight before them, and to fit them for the battle it is necessary to free them from the ash which reduces their heating equivalents. They cannot be hand picked. It would be an endless task to clean by hand a ton of No. 2 buckwheat, for instance, and the cost would be altogether out of proportion to the enhanced market value of the fuel. But the coal must be cleaned, so producers have been seeking with diligence mechanical means for cleaning their small sizes while not neglecting the opportunity to improve the treatment of their larger coal.

As a result many devices for screening, picking and washing within a comparatively short time, have been developed and placed on the market. Among these might be mentioned the “W-dent” screen plate and the Mason flat slate picker; also various machines such as the Reilly-Knapp, the Ransom, the James jigs, the Wilmot valve-plunger jig and another type now in the embryo stage, concerning which little can be said at present except that the laboratory model has given excellent results. These have been supplemented by such other coal-cleaning devices as the various concentrating tables, the Chance separator, the Rheo-Washer and more recently by another machine as yet unnamed which gives promise of excellent results. A few of these will be described.

One of the newer coal-cleaning devices now being used, but one that has been tried long enough to demonstrate thoroughly its practicability is the Ransom jig. This machine is so designed that it separates the coal

from the impurities accompanying it by means of upward pulsations of water only, the product to be treated being allowed to settle freely in a practically quiescent liquid.

To obtain this action a plunger operating in compartment A, (see Fig. 1) is fitted with light valves opening downward. These valves therefore open on the up and close on the down stroke. In the side of this compartment is placed a series of deflection vanes which give the water an upward motion as it enters the screen or separation compartment B. Light valves are also placed in the wall of this compartment preventing any backflow of the water as the direction of the plunger movement changes.

In operation, the feed, consisting of the mixture of coal and slate just as it comes from the screens, enters the jig in the usual manner, gaining access to the screen compartment by passing under a gate. On the screen C the coal is subjected only to upward pulsations of

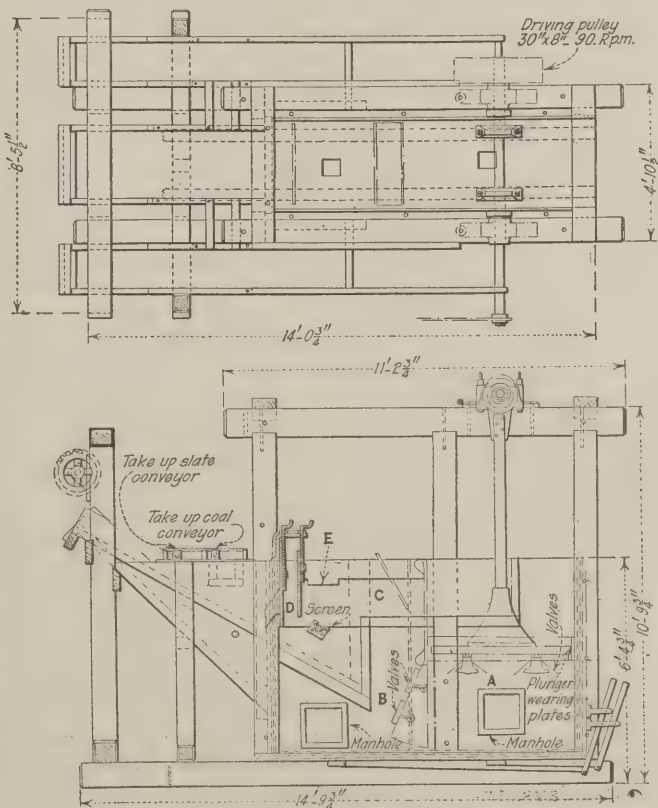


Fig. 1—Plan and Elevation of Ransom Jig

Because of the valves in the bottom of the plunger and those in the side of the screen compartment, water is forced through the screen in a series of upward pulsations without appreciable back suction. The bed of material being jigged is thus lifted sharply from the screen and allowed to settle back in practically quiescent water.

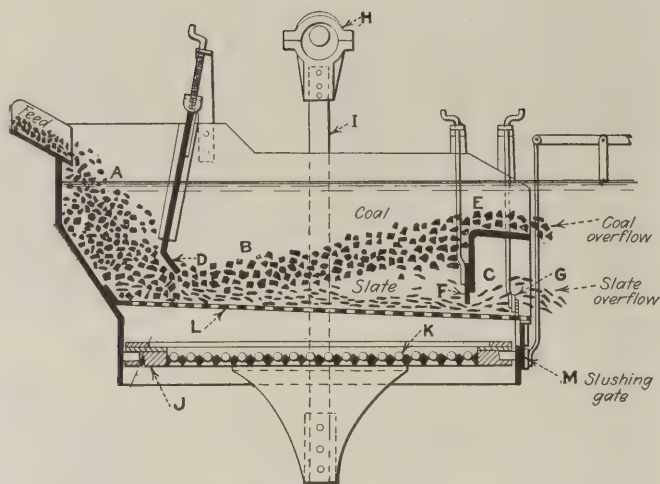


Fig. 2—Section Through Valve-Plunger Jig

As the plunger moves up and down the valves, which open upward, cause the water to be forced up through the screen in a series of pulsations. The action on the material jigged is much the same as that secured in the machine shown in Fig. 1, settlement of the bed taking place in practically still water.

water from the plunger compartment, the valves preventing any back flow, or back suction. The bed of material jigged is thus lifted from the screen and allowed to settle back in practically still water.

PARTICLES SETTLE IN QUIESCENT WATER

Naturally the particles stratify according to their respective specific gravities, that is, the pieces of highest specific gravity seek the bottom, those somewhat lighter coming next and those of least specific gravity, or the pure coal, seeking the top of the jig bed. Not only is the stratification more perfect, but the grinding of particles against each other is less pronounced in a machine of this kind, where the material in the jig is first agitated and then allowed to settle freely than where the pulsations of water are alternately upward and downward.

When stratification has become complete the good coal overflows notches at the sides of the jiggling compartment and is withdrawn by two conveyors, one upon either side of the machine. The slate is drawn off through the automatic gate *D* and is removed by another conveyor.

The thickness of the bed of rock maintained on the screen surface may be varied at will by manipulation of the gate *D*. The valves on the lower surface of the plunger and in the side of the jig compartment are made from strips of balata belting fastened along one edge. Their action is therefore so light and positive that if the flow of water to the plunger compartment is shut off the liquid is promptly pumped down below the reach of the plunger.

WILL CLEAN PEA AND SMALLER COAL

This jig is especially adapted to the treatment of the finer sizes of anthracite, being ordinarily used to clean pea and smaller coal. Some of the results secured from it follow: During November, 1923, three tests, one of 4-hr. and two of 7-hr. duration, were run on three successive days, the machine at that time operating on No. 1 buckwheat. Throughout these tests samples were taken of both the coal and refuse every 20 min. to a half hour with the following results: Maximum quantity of coal in rock discharge 8 per cent; minimum, 6 per cent; average 7½ per cent. The quantity of slate

in the coal discharge showed no variation, being 3 per cent in all cases.

Another washing device that has made its appearance within comparatively recent months is that known as the Wilmot valve-plunger jig. A cross-section of the bed of material being treated in this machine is shown in Fig. 2. This jig also employs the cup-and-gate refuse discharge on anthracite sizes smaller than ¾ in. This, however, may be used also on larger sizes.

In this machine the jig box is divided into three main divisions designated in Fig. 2 as *A*, *B* and *C*. Sized coal as it comes from the screens enters the feed hopper *A*. Thence it passes under the adjustable gate *D* into the jiggling compartment *B*. Here it stratifies under the action of pulsations of water from below, heavy pieces going to the bottom and the good coal, which is lighter, seeking the top of the jig bed. Accordingly the coal overflows at *E*, and the slate escapes through the refuse compartment *C* and over the gate *G*.

In this jig the water is given a series of upward pulsations. The plunger *J* is actuated through the connecting rods *I* by the eccentrics *H*. In the top of the plunger is placed a series of light valves *K* that open on the downstroke but close on the upstroke forcing water through the screen *L* in pulsations much like those from an ordinary hand pump.

As may be seen the screen *L* is set at a slight inclination. The gates *D*, *F* and *G* are all adjustable so that the feed going to the machine as well as the slate discharge may be readily controlled. The slushing gate *M* is opened occasionally to free the space above the plunger from any fine material that may have found its way downward through the screen *L*.

DISCHARGE GATES REMOVE DIFFERENT PRODUCTS

The heights of the discharge gates have been determined in accordance with the specific gravities and sizes of the materials handled. As a rule the height of the coal overflow is left stationary, and the slate gate is adjusted to suit the material treated. If the slate gate is too low some coal will pass over with the refuse; if too high slate will go over with the coal.

The capacity of this jig varies approximately as the

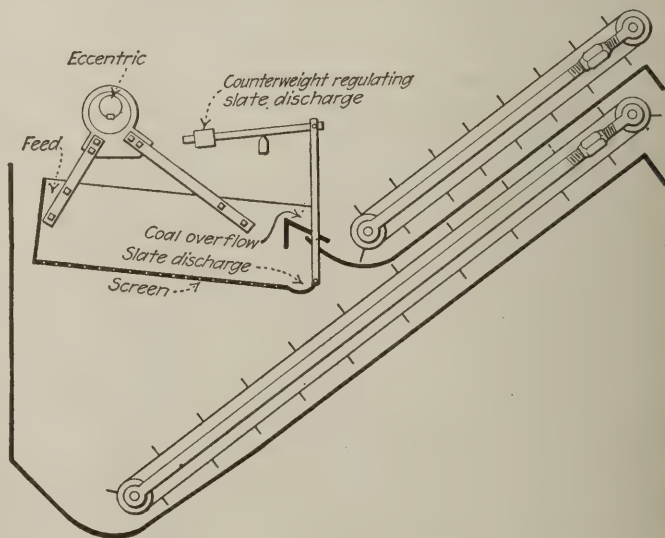


Fig. 3—Cross Section of the Basket-Type Jig

In this machine the basket or pan is moved up and down in a tank of water. The coal is thus washed in much the same manner as it has been cleaned by hand by the Chinese for centuries. This is perhaps the simplest jig of all.

speed of the eccentric shaft. When operating at 140 r.p.m. on buckwheat material passing over a $\frac{1}{4}$ -in. and through a $\frac{1}{2}$ -in. circular opening, one of these machines gave the following results:

Quality of feed, 30 per cent slate, 70 per cent coal; after jiggging the coal, discharge contained 8 per cent slate and 92 per cent good coal; the slate discharge contained 1 per cent of coal.

At the time this test was made the machine was taking feed at the rate of 25 tons per hour. It thus will be seen that although the machine is somewhat bulky its capacity is large. It is designed and built to withstand the hard and continuous work to which all machines of this kind inevitably are subjected.

BASKET, OR PAN, JIG AND PLUNGER JIG

Jigs of many different kinds have been perfected and placed on the market. In general these all embody the same cleaning principle although they are of two distinct types, namely, the basket, or pan jig and the plunger jig. In the basket jig (see Fig. 3) the whole compartment or pan containing the materials to be

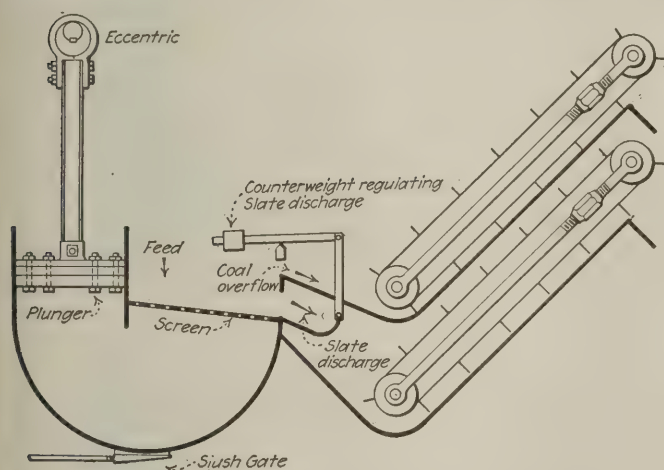


Fig. 4—A Plunger Jig Without Valves

Here the water is caused to surge or pulsate back and forth through the screen and the material supported by it by means of a plunger. Slate is discharged to one conveyor and coal to the other. This machine as well as that shown in Fig. 3 appears to be somewhat better adapted to treating the larger sizes of coal than the smaller.

separated is reciprocated up and down in a tank of water. In the plunger type of machine (Figs. 1, 2, 4 and 5) the coal container is held stationary while movement of the water is caused by a plunger.

In any case a jig, although fairly efficient in operation, is a big, heavy machine requiring much floor space. For treating the finer sizes in particular, operators have sought means less bulky and ponderous. To this end concentrating tables have been installed in appreciable numbers. Like the jigs they are of several types but all operate upon the principle that, on a reciprocating table, material of high specific gravity will follow along the riffles of the table while that of light specific gravity will be washed over them.

Various attempts also have been made to separate coal from its accompanying rock by means of flotation. Of these devices thus far perfected the Chance flotation apparatus is probably the best known. In this process a high specific gravity is imparted to water by intimately mixing fine sand with it and retaining this sand in suspension by continuous agitation. This device as well as the construction of a washery employing

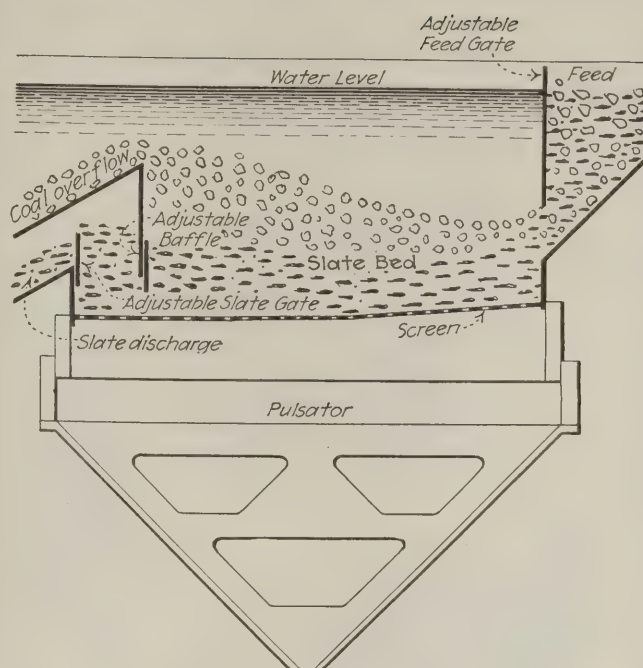


Fig. 5—Pulsator and Bed of the James Jig

In this machine the plunger or pulsator as it is called is provided with valves so that a series of upward pulsations is imparted to the water acting on the jig bed. The action of this machine is similar to that of the jigs shown in Figs. 1 and 2.

it was described in *Coal Age* of May 4, 1922, page 735. Another article appeared May 1, 1924, p. 633. Being a flotation process, it is not necessary to size the coal before separating the impurities from it.

DEPENDS ON SEVERAL PRINCIPLES OF SEGREGATION

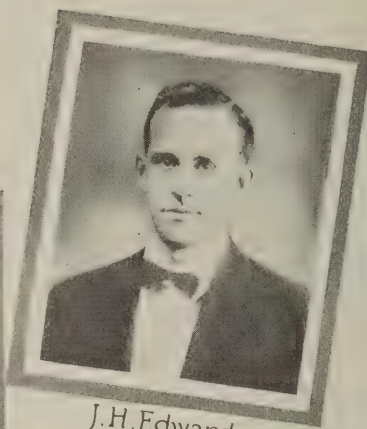
More recently the Rheolaveur, or Rheo-Washer, has made its appearance from Belgium. Although this machine itself is extremely simple, the principle of its operation is somewhat complex as advantage is taken of several properties of coal and slate or rock when immersed in water. This device was described in *Coal Age* of Dec. 6, 1923, page 847, also in the issue of Mar. 27, 1924, page 455. It is now being tried out in the anthracite region.

The whole art of anthracite preparation appears to be in a state of flux; a machine which today may be considered the "last word" in coal preparation tomorrow may be obsolete. Great progress has already been made but present average practice still leaves much to be desired. The small sizes as they come from the shakers in many cases not only contain a larger percentage of impurities than do the larger grades, but unlike the larger sizes, they cannot be hand picked. Of necessity, therefore, the coal producer must look to mechanical means, appliances and processes to clean his small coal if it is to compete in the open market with other fuels.

OPEN LIGHT, THE OPEN ROAD TO DISASTER—A recent study of the disaster files of the U. S. Bureau of Mines covering a period of seventeen years reveals the fact that open lights and gas have been the attributed cause of seven fires and 102 explosions in coal mines and of four fires in metal mines, in the United States. Tabulation of the data shows that these disasters were responsible for the death of 2,341 men, injury to 376 and great damage to property—in some instances the mine being entirely wrecked.



Graham Bright



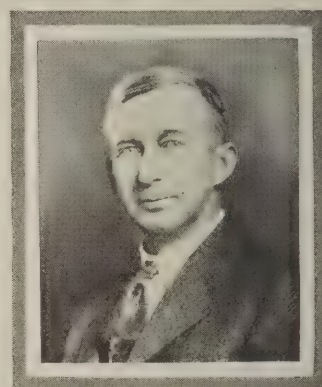
J.H. Edwards



Carl Lee



C.L. Harrod



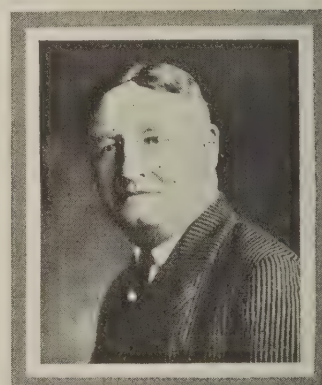
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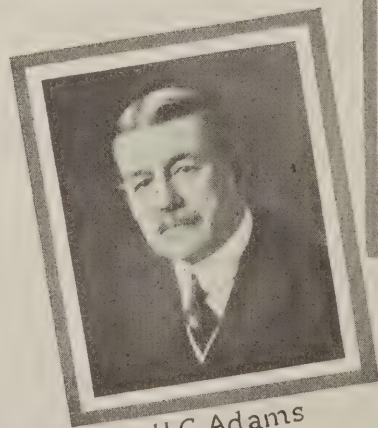
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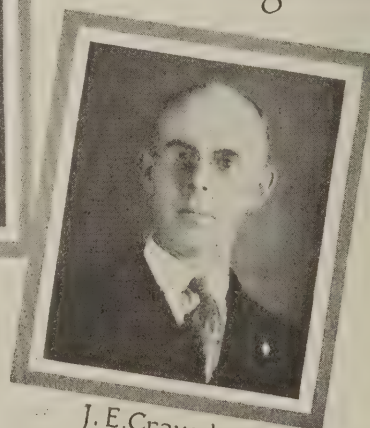
Hugh Shirkie



H.C. Adams



N.S. Greensfelder



J.E. Crawshaw

Speakers on Electrical, Preparation and Shooting Problems at Cincinnati Coal-Mining Convention with President, American Mining Congress



Howard N. Evenson



Raymond A. Walter



Carl Scholz



Everett E. Drennen



Sec. James F. Callbreath



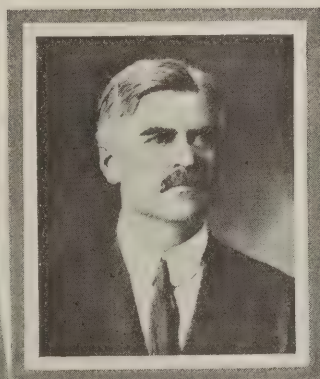
John E. Jones



J.W. Paul



John T. Ryan



Geo. S. Rice

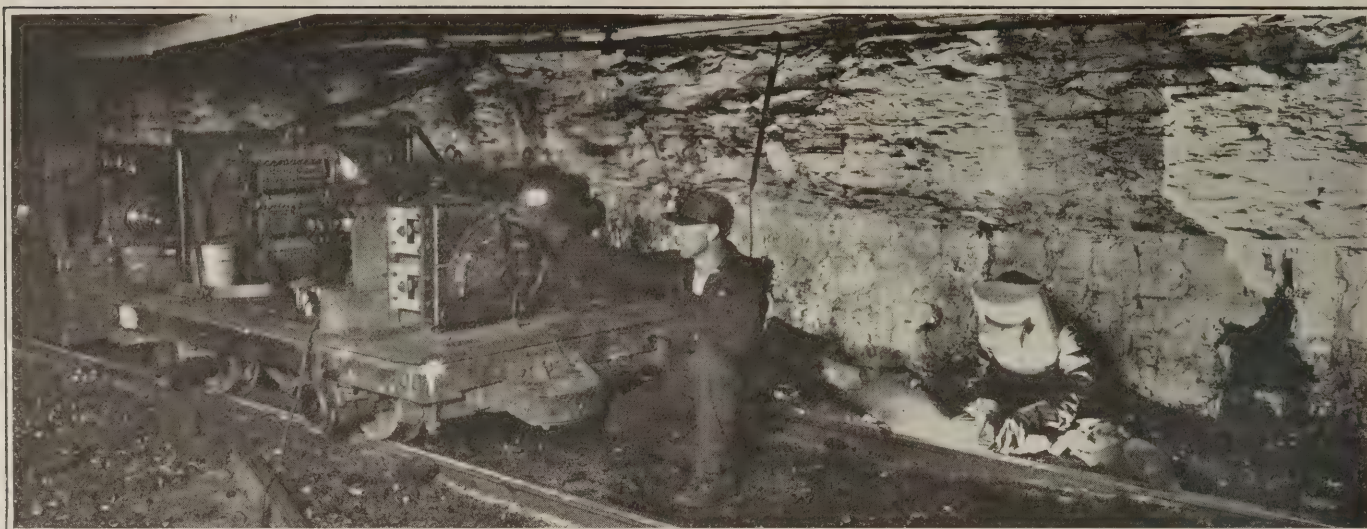


Edward Steidle



Charles W. Nelson

Speakers on Mechanical Loading and Rock Dusting Problems at Coal Mining Convention, Cincinnati Ohio, with Secretary, American Mining Congress



Stopping Up the Power Leaks During Night Shift

Cost-Cutting Suggestions for the Mine Executive

Savings in the Past Testify to the Possibilities of the Present—Automatic Equipment Saves Labor, Eliminates Accident and Is More Dependable Than a Station Tender—Super-Power Practice Adaptable to Mine Conditions

BY EDGAR GEALY
Associate Editor, *Coal Age*

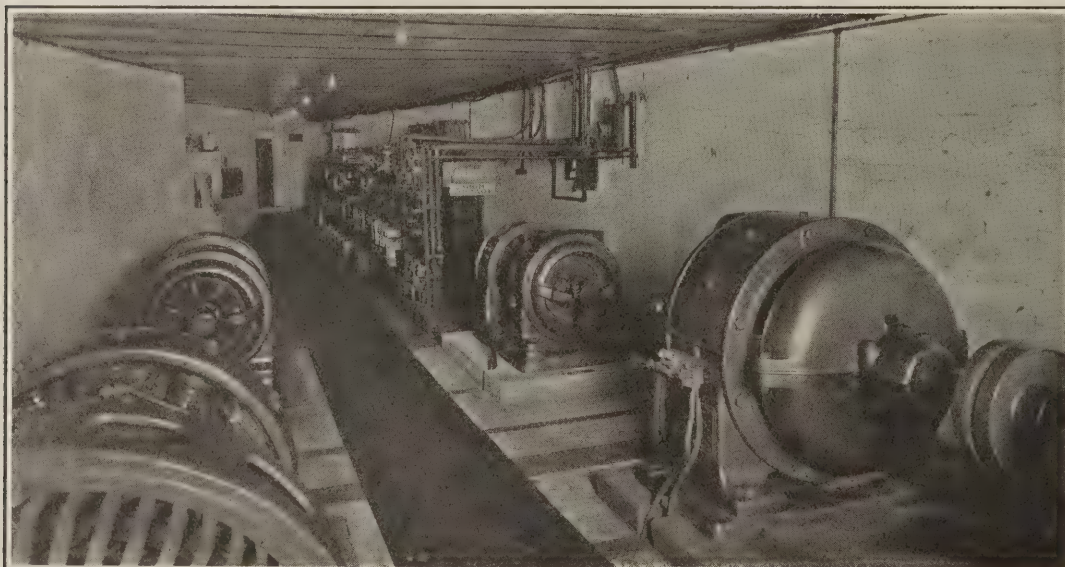
IN the next three years as much advance will be made in coal-mine equipment as in the past seven years," said a prominent mining engineer recently, and the interest of the mining public in the possibilities of mechanization amply justify his statement.

Almost every man now working with his muscles can perform his labor easier, cheaper and better by the aid of equipment, for the human body is slower, weaker and less efficient than the machine and the human eye and ear less attentive and responsive than electrical apparatus.

Though the miner must perforce cut his kerf in the bottom, the machine cutter will put the kerf where it will do the most good, at the top, bottom or in the

center of the seam. It even will cut out a dirt streak. It will cut a deeper kerf also so that the coal on shooting will fall in lumps of marketable size. When power drills are used, shotholes can be better placed than when drilled by hand.

Loading machines work so rapidly that when they are used, less timbering is needed and the coal is extracted and the place is vacated before the bottom heaves and the drawslate falls, and both have to be removed. Storage-battery locomotives reduce operating charges, for they will not only haul more cars than mules but they also "eat no hay" when the mine is idle, and in low coal they save much deadwork. Haulage locomotives transport more coal in a trip and move at



Inside Power Station

More and more, transformer and power-converting apparatus are being installed in the mines. In some respects this is due to the need for a shortening of feeder cables. Many engineers find that this is the only way to minimize the effects of bad bonding.

higher speed, saving in manual labor and making possible the delivery of more cars. The replacement of steam by electricity also serves to save power, for electric hoists use power only when raising loads, preventing the waste of steam and heat when the hoist is not running.

Automatic apparatus not only saves labor but responds more promptly to demands made upon it than do the men who are put in charge of substations not thus equipped. They put the power at proper voltages where it is needed. Line and feeder control devices maintain the power on circuits and localize troubles which otherwise might shut down the entire plant and lower the morale of the working force.

Not only are the new devices more certain, effective and economical, but they also afford greater safety. Control apparatus not only automatically starts and stops equipment, but some of these accessories operating with a certainty almost uncanny protect both equipment and workmen. Many machines are started and stopped by remote control so that the workman who sets them in motion or stops them is at no time in danger. A relatively new use for electricity is gangway and face illumination and its introduction has greatly reduced mine hazards.

Increased speed is the keynote of success in the coal industry; every operation must be speeded up to keep in step with the fastest moving equipment. Most important of all is the continuous flow of coal, so that every machine and man will be able to devote full time in productive effort. Friction, the bane of speed and production, is being greatly reduced. Anti-friction bearings, applied to mine cars and idler pulleys for long conveyor-belt systems, lower energy costs and increase the capacity of present power units.

PROOF THAT BETTER EQUIPMENT LOWERS COST

It is an undisputed fact that these changes will greatly reduce operating costs. Where long steam pipes have been replaced by electric power lines the investment in many instances has been returned in two or three years. One large mining company, almost completely electrified, is now generating more power than the public-utility company which supplies the principal city and the adjoining municipalities of that same region. This coal company is now spending \$1,000,000 to increase the capacity of a single power plant. The



Safe Enough for Anyone

By supplying the workman with power-driven machinery which he can operate safely, half the work of gathering cars on the main branches is done before the gathering locomotive returns for another trip.

engineers have determined that electrification of the hoisting shafts will save \$600,000 annually.

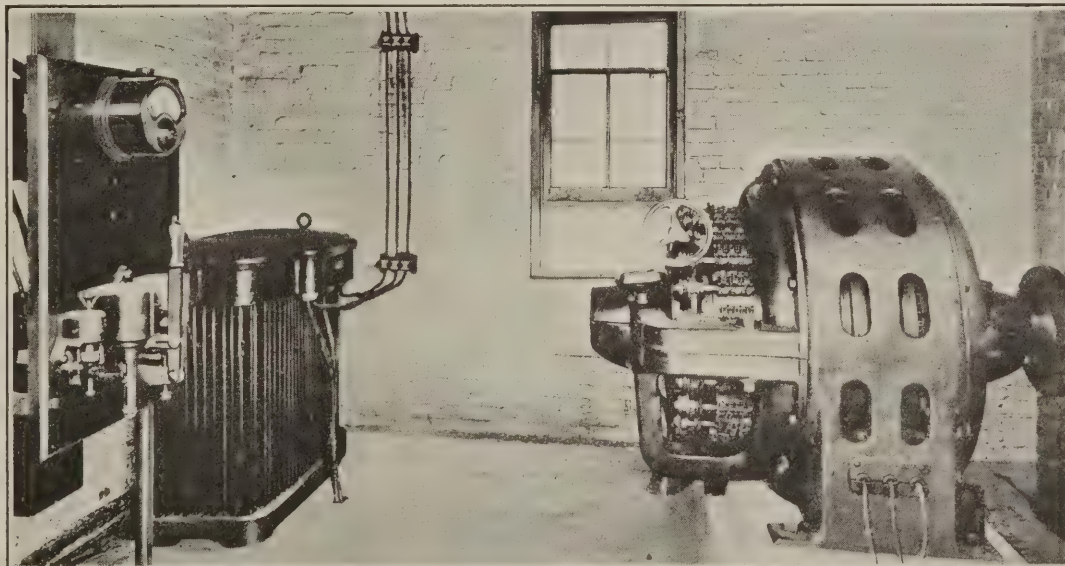
There is not a coal company anywhere which cannot reduce its costs by a further application of machinery. From a survey of the field it is obvious that much new machinery has been so well developed that its effect in cutting cost can be predicted with confidence. Nearly every company is doing at least some one thing better than the others, and valuable information can be gathered by an interchange of ideas.

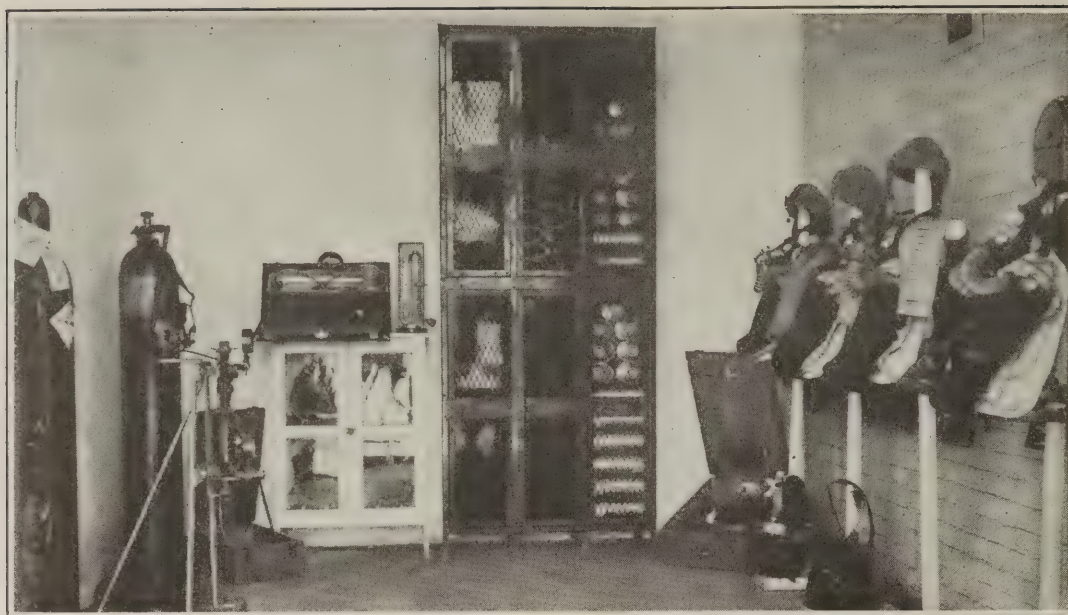
Then too, ingenuity and competition for business have resulted in the design of many labor-saving devices. One large company has made wonderful savings by better control of the direct-current distributing lines. The principle of the super-power system, that promises so much in national development, has been adapted to render more economical the operation of the power systems of individual companies. Circuits have been arranged and protected so that, during peak loads, power can be taken from several different substations. As a consequence most of the generating equipment operates continually at a high load factor. Furthermore, by the use of substations the generation of direct current is located close to the machinery to be operated so that there are no long power lines and defective return circuits.

Another company is now using large fan motors which can be slowed down, thus saving power during

Fan Motor Lowers Costs

Fans are large consumers of power. If the energy consumed by a 100-hp. fan motor could be cut in half during the night hours the power thus saved would be sufficient to run three 100-hp. hoist motors during the operating day. Such savings as these are not obvious but they can be made with little effort and expense.





Rescue Apparatus Pays Profits

When an accident occurs every minute means money and anxiety. Fire-fighting equipment when readily available may quickly return its investment. Dangers multiply and fires quickly spread when not combated immediately. Idle periods occasioned by accidents eat up the profits, for they usually occur when the market is good.

idle periods, nights and holidays. Where some of these motors have been installed the power costs during two-thirds of the twenty-four-hour day have been halved.

Storage batteries used on locomotives, cagers and coal cutters often bring about great savings. Yet the possibilities of this development are as yet but inadequately recognized. Batteries recharged at night do much to minimize the daily peak load, for which the consumer usually pays a fancy charge whether it be to his own power plant or the power company. Rotary converters which supply energy during the day to trolley locomotives, cutters, etc. are often used during the night to charge storage batteries. Where 110-volt batteries are used large savings of power are made by placing the battery in the circuit between one line wire and a neutral point on the rotary transformer bank.

Storage batteries are now frequently put on charge and given little or no further attention until morning. By means of ampere-hour meters with suitable contacts, the high charging rate is lowered at a predetermined time and finally terminated. When the last battery is fully charged the power-converting machine is shut down by a load control relay or a time clock.

The power loss resulting from poor bonding is not fully realized or appreciated. Most of the bonding work comes under the direct supervision of a mine foreman and consequently is often left undone. Electrical engineers are now endeavoring to overcome this evil by making the repair of the return circuit a part of their work whenever they install any new apparatus in the mine. Others are surmounting the difficulty by placing the substations so near the center of the loads that the feeder and return circuits are short, thus reducing the voltage drop.

Heretofore, lightning arresters have been used almost exclusively on power lines exposed to atmospheric lightning, but lately many new types of such apparatus have been developed and these have been applied where owing to grounds, short-circuits and switching operations, abnormal voltages are built up. The added protection thus afforded has often checked line disturbances which hitherto have greatly damaged electrical equipment.

Static condensers located where they can correct lagging power factor offer wonderful opportunities to increase the kilowatt capacity of transformers, power

lines, switches and generators. Synchronous motor-generator sets once located where they could best correct the lagging power-factor of tiddle and breaker drives can now be transferred to the mine where they can deliver full voltage to the mining machinery. Thus burnouts will be less frequent, power losses will be diminished and higher operating speeds attained.

Obviously, we are seeing revolutionary changes; factory methods are being adopted and these enable the operator to get out his product at minimum cost. Thus intensively performed mining will bring in a profit every working day.

Keep Open-Flame Lamp from Coal Mines

By L. C. Ilsley and M. W. von Bernewitz*

Several hundred thousand open lights are carried daily in coal mines of the United States, each lamp being a menace to light and property through fire or explosion. They have been responsible for many disasters in the past and will be again. Flame safety lamps have been available for over a hundred years, but during the last ten years safe and practical electric lamps have been perfected. These have eliminated many of the flame safety lamps and in a few mines have replaced open-flame lamps.

But there are still more than twice as many open lamps as electric lamps in our mines, and the open lamps should be discarded in favor of an approved type of electric lamp. There are several electric miners' lamps which have been approved by the Bureau of Mines for safety and efficiency which give a good light and are easily maintained and carried. Some flame safety lamps will always be used, but mostly for detecting gas, although they might be supplanted if some simple, reliable and cheap gas detector were developed.

An open light and gas combine to form a vicious hazard, and if any coal dust is present in the vicinity the consequences are multiplied many times. An open light and black blasting powder also constitute an explosion hazard, as has been vividly attested by several serious disasters.

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Give Loading Machine the Chance It Deserves

Every Mine Installing Machines Should Work Out a System of Operation—The One Presented Should Enable Six Machines to Produce 1,500 Tons Per Day from Twenty-Four Places.

BY CHARLES GOTTSCHALK
Mining Engineer, Evansville, Ind.

IN THE development and adoption of mechanical loading underground, the past year has been an important one for both mine operator and manufacturer. During the formative period, the pioneers are many, and not all can succeed. In the case of mechanical loading this has proved true of both the mine operator and the manufacturer. Fortunately, however, the net result of combined efforts has been a demonstration by several mine owners of their ability to install mechan-

chines always requires the expenditure of appreciable sums of money. To make these investments pay dividends, the management must provide continuity of operation for such machinery. This sounds easy; unfortunately, however, failure to observe this fundamental principle has done more to disappoint investors in loaders than any other consideration.

In order to illustrate the thought in mind, a plan for the operation of mechanical loaders is shown in the accompanying sketches, Figs. 1, 2 and 3. A room section conforming to the standard dimensions adopted in a certain large producing field has been selected as a basis, and a layout suggested that will conform with the plans of a mine operated on the room-and-pillar system. This layout and the successive steps followed in the development of the block have been projected with especial consideration to the operating conditions and capacities of a gathering and loading machine provided with a swinging conveyor.

The development work connected with the room section here shown has been so planned that within a radius of approximately 100 ft. enough places will be provided to afford a capacity of 125 tons per machine every day, it being assumed that this is the average daily capacity of one mechanical loader.

When the room entries have been driven to their limit and the last pair of rooms extended as shown in Fig. 1, sufficient territory will have been developed so that each room entry will accommodate three loaders per side, or six in all, the rooms being of such width that four of them will furnish work for one loader.

The third step contemplates widening the room by taking three slabbing cuts off one side of each pillar. This operation has been timed so as to form the final stage of the work. It may be started from the inside, that is, on the retreat.

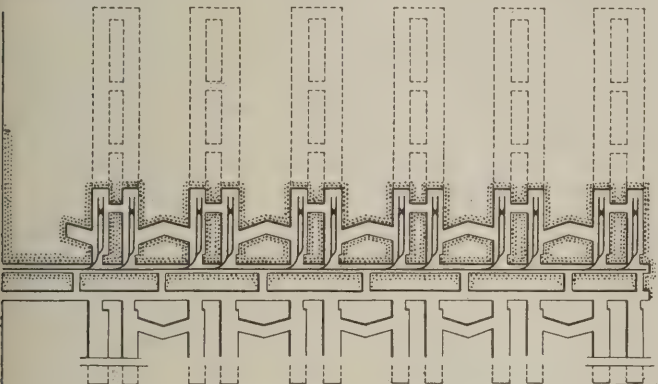


Fig. 1—Developing a Block of Rooms

Heavy lines denote territory developed by loader at the rate of 125 tons per day. This section is now ready for six machines allowing four rooms to each. The total capacity of this group of rooms should be 750 tons per day.

ical loaders and to obtain the entire output of their mines from these machines for periods exceeding a year of continuous operation.

In the Indiana, Kentucky, and Illinois fields it appears that those operations that have made only conservative changes in the mode of mining followed have been more successful than those which made radical departures from proved methods of roof control. However, many enthusiasts hold to the idea that success with loading machines is dependent upon modified longwall mining. At the opposite extreme—and instances of its use are numerous—machines have been placed in the mines with little further preparation for their operation than would have been made had so many more laborers been added to the payroll. Needless to say that in such cases satisfactory results were lacking.

As most of the mechanical loaders installed in Kentucky, Illinois and Indiana during the past year had first to demonstrate sufficient capacity in straight room-and-pillar work to justify their purchase, it is only logical to suppose that more satisfactory results would be obtained by modifying the transportation system than by altering the method of mining. To a certain extent pioneering could thus be made profitable as well as instructive. Only after the capacity of a loader under existing conditions has been determined can the most efficient scheme of transportation be devised.

Installation of improved mining and loading ma-

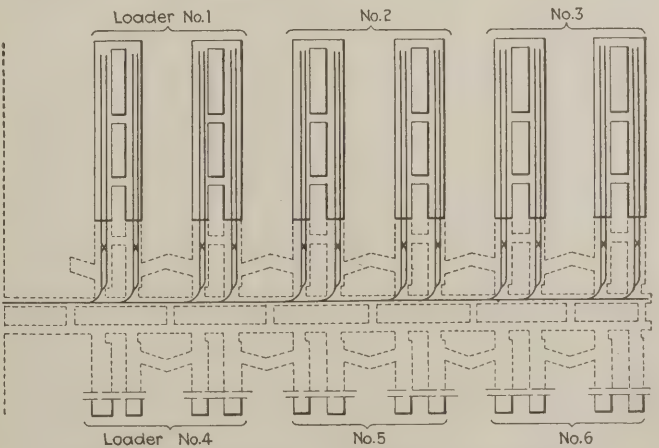


Fig. 2—Second Step in This Kind of Room Work

Heavy lines indicate mining done on regular room faces. All six loading machines start together and advance all twenty-four rooms at the same rate. The output during this stage should be 750 tons per day.

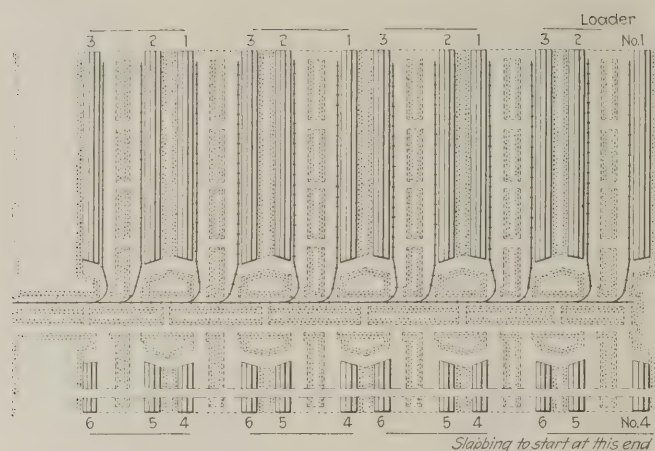


Fig. 3—Slabbing Finishes the Block

Solid lines indicate territory mined by slabbing. The six loading machines start simultaneously loading out three long slabbing cuts from each pillar. The maximum productive capacity is attained at this stage and the output should approximate 1,500 tons per day.

Up to this time, ample pillars have been left in place to insure against the possible development of a squeeze or creep. The capacity of a loader with a swinging conveyor on slab work is more than double that on ordinary face loading. Where development work is performed on the basis described, it is a weak roof indeed that would not permit of at least three slabbing cuts being taken in the short time required by such a machine to load out the coal produced.

It should be noted that the basic idea embodied in this plan has been to develop sufficient territory so that working places may be provided and the maximum capacity of loaders rendered available as each machine is put into service. The production curve for each stage of operation is, therefore, a straight line. Transportation also is simplified by this plan.

The method, as offered, should be a big improvement over systems now in use in many mines. The intention of the illustrations, however, is to impress on those interested in the operation of loading machines, that the big problem at the present time is that of affording the machines now on the market, the opportunity due them. To this end a planning department should be provided which should have the ability and authority to synchronize the various movements necessary for successful and economical operation of the machine. The plan suggested calls for a loading machine so flexible that it may be used for narrow work, room turning, wide work, and slabbing, for which latter purpose special machines have been designed.

The three accompanying sketches tell their own story. Conditions assumed were: A 6-ft. bed of coal, an average roof, inclination of bed such as will permit of turning rooms off both entries, and the like. In short, the conditions generally found in Indiana and Illinois.

As the first stage, or development work, progresses, a parting should be installed in each extended room neck. This parting should hold sufficient cars to clean up a face of coal. With such an arrangement a mule could be employed to move the individual cars after they were once spotted on the room partings by a locomotive. Where the loading machine is equipped with a swinging conveyor, the rooms may be provided advantageously with double tracks. The machine may thus load alternately first on one and then the other regardless of the position in which it may be working.

The Miner's Torch

What Rock in Coal May Do

THERE are several explanations for pieces of rock being found mixed with the coal which has been shot down at the working faces and ready to load into mine cars. It may have fallen from the roof, it may have originated from partings in the coal, or perhaps the machine mining was made in a soft bottom, etc. Miners do not always separate carefully the rock from the coal before loading the coal into cars at the working face, and the slate inspectors on the top house do not always discover this falling from grace, as it were, on the part of some of the miners. The slate pickers are never able to entirely clean the coal between the mine cars and the railroad cars especially if an inordinate quantity has been loaded by the miners.

Much of the rock that falls from the roof to mingle with the coal falls because some miner takes a chance with a prop; he thinks he may get along without it, and does, but with unsatisfactory results. Much of the rock that is loaded with the coal in violation of the spirit of the dockage rules is loaded because the miner knows that all the cars cannot be inspected and he is willing to take a chance at the penalty. Much of the slate that passes along the picking belt into railroad cars, does so because a slate picker finds it easier to let a piece of rock go by than to summon the effort necessary to lift it off the belt, especially if the boss picker has his back turned.

Some of the railroad cars loaded with dirty coal find their way to railroad coaling stations; a passenger engine coming along just as some of the dirty coal gets to the chute gets a tender full of coal and rock, perhaps mostly rock. Then, as the engine is approaching the maximum grade on the run the fireman finds that he cannot maintain the necessary steam pressure with the coal that he has, and the train gets off schedule. At the next junction point one of the passengers misses his connection, due to the lateness of the train. Many things happen to passengers who miss connections. Some of the consequences are amusing, others are tragic.

Perhaps a railroad car with more than its share of rock is delivered to a retail coal yard. The yard man having paid for the rock decides to pass the bad buy on to his customers. In the course of events some of the coal with rock is unloaded at a hospital coal bin. Firemen at hospitals are just average firemen; they are not able to keep steam pressures up to the maximum with fireboxes full of clinker. There are times when the lives of several patients may hinge on the temperature of the hospital wards. Pneumonia is always just around the corner following operations; an unlooked for drop in the temperature of the room, if not quickly noticed by the nurse in attendance, may mean life or death to such a patient.

Perhaps this impresses you mostly as a journey of the imagination. Your guess is correct; but if the men responsible for the rock that gets to the coal pile with the coal would use their imaginations more, such things would not happen.

Shale Dusting Now Spreading Rapidly in Illinois

Many Companies Follow Lead of "Old Ben"—Traveling Blower to Dust Ribs and Roof Comes Into Use—Valier Coal Co. Tries One-Process Pulverizer to Cut Costs

SOUTHERN Illinois, where are grouped some of the largest bituminous coal mines in the world, is seriously adopting shale dusting. The years of study and thought that have been devoted to the subject of stopping explosions and thus saving life and property by the use of shale dust is getting in its work at last. The mines of the Old Ben Coal Corporation, where the dusting system got its greatest impetus are now merely the center of what has become a widely radiating spread of the dust idea. The Chicago, Wilmington and Franklin Coal Co. at its two great Orient mines, the Peabody Coal Co. at mines 19 and 20, and the Valier Coal Co. at the Valier mine that Carl Scholz built, all are plunging into dusting with definite and comprehensive programs. Others are following. The region is gaseous and the coal dust dangerous. These dangers are to be materially lessened by pulverized shale.

For years the principle of rock-dust protection has been studied in the southern Illinois region, but the events of the last few months seem to have stung the territory into action. Perhaps the fact that in this country the three years 1918, 1919 and 1920 were comparatively free from dust explosions tended to lull Illinois as well as the rest of America into a lackadaisical attitude of mind toward shale dusting.

Only 169 men were killed in major explosions in those years. Much confidence came to be placed in water as a protecting agent against coal-dust ignition. Events of the immediate past, however, have upset this faith in water. The tremendous explosions since Jan. 1 in which nearly 400 lives have been lost and in which coal dust played its part, have helped in this awakening.

Perhaps the recent visit of the official delegation of the British Mines Department, which toured through Illinois, may have helped. Much was said during the tour concerning English rock dusting. Perhaps the studies which George S. Rice of the Bureau of Mines made in England a few months earlier may have added their bit. Naturally the conclusions reached within the year by other Bureau of Mines engineers favoring the use of rock dust in coal mines have had their effect. But Illinois is taking its swing toward rock dust principally because the results of its own investigations

have finally convinced many operators that dusty, gaseous mines *must* be protected with incombustible dust.

Most of the Illinois investigations into the value of dust protection have been made since 1917 and by the Old Ben Coal Corporation under the direction of J. E. Jones, its safety engineer.

It is now generally claimed among mining engineers in the Midwest that Jones has had more experience in rock dusting than any man in this country.

However, the mines of Illinois are not following every detail of the Old Ben plan of dust protection underground. That corporation has applied shale dust in its mines in four ways: In concentrated barriers containing one and a half to three tons of dust, in V-shaped troughs, piled on platforms elevated a few feet from the floor and spread on roof and ribs. It is roof-and-rib dusting which is now being introduced into many of the large mines of southern Illinois.

In order to spread shale dust on roof and ribs throughout the mines, an

old device in shale dusting is now being once more introduced—the traveling blower. For more than a year Mr. Jones and his associates have worked to produce a machine that will do the work satisfactorily. All sorts of devices have been tried in an effort to get something that would distribute rock dust uniformly into every crevice and on top of every projection. Previously dust had been spread by hand with limited success. Eventually a machine was built which is now in its final stages. Its construction details hitherto have not been made public.

Meantime other interested engineers have been busy trying to conceive a traveling blower to serve the same purpose. Their problems have been many. Shale dust pulverized to a fineness of 250-mesh is difficult to handle. Loaded into a hopper feeding into a suction vent pipe, the material persistently packs in the feed line. Its weight, in the case of some Illinois shales, averages between 60 and 75 lb. per cubic foot. Various devices to overcome the difficulties of feed have progressed at least as far as the blueprint stage.

One is equipped with a piston agitator in the bottom of the hopper (Fig. 1). The piston is actuated by a short crank driven by a chain from one of the wheels of the truck so that the speed of the piston is deter-

THE ANTI-EXPLOSION CAMPAIGN IS WINNING

J. E. JONES, shale-dust expert, sees real progress now being made against mine explosions. Speaking of Franklin County and Illinois he says: "The outlook for increased safety against explosions is brighter than ever in the history of the county or the state, as is evidenced by a more thorough understanding of the hazard and the growing interest in the reduction of this hazard by both employer and employee. * * * The three principal factors required to produce a coal-dust explosion are an open light, an accumulation of gas and explosive coal dust. The first is removable by the installation of enclosed lights found permissible by the Bureau of Mines. The second can be minimized by proper ventilation and inspection, but this hazard will always exist in a gaseous mine. The third can be eliminated by neutralizing the coal dust with incombustible dust making a mixture that is non-explosive."

mined by the speed of the truck. This is calculated to feed dust to the blower in a volume varying with the rate of travel. Another is equipped with a belt type of feed to the fan, which also is designed to maintain a given ratio of dust volume to truck speed.

These dust spreaders are to be supplied with flexible nozzles of large diameter. An operator riding with the truck directs the flow of dust according to the immediate conditions. Such a truck, carrying several tons of dust and pulled by a locomotive can proceed at a low rate of speed throughout the entire mine making a uniform deposit of dust on roof and ribs in much less time and at much less cost than ever could have been possible by hand.

Careful studies of the several mines that are adopting stone dusting in Illinois are determining the exact quantities of dust to be applied in each case and are working out frequencies of application calculated to maintain given proportions of incombustible material to coal dust.

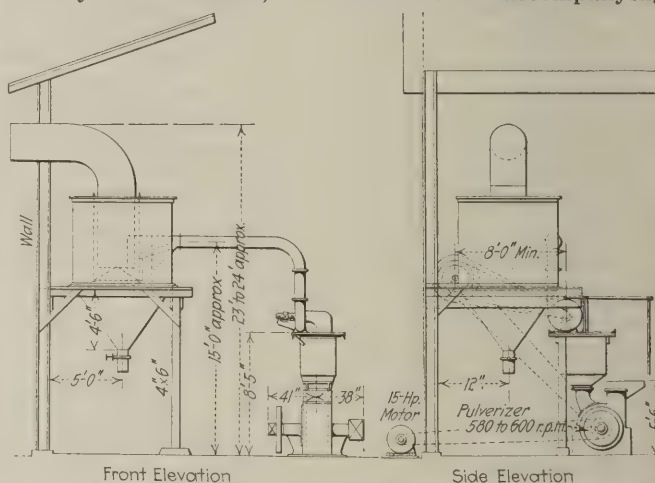
It is generally accepted that at least 55 per cent of shale dust must be added to the coal in the roadway to render it harmless. In some cases, higher percentages than this will be provided, running, probably, up to 70 per cent at the time of application. To secure such a proportion, it may be necessary to distribute as much as 10 lb. per lineal foot of 12-ft. haulage or airway or approximately 26 tons per mile. Most of the companies now adopting the dusting method expect to make one thorough and complete dusting of the mine every three months with more frequent application in main haulageways. Periodical dust analyses will determine a frequency of application that will maintain a safe proportion of shale to coal for each mine.

The most definite progress in dusting in southern Illinois, except the extensive work done at the Old Ben mines, has been made at the Valier mine of the Valier Coal Co., owned and operated by the Chicago, Burlington & Quincy Ry. This property, in the northwest edge of the great Franklin County field, has purchased

shale dust for a year from the Old Ben preparation plant, and the Valier men have been spreading it by hand.

Recently the Valier Coal Co. decided to do its own pulverizing, using shale from its own workings. Accordingly it installed a grinder which did not afford the proper fineness. It then set up and is now testing an American ring pulverizer which, for a month, has been producing between one and two tons of pulverized shale per hour, 85 per cent of it is 80-mesh fine and a considerable proportion finer than 200-mesh. One operator at the union top-work day rate of \$6.59 has been running the pulverizer, and the cost of the dust, as computed by the company, is little more than \$1 a ton so long as the pulverizer can get anywhere near continuous running time. This is about one fifth of the previous cost of shale dust to the Valier company.

This ring pulverizer with an air separation system and cyclone collector, as shown in an accompanying



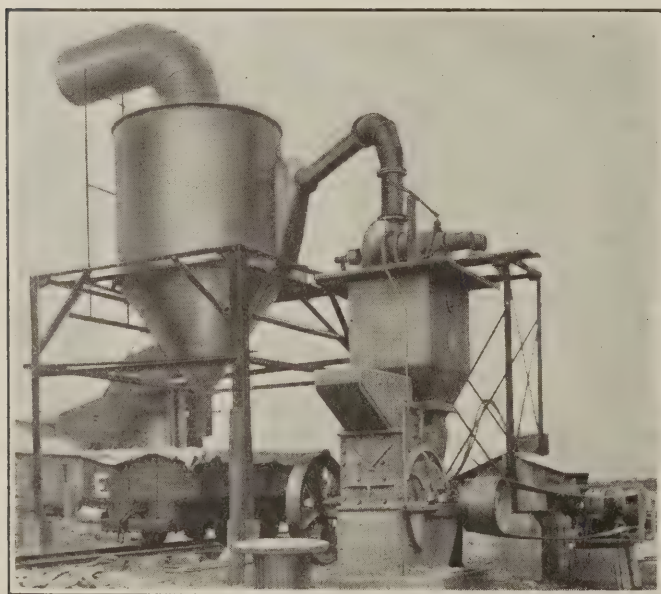
Elevation of a Pulverizing Plant

The cars covered with tarpaulin are run under the bin and receive their load. In this case only one machine is provided, the one unit serving for both crushing and powdering.

illustration, is installed at a point not far from the main shaft. Shale from the mine is hauled by pit car to the pulverizer, broken up into 6-in. chunks by sledges and fed into the hopper by hand by the lone operator. A 40-hp. motor, belt-connected, drives the pulverizer. The fineness of the output of the mill is controlled by opening a bypass valve and closing a deflection gate in the section elbow above the mill. The degree of draft thus created by a 2-hp. motor-driven suction fan determines the fineness of the dust to be delivered through the cyclone collector and discharge pipe into a waiting car lined with tarpaulin.

ALL "OLD BEN" DUST PASSES 150-MESH SCREEN

The only other shale-dust producer in Illinois is the unit operated by the Old Ben corporation. This is a two-stage mill with a capacity of 40 tons of dust per day. Hammer crushers first break the shale into 1-in. cubes and a ball mill equipped with cloth screens and suction fan, grinds the cubes into very fine dust. This plant is at Old Ben No. 9 mine where the shale is considered to be well adapted for the purpose. The percentage of combustible in this shale is low indeed as shown by tests that have been made upon it by the Bureau of Mines. An analysis showed moisture, 1.29 per cent, carbonaceous and other volatile matter, 6.05 per cent, carbon dioxide, 0.48 per cent and ash, 92.18

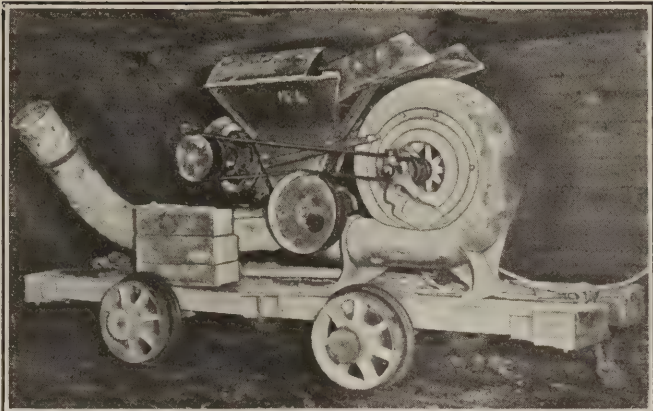


Courtesy American Pulverizer Co.

Pulverizer, Fan and Settling Chamber

The dust as fast as it is pulverized to the right degree is lifted by the draft and drops into the bin. Thus the coarse material is not protected by the fine but suffers all the violence of the pulverizing machinery.

This snail-like machine is rock-dusting roof, ribs and floor of the headings in an Old Ben Mine. The new machine on the same principle will have a double discharge and will completely dust the heading in one trip.



The machine illustrated is operated by two men, treats a heading completely in two operations at the rate of 2,000 to 3,000 lin.ft. per hour distributing 2 to 3 lb. per lineal foot and making the ash content of the mine dust about 65 per cent.

per cent. It comes from the mill all finer than 150 mesh, 97 per cent being 200 mesh and 92 per cent 255 mesh or finer.

Extreme fineness of shale dust for use on roof and ribs is essential in order to get a proper impregnation of the dangerous coal dust deposited there. The removal of such coal dust from mines is a practical impossibility, for the finest of it settles in the most inaccessible places and astonishingly small quantities of it will propagate an explosion. The extent of a dust explosion depends upon the supply of oxygen and not as might be thought, on the quantity of dust. Mr. Jones holds that only 6 or 8 oz. of fine coal dust per lineal foot of passageway is required to satisfy the oxygen per lineal foot, and that therefore, a mine could be exploded over and over again—possibly hundreds of times—merely by refilling it with air after each “blow.” Such facts as these are now realized by engineers in Illinois and elsewhere, and the realization is tending to spread the shale-dust propaganda far and very effectively.

Mr. Jones, in speaking recently before an audience in New York at the meeting of the American Association for Labor Legislation on coal dust explosions and how to prevent them, traced the history of the shale-dust study that has been made in Illinois and described the “Old Ben” system of dusting. He declared that by general and uniform use of closed lights, proper ventilation and inspection of mines and the neutralizing of coal dust with incombustible dust, the dangers of mine explosions will be greatly reduced. The dust hazard, long so troublesome and perplexing, can be removed, he said. In Franklin County, he added, the protection against explosion has been extended to a point where 4,350 of the 12,855 underground men of that county are protected with shale dust and 1,925 with enclosed lights. These figures are expected to be enlarged considerably within the next few months.

A part of Mr. Jones’ paper follows:

Table I—Fatalities From All Causes in Franklin County Coal Mines, 1904-1921		
Cause	Number	Per Cent
Gas and coal-dust explosions.....	203	38.09
Haulage equipment.....	124	23.26
Roof face and rib falls.....	107	20.08
Hoisting and shafts.....	25	4.69
Powder ignition explosions and return to shots.....	22	4.13
Electricity.....	18	3.38
Railroad equipment.....	13	2.44
Falling persons and objects.....	8	1.50
Machinery and mining machines.....	7	1.31
Explosions and suffocation other than by mine gas or powder.....	6	1.12
Total.....	533	100.00

“The Franklin county coal field of Illinois is comparatively new. It was opened in 1904. It now has an annual capacity of nearly twenty million tons. The mines are gaseous, and the coal dust is very explosive. The fatality rate from 1904-1921 was nearly double that of the state for the same period. The difference in the rate was largely due to the fatalities which were the result of mine explosions.

Table II—Gas and Coal-Dust Explosions in Franklin County, 1904-1921			
Cause	Explosions	Fatalities	Per Cent
Gas and coal dust, origin unknown.....	1	51	25.1
Gas and coal dust, naked-light ignition.....	4	99	48.8
Gas, naked-light ignition.....	10	18	8.8
Gas, mine-fire ignition.....	3	32	15.8
Gas, electric arc or naked-light ignition.....	1	1	0.5
Breathing apparatus, after explosion.....	2	2	1.0
Total.....	19	203	100.0
Number of fatalities caused by gas explosions which were propagated by coal dust.....			153
Number of fatalities caused by gas explosions which were slightly or not at all propagated by coal dust.....			50

“The number of fatalities in Franklin county mines from all causes during this eighteen-year period was 533, of which 203 were caused by gas and coal-dust explosions. Table I gives data on fatalities from all causes. Table II shows that three times as many deaths were caused by coal-dust explosions as by gas explosions.

“In Franklin county the progress in preventing explosions has been most encouraging. The chief improvement has been a better understanding of the dangers of gas and a consequent greater respect for it. Formerly, naked lights were often used by fire bosses during their examination, and it was considered a great joke to frighten someone by igniting a pocket of gas. But this is past history in this county. Most of the men employed underground are now aware of the dangers and comply with the regulations made for their safety. One of the chief factors in reducing accidents has been the change from black powder to permissible explosives for blasting.

“How greatly the fatality rate in the county has been lowered from 1904 to 1922 is shown in Table III, in which the first nine-year period of eighteen years is compared with the last nine-year period. The average of the fatality ratings has been reduced to less than one-half those of the first nine-year period.

“On Thanksgiving night, Nov. 29, 1917, the Old Ben Coal Corporation, which now operates nine mines in Franklin county and three mines just across the line in Williamson county, experienced a disastrous gas and coal-dust explosion in Mine No. 11, Christopher, Ill.

Table III—Fatality Rate in Franklin County, Lower Now Than in Previous Decade

Period	Killed	Employed	Killed per 1,000 Employees	Tonnage	Killed per Million Tons
1904 to 1913	156	17,935	8.70	13,965,493	11.17
1913 to 1922	377	88,679	4.25	86,904,726	4.34

This mine is one of the most modern in the United States and was but four years old at the time of the explosion. The mine did not extend at any point any further than 4,000 ft. in any direction from the shaft bottom, and the ventilation was good. The methane content on the main returns has rarely reached 0.2 per cent.

AN OPEN DOOR FILLS HIGH SPOT WITH GAS

"A short circuit of the air current, due to a door being left open at a crosscut 400 ft. from the face of the main east entry, caused an accumulation of gas on top of an abrupt knoll near the face of this entry. This section of the mine was quite wet both inby and outby from this accumulation of gas; the roadways outby being a swamp 300 ft. long which the explosion was compelled to cross before it could extend into any other section of the mine. The percentage of coal dust was exceedingly small in this territory compared with that in the producing sections as the work done was development only.

"As the day was a holiday, only part of the night shift reported for work. Seventeen men were in the mine. One of the men, a pumpman, went to the main east entry to start an electric pump to remove the water from that section preparatory for the next day's work. His carbide naked light ignited the gas.

"The ensuing explosion dried the saturated coal dust in its immediate vicinity to such an extent that an explosion was propagated with intense violence and heat throughout the entire workings, wrecking the mine in every direction, especially close to and in both shafts, instantly killing all the men.

"Had this explosion occurred on the day shift with its 600 men underground, every man would have been killed, and Franklin county would have had the worst mining disaster, if not the worst industrial disaster, of the United States.

"Considering the large volume of air, the apparent absence of coal dust and the wet condition of the territory where this explosion originated, one can easily understand that a dust explosion is always imminent in a gassy mine and that it is futile to hope to prevent the propagation of an explosion by cleaning or sprinkling the mine workings.

"This experience caused the officials of the Old Ben Coal Corporation to lose the little faith they might have had in the theory of watering and cleaning to prevent coal-dust explosions.

"The explosion also forcibly impressed them as to the hazard of naked lights, especially in a gaseous mine where the forgetfulness of one out of 600 employees might result in leaving a door open for considerable length of time or cause other derangement of the ventilation, permitting the accumulation of the explosive gas or the entrance of a miner with a naked light into a forbidden and gassy place.

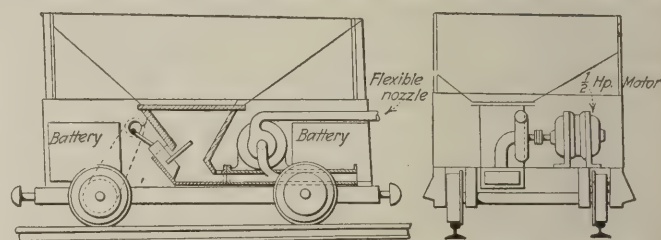
"D. W. Buchanan, president of the company, decided from that time on to use enclosed lights and shale dust. When the mine where the explosion occurred resumed operations, it was on a strictly enclosed-light basis.

This, however, was following a three months' strike by the miners against the enclosed lights. The company now has three mines in which only enclosed lights are allowed to enter night or day. In the other mines enclosed lights are used to the exclusion of all others from the quitting time of the day shift until starting time the following morning.

"The methods of preparing and placing shale dust were given much study. From a representative mine of the company samples of dust and air were collected by a Bureau of Mines engineer and these samples were sized and analyzed by the Bureau of Mines.

"Voluminous analyses showed that the most dangerous dust is laid along aircourses, at the working faces and on the roof and ribs of haulage roads and that the dust along the floor of the haulage roads is generally so high in ash that it is not nearly so hazardous as the other accumulations of coal dust.

"Five tons of coal were also sent to the Bureau of



Courtesy American Pulverizer Co.

Suggested Rock-Dust Distributor

One pair of wheels keeps the dust in the hopper loose so that the fan can draw in the dust and expel it.

Mines' experimental mine from this representative mine to be ground into dust and subjected to experiment to determine its explosive properties. A commission of mining men from the state of Illinois and the Old Ben Coal Corporation were present at the Bureau's mine during part of the experiments. These tests showed in part, that Franklin county mine dust, containing 42.82 per cent of incombustible matter with no gas present, actually propagated an explosion, and that mine dust containing 58.66 per cent of incombustible matter with no gas present did not propagate an explosion.

The test also showed that dust containing 58.17 per cent of incombustible matter with 1.1 per cent methane present and dust containing 66.72 per cent incombustible matter with 2.2 per cent methane present both propagated explosions. It was demonstrated also in the experimental mine that the flame of an explosion could be successfully extinguished by rock dust that had been placed in Taffanel and concentrated barriers.

"The first problem in the rock dusting of the mines was to find material that would make an acceptable dust. Limestone dust was purchased, but this was found to be too coarse and to contain too much siliceous material. Surface road dust was also tried but it was found that a small quantity of moisture would cause this dust to cake and cease to act as a dust. The shale overlying the coal seam was analyzed and found to be exceptionally suitable for the purpose, hence the name, shale dust.

"Old Ben Mine No. 9 was chosen as the logical mine from which to obtain the shale and prepare the dust because of the cage-equipped material shaft and the adequate railroad connections for the field. A mill for the grinding of the shale into dust is installed at this mine. It has a maximum capacity of 40 tons of dust per day.

“Early in the mining experience of the county it was learned that the panel system of mining was that most favored for the localizing of explosions and mine fires. The panel system, where the panels are not connected to each other, gives a unit system of mining whereby each unit or panel is a territory by itself with unbroken coal pillars between it and all other units or panels, the only openings being those where the two entries connect with a pair of main headings for ventilation and haulage. The distance from one pair of panel openings to another pair is usually 500 ft.

“As the purpose of the shale-dust installation is to localize explosions, these two entries are the most important ones in which to install dust. An explosion cannot get into or out of a panel without passing through one of these two openings. Therefore, the shale dust is installed from the first room on each panel back to the entries from which the panel is turned and along these entries for 100 ft. in each direction, the trackless passages being provided with shale-dust troughs and the haulage roads having the roof and side walls coated with the shale dust. In addition to this protection each set of panels is protected by an ‘Old Ben’ concentrated barrier.

“Possibly of no less importance is the protection of all haulage roads and aircourses. Haulage roads are protected with the concentrated barrier at intervals of 500 ft. or less, the aircourse opposite the barrier having the trough installation. In addition to this protection the shale dust is now being mechanically applied by small portable high-speed fans to the roof and side walls of all the haulage entries and is being blown into aircourses to be carried into the mine and deposited, all

this giving a high incombustible content from the shaft bottom to Room No. 1 of each panel.”

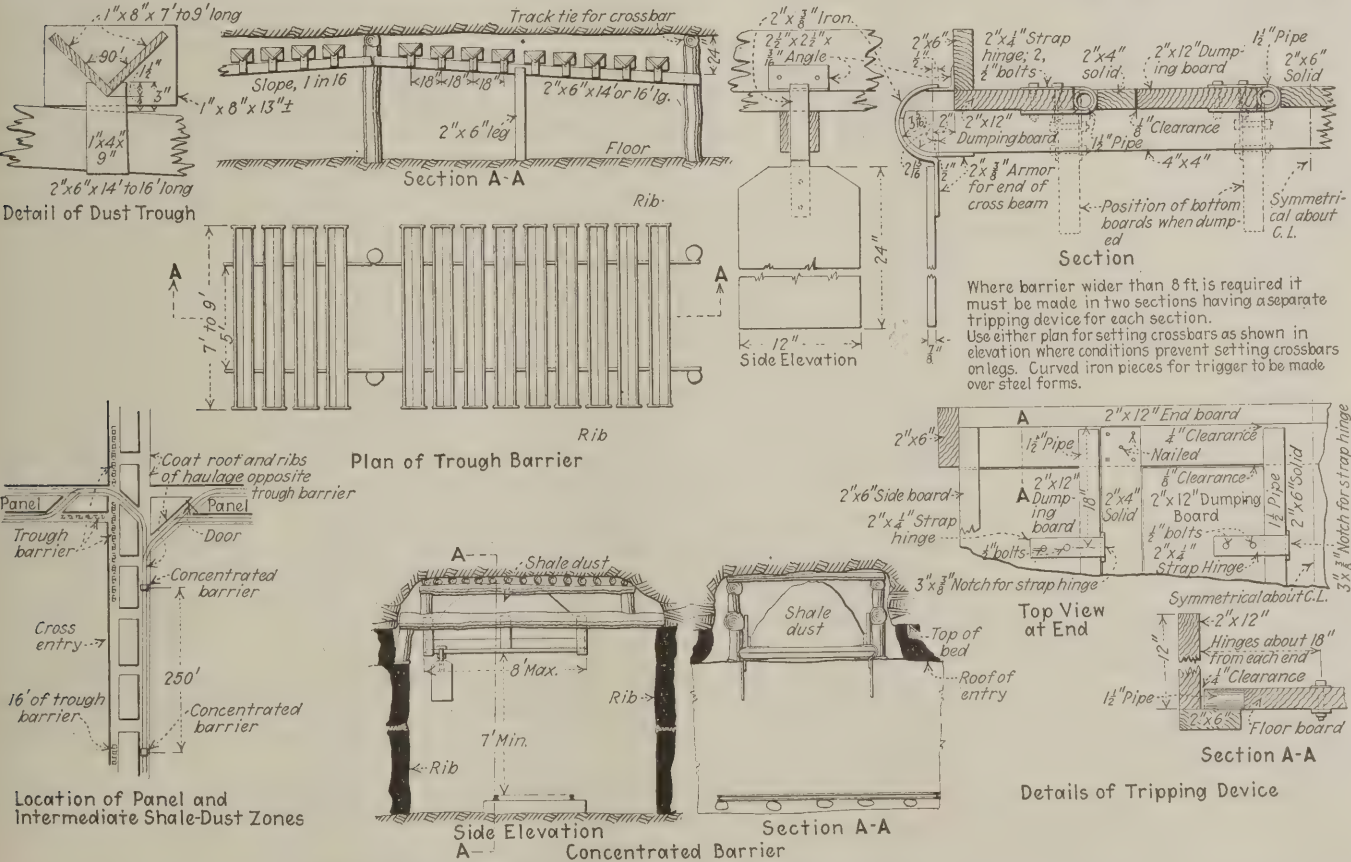
Mr. Jones in his address also described the “Old Ben” concentrated barrier, the V-shaped shale trough, the shale platform, and the distribution of dust on roof and ribs as follows:

“OLD BEN” CONCENTRATED BARRIER

“The ‘Old Ben’ concentrated barrier has been designed with two purposes in view: (1) Placing in suspension a large quantity of the shale dust in as simple a manner as possible by the action of an explosive force, and (2) making certain that even though the device should be tripped accidentally or mischievously no part of it would fall a sufficient distance to injure a person who might be under it or endanger those on moving trips while approaching or passing under a barrier.

The barriers are built in roof cavities dug for that purpose and hold from one and one-half to three tons of dust. The bottom of the barrier is usually approximately in the same plane as the roof. The bottom, or floor, of the barrier is made of several, usually four to six, 2x12-in. or 2x14-in. planks, each plank being approximately 6 ft. long, dependent upon the width of the barrier.

Each of these planks is hinged on one edge, this hinged edge resting on the sides of the barrier. When free to move, the width of the plank hangs vertically. The floor, when the barrier is ready to be filled, is in a horizontal plane, the free-moving edge of all the planks being held in place by a beam which rests on two trigger vanes. Each of these vanes may be tripped from either direction, the displacing of either vane



Devices Used by Old Ben to Rain Powdered Rock on a Coal-Dust Flame

The troughs are used on roads that have no tracks. Concentrated barriers are installed on main haulageways. These latter are upset whenever the blast from either direction strikes a projecting vane. The dust in the troughs is not spoiled by mois-

ture as readily as that in the roadways and is always ready for action. Besides its location above the roadway makes its distribution at the right time more certain and more intense. Prompt and positive release is secured by vane triggers.

causing the floor of the barrier to swing down about 10 in. and permitting the dust to flow down through the openings thus made in the floor. The flow of dust continues for ten to twenty seconds and gives a dense dust screen over the entire cross-sections of the passageway.

DUST TROUGHS UPSET WHEN BLAST OCCURS

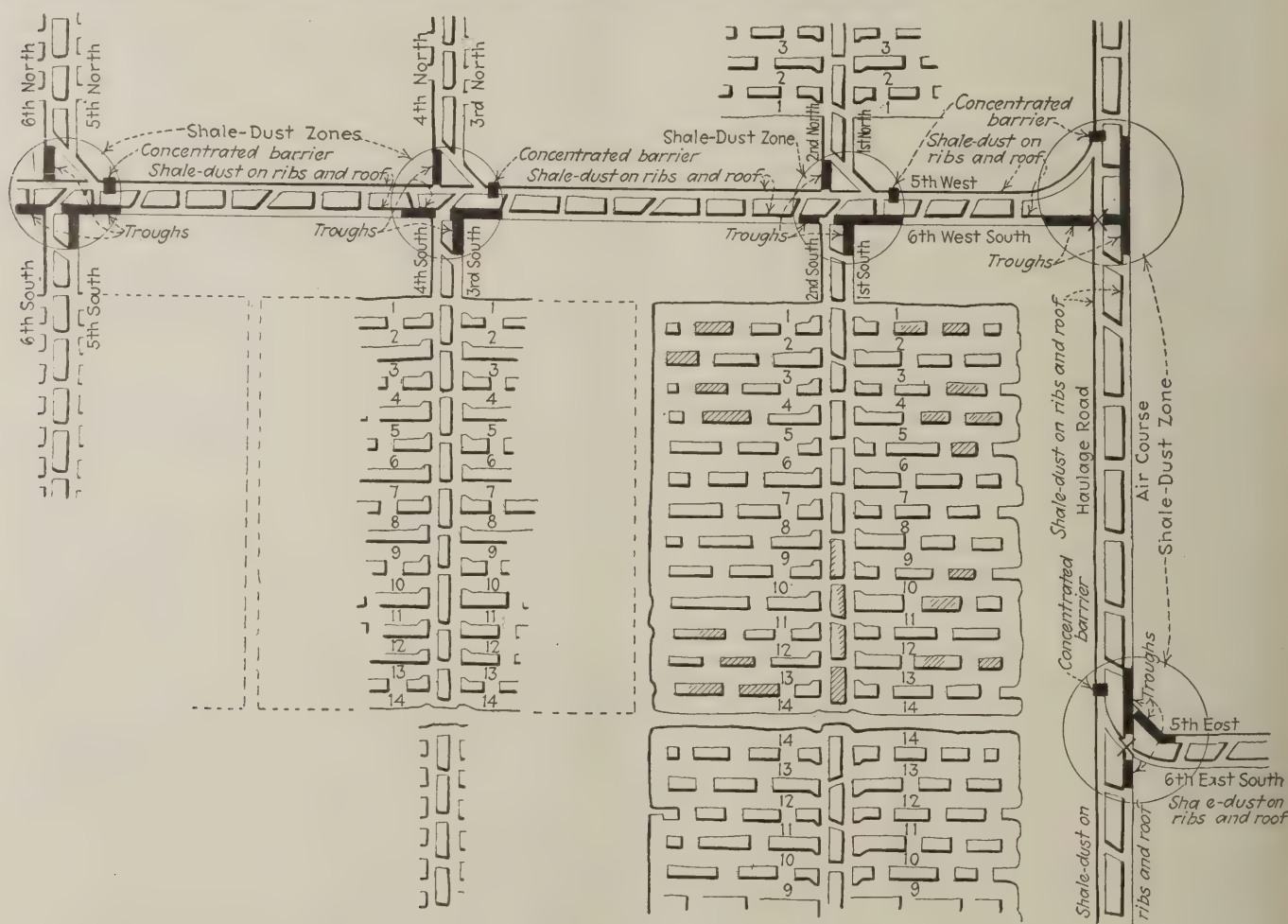
The shale-dust trough is V-shaped and made from 1x8-in. lumber. It is from 5 to 8 ft. long, the length being dependent upon the width of the passageway. The troughs are filled with the dust, from 50 to 80 lb. being placed in each. They rest on two small notched pieces of wood which have been nailed to framework. The troughs are placed close to the roof yet have sufficient clearance to that a slight explosive force will upset them and discharge the dust.

A violent explosion would, of course, tear out the entire installation but with a slight force the trough will turn part way over in the direction of the force, retaining about one-third of its dust to be thrown in the opposite direction should a reaction of the explosion occur. As the troughs are installed close to the roof an explosion causes a dense dust screen to be formed in the entire cross-section of the passage way. Placed in this position they give the least obstruction to ventilation and to the travel of persons. Wherever concentrated barriers are installed on the haulage road shale-dust troughs are installed in all trackless passages

of adjacent parallel entries to give a complete barricade of shale dust.

"On haulage roads in the shale-dust zones the dust has been thrown on the roof and ribs by hand, a large percentage of it falling to the floor. Because of the extreme fineness of the dust a large part of it is carried along the entry by the air current, settling on timbers, ribs, roof and bottom for long distances from where it is being spread. Recently the dust has been distributed successfully by small high-speed portable fans, the dust being fed into the intake of the fan and conducted by a hose of large diameter. By this means the dust has been deposited at any point desired. This method is so efficient and its cost so light that it bids fair to offset the necessity for the large number of concentrated barriers now in use in each mine.

Elevated platforms are usually made from broken and discarded ventilation doors and stand from 2 to 4 ft. above the floor. The principal purpose of these platforms is to supply additional shale dust in the event of an explosion and the secondary purpose is to give a supply of dust for refilling of troughs. When shale dust is stored on the mine floor much of it is wasted because the dust absorbs moisture from the fireclay and becomes mud, or is trampled into a solid mass that would prevent it from being thrown into suspension. The closer to the roof the dust is stored the greater the possibility that it will be thrown into suspension quickly in the event of an explosion."



How Old Ben Lays Out Mine in Panels and Guards Portals with Shale Dust Zones, Concentrated Barriers and Dust Troughs

The mouth of each panel is regarded as a point at which an explosion if generated must be stopped or it will involve other headings. Consequently it is arranged that if the flame of the explosion tries to leave by either main or back entry it will be promptly extinguished by a deluge of dust.

How to Get Big Output From Loading Machines

Plans That Enable Loaders to Keep Working Steadily but Which Do Not Involve Radical Reconstruction of Mine Workings or Abandonment of Room-and-Pillar Methods

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Consulting Engineer,
Franklin, Pa.

BY THE use of mechanical loaders the labor expense of producing a ton of coal, now averaging about 70 per cent of the whole cost of production, may be cut down to such a degree as to lower the cost of the coal delivered on the railroad car under the tippie by as much as 40 to 50 per cent.

The advantages inherent in the use of mechanical loaders may be briefly summarized as follows: An increased tonnage per man per day; an increase in efficiency throughout the entire operation of mining as the result of a concentration of workings; an increased speed in undercutting because of a more definite cycle of operations; an increased tonnage per pound of explosives used; a decrease in haulage costs because of concentration of mining operations; a decrease in the quantity of timber used because the work progresses rapidly; a decrease in the cost of ventilation and drainage made possible by a reduction in the number of working places; an increased extraction of coal resulting from the more rapid advance of the work; a reduction in overhead expense rendered possible by a more uniform daily output and a decrease in the number of accidents sustained due to better supervision made possible by a concentration of working areas, which in turn results in lower insurance rates.

AN ANALYSIS OF CONDITIONS IS NECESSARY

Having decided to use these machines a careful analysis of the physical conditions in coal bed and workings should be made, for here, as in other industries, any improvement in methods or apparatus inevitably requires such modifications and changes as will enable the new device to function at maximum efficiency. This does not imply any drastic departure from methods proved suitable for hand loading. On the contrary, it would not be advisable to reconstruct the mine, for a settled policy can be reached only after long and careful study of local operating conditions. However, inasmuch as the change from old to new methods is made for the purpose of accomplishing certain specific results, so far as possible conditions should be modified to suit the new arrangement.

Attainment of steady production is largely dependent upon the adaptation of the machine to each particular problem. This application must necessarily be evolved by the operating personnel of each property. Realizing how greatly working conditions vary throughout the coal-producing fields and the impossibility of formulating any set rule of operations applicable to all districts, the following fundamental suggestions covering mechanical loading are offered.

The generally accepted plan of coal development throughout the United States is some form of double-entry room-and-pillar system. Although this plan is employed in approximately 98 per cent of the producing mines of the country, the variations and modifications

introduced are innumerable. As longwall mining was originated for use in thin beds, it has not been necessary to apply it in this country, except in a few instances.

The simple room-and-pillar system, either in panels or otherwise, and either advancing or retreating, together with hundreds of variations employed for recovering the pillars is well adapted to the extraction of coal so long as such a comparatively slow method as hand loading is adopted. Mechanical loading makes it possible to increase greatly the speed of mining. A modification of the present methods, without drastic departure from the general plan, will meet the physical conditions encountered, while at the same time it allows the machine to operate at maximum efficiency.

Underground transportation is an important factor in the cost of coal. Without proper equipment, coal cannot be economically gathered and delivered to the surface. Similarly, without proper track arrangements the time lost in car shifting may readily absorb the entire margin of profit. Consequently a few suggestions concerning track maintenance and equipment with particular reference to their relation to mechanical loading will not be inappropriate. Favorable grades and a firm, well drained track are primary requisites of any economical haulage system. Rail of adequate weight to carry the expected load should be permanently laid on all main haulways. It is false economy, regardless of its first cost, to install a rail too light to carry the maximum load. Although local conditions govern the gage of mine tracks, it is well known that the wider the gage the greater will be the stability of the rolling stock. In order to avoid derailments and other accidents, the track should be constantly maintained to gage and in alignment.

Tie sizes are governed by rail weights and track gage. Ties should be selected, however, to give the minimum maintenance cost. For track that must be

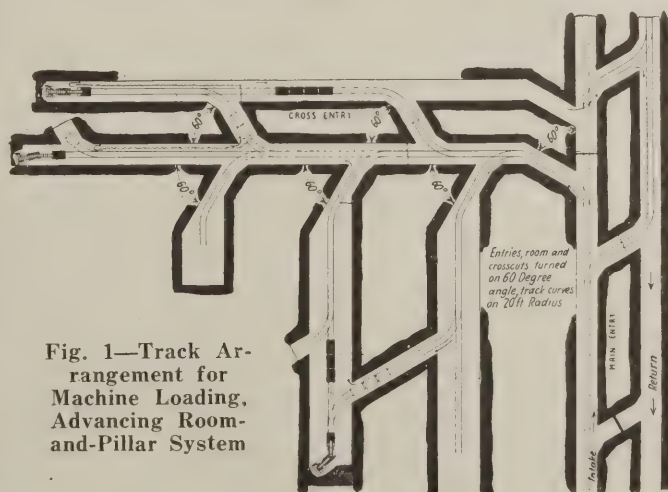


Fig. 1—Track Arrangement for Machine Loading, Advancing Room-and-Pillar System

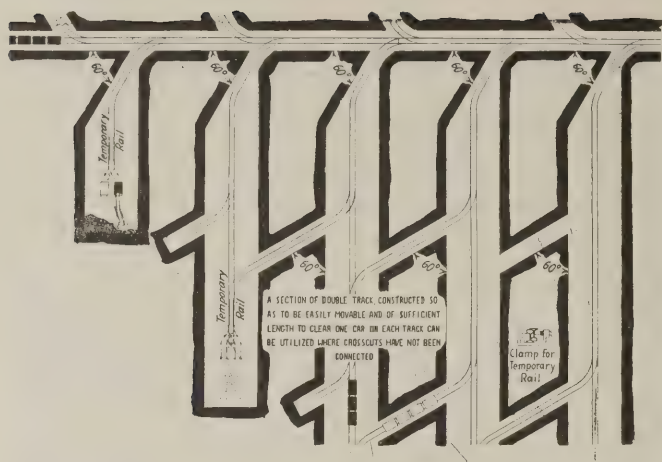


Fig. 2—Trackage System for an Advancing Machine-Loading Panel

This shows how the tracks may be utilized to afford storage for both empty and loaded mine cars. All cross cuts and rooms are turned at a 60 deg. angle.

frequently moved, steel ties should be employed. The additional headroom afforded by their use and the ease with which sections of such track may be moved or replaced well warrants the first cost of this equipment. Track curves should be laid on standard radii. To promote smooth transportation, as well as for easy movement of loading machines, the radii of curves should be more ample than are usually found in average practice. Adoption of a standard curve with a minimum radius of 20 ft. will be beneficial.

Switches, frogs, guards and curved rails in general should be standardized, and whether made up in the shops or purchased, should be delivered underground ready to put in place. Where electric haulage is used, the track should be carefully bonded. Trolley-wire supports and insulators should be standardized, thus reducing power losses. Local conditions dictate the size of mine cars that may be used. As a general rule, however, the initial investment necessary for a large size of car is more than compensated by lower cost of maintenance and an increase in the tonnage movement. The possibility of reducing frictional losses by the utilization of anti-friction bearings is well recognized throughout the industry. The weight, size and type of locomotives to be used is governed by local conditions, gradients, size of trips and length of haul. All rolling stock, but particularly locomotives, should be systematically inspected and repaired.

LITTLE CHANGES THAT MAKE LOADING EASY

So much for the general principles of mining and transportation. An analysis of a few arrangements and systems that have proved successful with machine loading will now be attempted. In Fig. 1 is shown the plan of a mine section during the early stages of development. All cross-entries, room necks and crosscuts are shown turned on angles of 60 deg. This promotes the easy loading of coal from room necks and crosscuts, facilitates the laying of curves on a minimum radius of 20 ft., and permits the easy starting of heavy trips. All points on chain pillars and room necks near track curves are slabbed sufficiently to allow clearance.

The advancing, main and back entries are shown connected by crosscuts at a point near the main cross entry thus forming a local empty and loaded storage track. A run-around is also utilized in the advancing

entries to provide similar storage. The same system is followed in driving rooms by placing track in room crosscuts. In narrow work in the room-and-pillar system the tonnage output per loading machine increases inversely with the time lost in changing cars; that is, it decreases as the distance from the nearest siding is lessened.

Fig. 2 shows a suggested track arrangement designed for machine loading, and the manner in which these tracks may be utilized for mine-car storage. In this plan, all room necks and crosscuts in the panel are turned on angles of 60 deg., and all track curves are of 20-ft. radius. Four rooms are shown with crosscut track connections designed so as to permit the greatest flexibility in transportation facilities.

CROSSCUT TRACK MOVED AS WORK ADVANCES

As rooms are advanced and crosscuts connected, the track is removed from the last crosscut and replaced in the new one. This provides car storage at a point close to machine operation. A double-track arrangement so designed as to be easily removable and of sufficient length to clear one car on each track may be used in wide entry and room work to provide a car storage at the machine.

This section of track should be rigidly constructed so that by attaching a chain to it and to the loading machine the entire "Y" may be moved forward in the room or entry by the machine. In order to advance this section as required, temporary rails are joined to the permanent track on one end and to the "Y"-section on the other by means of quick-acting clamps designed for this purpose. A detail of these clamps is also shown in this figure. By the use of this simple track arrangement the time necessary for changing cars at the machine can be materially reduced.

Fig. 3 shows a suggested modified retreating panel-and-wall system of mining for use with loading machines. In mining a block of coal containing, say, 40 acres, the thickness of the cover, the condition of the floor and roof, as well as the character of the coal itself, may demand extraction by some method that will allow one-third to be taken on the advance and two-thirds on the retreat. Rooms may be driven on 72-ft. centers with a width of 24 ft. and pillars then pulled; or, rooms may be driven to their limit on 72-ft. centers with a width of 12 ft., two slabbing cuts taken for the entire length of each room, and pillaring operations then commenced. In either case the weight per square foot remains the same at the completion of first extraction.

However, when the roadways are driven only 12 ft. wide, they are no longer like rooms but more closely resemble single entries. In many mines they need no timber and when they are completed the rib on one side can be treated as a longwall face, thus permitting the mechanical loader to be operated for the entire length of the room. In consequence, it can handle a large tonnage, and the transportation units are enabled to work under the most favorable conditions. The same principle can be applied to mines where, owing to squeezes and creeps, it has not been found possible to draw the pillars satisfactorily. The pillars can be slabbed till a crushing strain develops. The rest of the pillar can be left. In this instance, however, the distance between room centers may be increased, the original room widths may be narrowed and a number of slabbing cuts may be

taken throughout the entire length of the panel before abandonment is necessary.

This application is shown in detail in Fig. 3, as a modified retreating panel of any length and width, developed from double main and cross entries. All narrow work is turned on angles of 60 deg. and the minimum radius of the track curves is 20 ft.

Ventilation as indicated in this plan consists of a separate split for each panel. This is taken from the intake through the main cross entries and through rooms, where regulators may be installed. The air is next conducted through the back cross entry to the main return which is overcast at cross-entry intersections. In driving the narrow rooms through the panel before connections are made, portable blowers and flexible tubing may be utilized to furnish air to the faces.

Narrow rooms, Nos. 1, 2, 3 and 4, are shown developing. This work is prosecuted from the cross entry which has a parting of adequate length to accommodate narrow-work switching. These rooms, however, are driven of sufficient width to permit a movable double-track "Y" to be used at the machine as shown in Fig. 2. Room No. 5 is shown connected through and with the first wall cut practically cleaned up. A loader with gathering head parallel to the cut delivers coal to a large trip of cars, while the mining machine is making its second cut on that portion of the wall that has been uncovered by the loader.

Room No. 6 shows the second wall, or slabbing cut, being loaded out and the third wall cut being prepared for drilling and shooting. Room No. 7 is operating on the sixth cut. Solid lines indicate the present position

of the track, and dotted lines indicate its former positions. As shown, the tracks are moved over toward the rib after each two slabs have been loaded out.

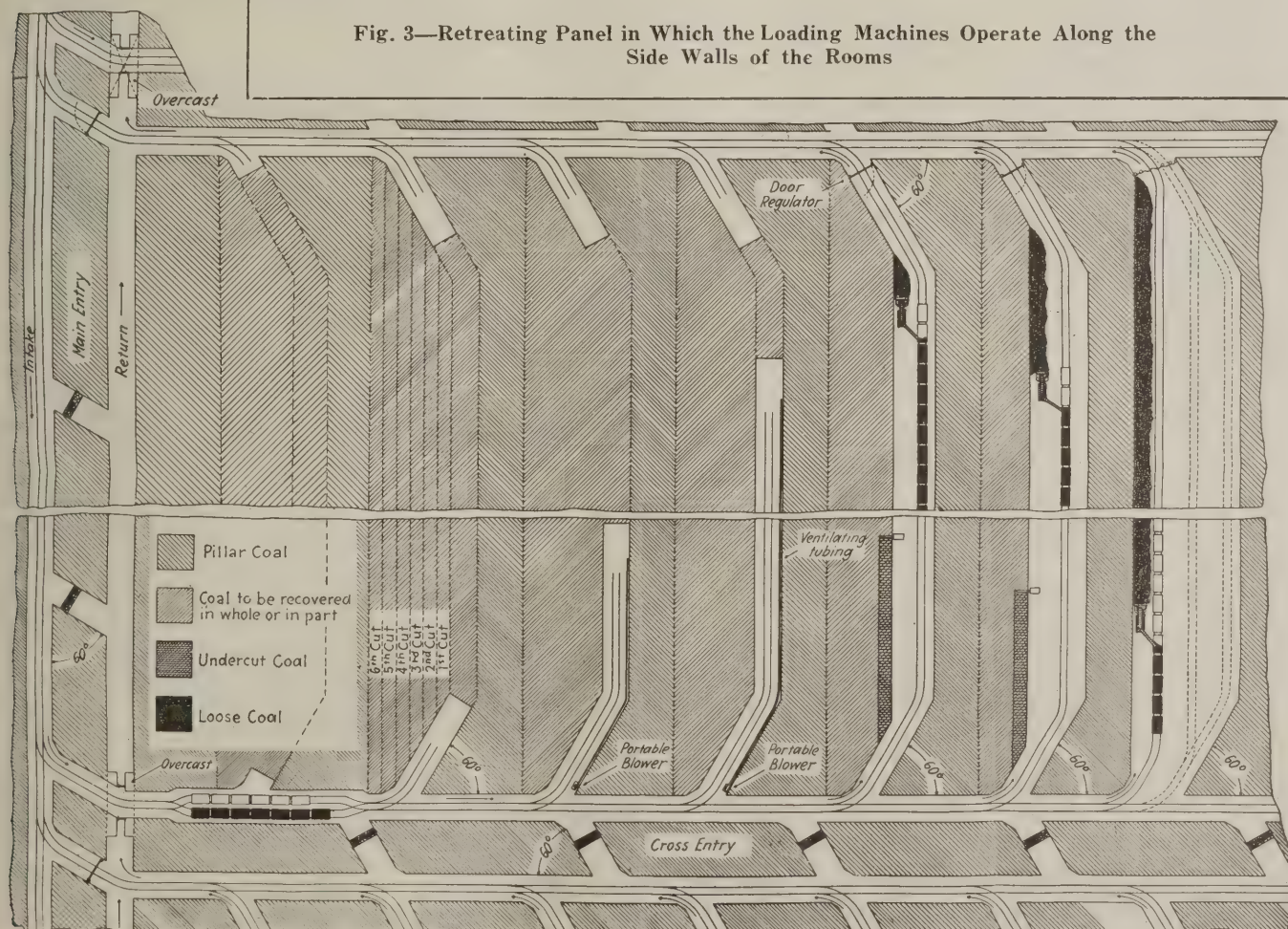
SLABBING CUTS FACILITATE RAPID LOADING

It is easy to see how this method facilitates the problem of transportation. At each cut empty cars are loaded in a continuous trip without any delay. They are hauled out on one side of the panel, and a second trip is brought in from the other side. The delay between trips, however, is insignificant, for the second trip may be standing ready to replace that which has been loaded.

A continuous movement of empty cars past the faces can be arranged in operations of this character. By this means the time lost in car or trip changing may be reduced to a minimum. That the reader may be enabled to compare the tonnages ordinarily obtained by hand methods with those obtained by this system, it may be said that where 6-ft. cuts were made in 6-ft. coal 800 tons were loaded by machine in a single eight-hour shift. Where a system of this kind is applied to operations where the total extraction of the coal is not customary, an uninterrupted car movement can be obtained. In such cases the coal can be mined at an extremely low cost.

Fig. 4 shows a room-and-pillar method suitable to the operation of loading machines, the rooms and the pillars both being worked advancing. This system is suited to thick beds such as are found in the West. The section of mine to be operated in this manner is developed by main and back entries which are used as intake and return aircourses respectively.

Fig. 3—Retreating Panel in Which the Loading Machines Operate Along the Side Walls of the Rooms



From these are turned pairs of right and left cross entries carrying air splits. All cross entries, room necks and room crosscuts are turned at 60 deg., and the track curves are laid to standard radii. From the main cross entry, rooms are driven to their limit on centers the distance between which is determined by local conditions. Room tracks are connected through the crosscuts nearest the working faces giving maximum flexibility of transportation.

A loading machine is shown in operation in the last crosscut of room No. 6, utilizing for the storage of empty cars that portion of track extending past this crosscut. The track laid in the nearest crosscut outby forms a storage place for loaded cars. Another loader is shown operating in the face of Room No. 5, using the last crosscut for empty storage and the one nearest to it for loaded cars. In both instances, incoming empty trips as well as outgoing loads, can be delivered to, or pulled from, the storage tracks by the main-haulage locomotives. The cars can be changed at the loading machine by a lighter switching locomotive.

As the distance to be covered in shifting both loaded and empty cars is reduced, the mechanical loader can deliver a maximum tonnage per room per minute. Where the condition of the roof is unfavorable, the distance between room crosscuts should be made such that pillars may be drawn by the usual method of cutting a crosscut near the end of the room pillar and then reducing the small detached pillar thus formed by cutting toward the inby edge of that pillar until it is reduced to the required thickness. The stump thus formed may be

either left standing or drawn by hand. The pillar ends may be arranged to conform to the usual saw-tooth fracture line. However, with favorable roof and floor conditions the plan shown probably will give satisfactory results.

When the first room has been completed and the last crosscut in it has been driven, slab cuts successively may be taken beyond the room and crosscut into the barrier pillar protecting the next cross entry till the pillar has been reduced enough to bring it to the thickness required. An example of this method of removing the first portion of the pillar is shown between rooms No. 4 and 5.

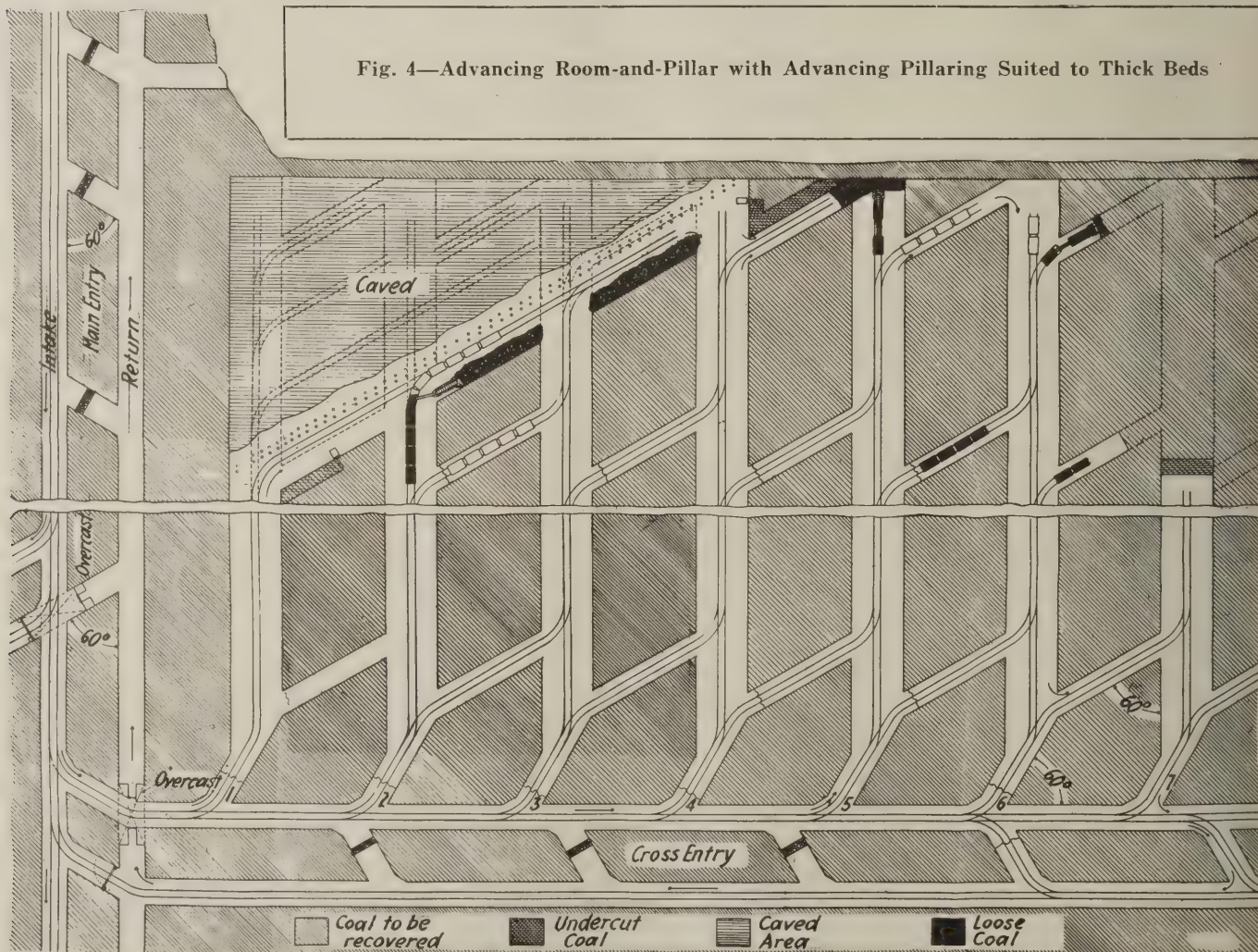
When pillaring has been started in the manner just described, the undercutters take slabbing cuts on the retreating side of the last crosscut until a sufficient area has been extracted to permit of caving the roof. Both cutting and loading machines may be protected by a break line of props wherever local conditions demand such protection.

CONTINUOUS BREAK LINE MAY BE ESTABLISHED

Loading tracks are moved forward after every second retreating cut. New props are then set, and the old break-line props pulled. After a sufficient distance has been gained, a break line, presenting in effect a continuous face of pillar cuts, may be established.

By this means the undercutters are afforded cuts two or three times longer than in room faces. By properly arranging the cycles of operation the work may be performed with maximum efficiency, as little time is lost in

Fig. 4—Advancing Room-and-Pillar with Advancing Pillaring Suited to Thick Beds



moving from face to face. The mechanical loader operating with its gathering head parallel to the cut, moves into position at one end of the face and continues loading throughout the entire length of the cut. Connecting the face track with the room track will allow the loader to fill an entire trip without interruption. As the time consumed in changing trips should not be materially greater than that employed in changing single cars, it is obvious that the total operating time of the machine will be greatly increased.

Though this method of operation is based primarily on the standard room-and-pillar system of mining by the introduction of a slight variation from usual custom, a condition is secured that meets the physical characteristics of the deposit and at the same time allows the loading machine to operate at maximum efficiency.

Fig. 5 shows a suggestion for a retreating panel system of mining, adapted to machine loading. Development is made from headings by single entries driven at an angle. This plan is suited to transportation from the faces by either cars or conveyors. This system may be adopted with any standard or modified entry system of development. The size and shape of panel, and the angle at which the single entries are turned are governed by local conditions.

In this plan is shown a double main and cross entry for haulage and ventilation. With the exception of the single entry developments off the cross heading, which are turned at 45 deg., all openings are turned at an angle of 60 deg., and all track curves are laid on radii at 20 ft. Here again the main and back cross head-

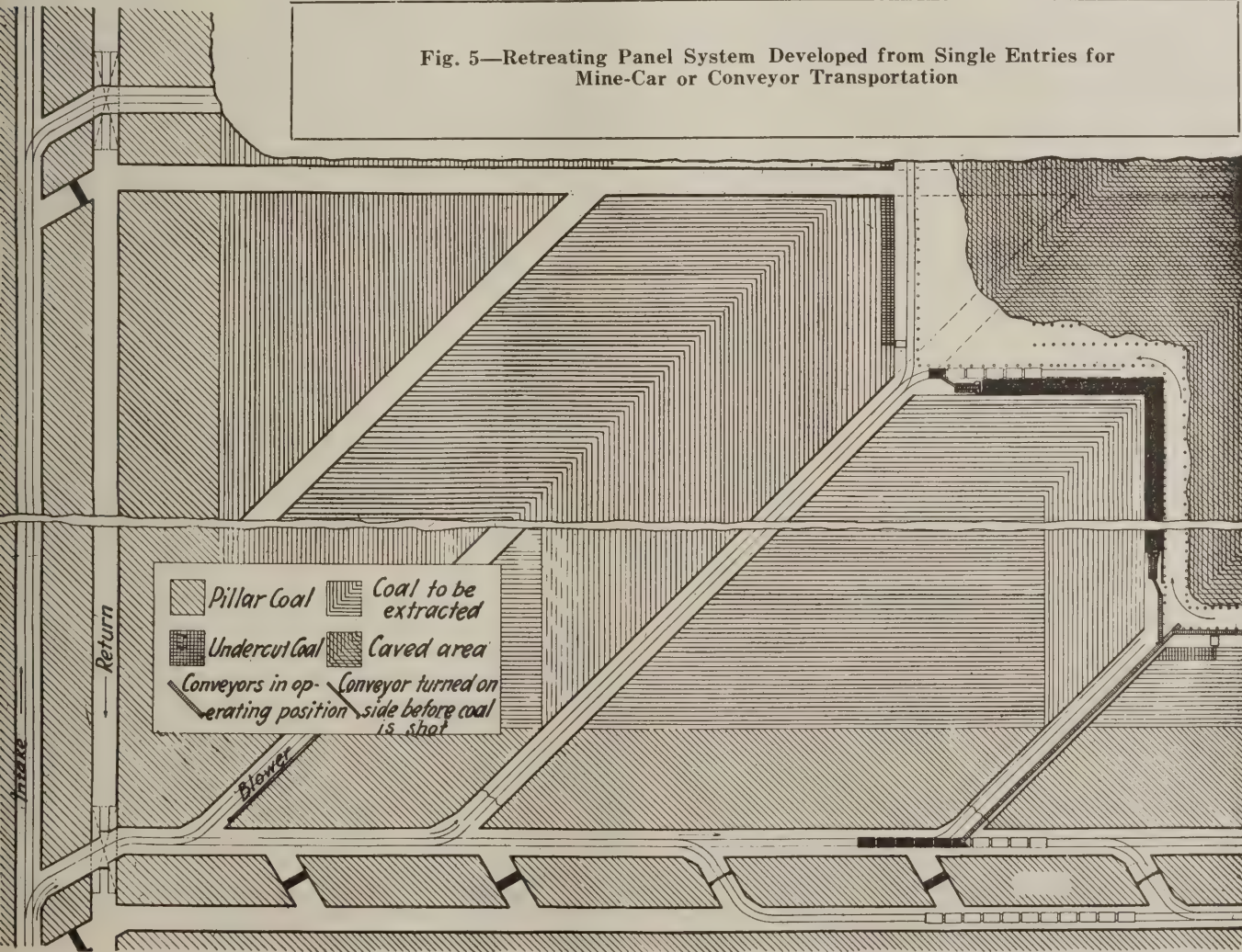
ings are shown connected through the crosscuts by a track arrangement that forms loaded and empty storage.

The entries are driven on such centers as to afford the greatest possible length of retreating face allowable under local working conditions. These entries are driven of sufficient width to permit of the use of the two-car, double-track "Y." Ventilation is supplied by portable blowers placed at the main cross heading, which supply air to the face through tubing or ventilating pipe.

When the single entries have been driven through to the panel boundary, cuts are taken on each side of the connection, to give the angle at which faces are to be carried during retreat. The method of timbering and spacing of props at the faces, together with the system of caving and the maintenance of the break-line, may be determined according to local operating conditions. In this instance single entries are shown turned on an angle of 45 deg. from the main heading on approximately 166-ft. centers; or, at points in the main heading about 260 ft. apart. This gives a pillar thickness of 154-ft. Retreating faces are shown at an angle of 45 degrees to the angled entry, or 90 deg. to the main- and cross-entry development.

SAW-TOOTH PILLAR POINT YIELDS BIG TONNAGE

Maintaining the saw-tooth arrangement on an angle of 45 deg. from the single entry, gives a 100-ft. face on each side of the retreating block. At this angle, faces aggregating 200-ft. in length are obtained from a block 166 ft. wide. Assuming that one full cut 6 ft. deep



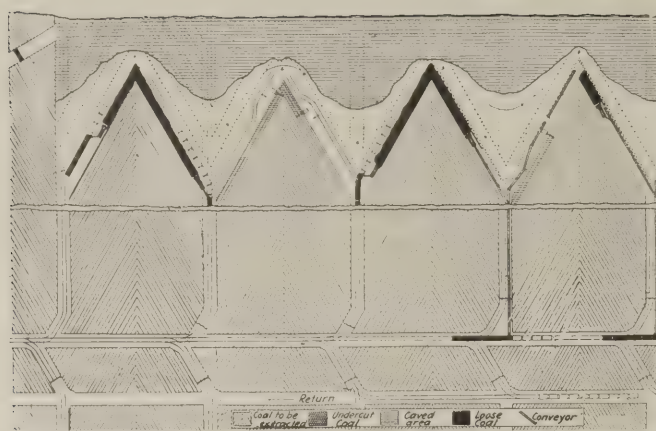


Fig. 6—Panel Developed by Modified V-System

This plan is adapted not only to loading machines but to either mine-car or conveyor haulage. High-output, low-cost mines in the future will doubtless use conveyors.

is made on each face per day, in a 6-ft. bed, the block would produce 266 tons. This operating concentration, made possible by a slight variation from the practice customary in panel work, greatly increases the speed with which the coal is extracted and enables the mine to be operated efficiently. Although this system has been advocated recently as a means of transporting coal from the faces by conveyors, it is well adapted, where physical conditions will permit, to mine-car haulage.

Fig. 5 shows a single entry with its tributary faces operated by mine-car haulage and another operated by face conveyors with a main conveyor extending to the heading where the coal is discharged into trips of cars. In both cases mechanical loaders are shown operating with their gathering heads parallel to the cut, and their discharge conveyors filling a trip of mine cars in one case and delivering coal to a face conveyor in the other. By the use of large trips the time of changing is materially decreased. When a sufficient length of track is not available at the face, or when the necessity for timbering will not permit the width necessary for track and car clearance, conveyors provide continuous transportation to headings where uninterrupted trip loading may be effected. By the adoption of this method to retreating panel work the loader is given an opportunity to accomplish the results for which it was designed.

Fig. 6 shows a suggested modified panel, "V"-system adapted to machine loading and to transportation from faces by either cars or conveyors. This is a further modification of the retreating-type panel, and was recently presented to the coal industry as particularly applicable to conveyor haulage. Its advantages, however, may be realized also when mine cars are used and it is well adapted to machine loading.

As in Fig. 5 the size and shape of the panel, and the angle at which retreating faces are carried, should be governed by local conditions. As here shown the V-system is developed from double main and cross entries. Main and back cross entries are connected through crosscuts by an arrangement of track affording storage for both empties and loads. Single entries are driven on such centers as will give the desired width of block, and length of angle face. Ventilation is supplied to single entries by small blowers.

Upon completion of single entries through the first section of the panel, angle cuts are taken on each side and face operations commenced. As noted in the explanation of Fig. 5, all detailed methods of operation

such as timbering, caving, establishing a break-line, etc., can be adapted from local practice.

The V-system, as illustrated in Fig. 6, is operating on 60-deg. pillar points, giving 120-ft. faces at an angle of 30-deg. to the single entries, which are driven on 132-ft. centers. This gives a double face, each face being 120 ft. long, for a 120-ft. pillar width. Thus the length of the angle face is twice as great as that of a straight face across the same pillar. One 6-ft. cut per day, in coal 6 ft. thick, will yield 160 tons per face, or 320 tons per section.

In Fig. 6, section 1 shows in detail the method of operation for mine-car transportation. The trackage arrangement is shown in solid lines for its present location, and broken lines indicate its former position. This particular section is shown with the track moving forward upon completion of two face cuts. This distance will, however, depend upon roof conditions.

LOWEST COST CAN BE ATTAINED WITH CONVEYORS

Section 2 shows how the cutting machine is operated. Portions of the track are in this case moved up after each cut. Section 4 is designed for complete conveyor transportation, and shows a cutting machine operating on one side and a mechanical loader on the other. Entries bounding this section are equipped with conveyors from angle faces to main entry, where mine-car trips are loaded. It is not unreasonable to expect the large-tonnage, low-cost mines of the future to be completely equipped with conveyors.

Face conveyors are shown built in sections. These may be turned on edge with their bottom plates toward the cut and the flight-face against the props before shots are fired. This is done to reduce the roof span in tender sections to a minimum, as only 8 ft. is needed between props and the new face to allow clearance for conveyors serving loading machines. The clearance between props and loading faces, in all operations where mechanical loading is employed, may be materially increased on account of the speed with which faces move forward.

This progress will result in an increased extraction from any given area, and allow a temporary increase of the roof span needed. As coal is loaded from the space between the conveyor sections and the face, each succeeding section as it is uncovered is turned to running position, and the tonnage continually delivered from the machines as they advance. The sequence of cutting and loading in each section of a panel of this character, may be so arranged that as a cut is taken the face drilled and shot on one side, the mechanical loader can be cleaning up the coal on the other. This can be made possible by a concentration of ventilation, provided state laws do not prohibit such practice. The tonnage delivered to the haulage locomotive or to the conveyor on any entry can thus be kept fairly constant.

No great departure has been made from accepted principles of panel mining in the systems outlined, but the opportunity for a record performance of loading machines has been increased many-fold. The outstanding features embodied in the illustrations are so elementary as to require no further emphasis or repetition. Mining men are daily attacking and solving problems far more difficult than any proposed in this article. In fact the practical application of mechanical loaders to coal production is simply a modification of present methods for the purpose of making available the large capacity of these new mechanical units.



News Of the Industry



Sees Co-operative Marketing of Coal as Relief from Cutthroat Competition

Merger Trend Believed to Foreshadow Further Move to Avert Recurrence of Distressing Conditions of 1914—Initiative Left to the Industry—Association Control Now a Pressing Problem.

BY PAUL WOOTON

Washington Correspondent of *Coal Age*

Along with the consideration of co-operative marketing as applied to agriculture, legislators and executive officials have given some thought to its extension to other industries. Many believe it is thoroughly practical to apply the principle to coal. It has been resorted to with great success in Germany and has come in for serious consideration in the past in this country.

There is reason to believe that before many months have passed coal operators generally will turn to some form of co-operative marketing as the most promising form of relief from the serious situation now developing as a result of competitive conditions within the industry. The situation rapidly is becoming as bad as that which existed in 1914, when the Raney resolution was introduced in the House of Representatives at the request of Illinois operators, with the idea of allowing them to co-operate in certain ways so as to save many of them from bankruptcy. A condition of distress even worse than that experienced in 1914 apparently is being approached.

Need of a Moses Is Near

The trend toward consolidations already is under way. While this tendency is regarded as having wholesome features—in fact the late F. S. Peabody publicly urged it as the only way to stabilize the industry—most operators do not want to stand by idly and watch their properties go on the bargain counter.

In the 80's the German coal industry was in much the same condition as that into which the American industry is rushing. It should be remembered that conditions surrounding the production of coal in Germany more nearly correspond to the American industry than do British operations. While Germany produces less coal than does the one state of Pennsylvania, it is thought that a lesson can be learned from experience in that country. When Germany was faced with overproduction and the difficulties it brings in its train, coal syndicates were formed. The largest was the Rhenish-Westphalian syndicate in the Ruhr. The wastes incident to overproduction were

halted at once and the entire industry placed on a stable and efficient basis.

The feeling is that while the government is thoroughly justified in putting forward suggestions when the general public is suffering, it might be misunderstood were the suggestion to come from it in this instance. Since it is the industry which is suffering, the thought is that the initiative should be taken by those engaged in the coal business.

Public Sentiment Undergoes Change

Many unnecessary losses could have been prevented at various times in the past had the American coal industry been at liberty to resort to co-operative marketing. Never before, however, has the situation been so propitious to obtain the necessary legislation. The public has entertained the feeling for many years that coal prices have been inexcusably high and that the recurring shortages had been increased by collusion and artificial bolstering. Public sentiment in that particular, however, is very different today. It is recognized by everyone that in making its three-year wage contract the industry has given bond to produce steadily. It is entirely obvious that present prices are barely sufficient to permit the industry to live. Under these conditions it is believed that Congress will be ready to listen to co-operative marketing proposals. Legislators are unusually well informed on the principles involved, due to their active consideration of the application of this principle to the agricultural industry.

Just at this time Congress is looking with favor on the Yoakum plan, which proposes the combination on a national scale of all former co-operative organizations. This would allow unified selling and unified purchases of all agricultural supplies. No such thought is entertained in applying co-operative marketing to coal. The idea is that there would be forty or more associations. Each of these associations would compete against the others. Under such an arrangement the price of coal to the public would not be enhanced and there would be great public benefit through the stabilization which would

Big Equipment Order For N. Y. Central?

The New York Central, the Michigan Central, the "Big Four" and the Cincinnati Northern railroads have filed a joint application with the Interstate Commerce Commission to issue \$45,630,000 worth of equipment trust certificates.

The money is to be used for the purchase of 189 locomotives, 15,250 freight cars and other rolling stock.

The equipment order is one of the largest ever placed and will bring the rolling stock of the carriers up to a point to meet the needs of heavy fall business.

be made possible. It is not only that there are too many mines but there are too many companies. The same number of mines could be operated to better advantage if handled in groups.

Some such plan is not without governmental support. The Coal Commission recommended large-scale operation. President Coolidge, in his message to Congress, pointed out that opportunity should be given for large-scale production and he hinted at co-operative marketing. There has been other support in administration quarters and some of the closest students of the coal industry recognize in this a constructive move.

Just at this time the thing most needed is suggestion as to how such associations could be operated and how they could be controlled. How could competition between the districts be insured? Should an association be permitted to allocate business pro rata among its membership? If so, should it be on a basis of mine capacity or on output during some previous period of time? Should such an association be incorporated? If so, should it be under state or federal authority? Should the association arrange to close high-cost mines and produce only from low-cost properties? Should such associations be allowed to handle labor relations as well as marketing problems? Should associations be allowed to buy coal from non-members and resell it? These and a myriad of other questions must be answered before any concrete legislative proposals can be made.

No early legislation on the subject is anticipated, but a year hence, when the demand for relief will be acute, it would be well, it is pointed out, to have the groundwork laid and the legislation in such form that its prompt consideration would be possible.

Miners of Southwest Win; Renew Scale for 3 Years

Coal miners of the Southwest scored a victory May 3, when the Scale Committees of the Southwestern Interstate Coal Operators' Association and the United Mine Workers of Kansas, Oklahoma, Arkansas and Missouri signed a contract renewing for three years the wage scale of 1923. In the joint conference which began in Kansas City, March 28, the operators had demanded a reduction from \$7.50 to \$6.00 a day in the pay of day and monthly men. The miners, however, demanded renewal for three years of the old contract. The new contract differs from the old only in a few details. Chief of these is a rule requiring final submission for arbitration of disputes to a commission composed of W. L. A. Johnson, commissioner of the operators' association, and John P. White, former international president of the mine workers.

Central Pennsylvania Miners Accept Wage Cuts

Miners employed by the Consolidation Coal Co., at Myersdale, Somerset County, Pa., after a month of idleness, have accepted the terms of the company and resumed work at reduced wages on May 1. The new arrangement sets the price of loading at \$1 per ton and assures the miners reasonably regular employment.

One hundred and twenty-five miners have returned to their places in the mines of the Vinton Collieries Co., in Vintondale, Cambria County, Pa. Twenty-five more eviction suits have been started by the company to get possession of houses occupied by miners who refuse to work. This makes a total of 58 ejectments started and 33 families have moved out. The wage cut at Vintondale amounts to 33½ per cent for day men and 20 per cent for miners. No. 6 mine is in operation and 152 coke ovens have been fired. The strike which tied up the Vinton collieries became effective on March 17.

New Prices at Milwaukee

(Effective May 1)

BITUMINOUS (Wholesale)

Pittsburgh, Hocking and Youghiogheny.....	\$6.75
Pile run.....	6.00
Screenings.....	5.00
West Virginia screened.....	6.50
Pile run.....	5.75
Screenings.....	5.00
Pocahontas screened.....	8.75
Mine run.....	6.50
Screenings.....	5.75
Smithing.....	8.75
Kanawha gas mine run.....	7.00
Illinois and Indiana screened.....	6.50
Pile run.....	5.75
Screenings.....	5.00
Byproduct coke, large size and nut.....	12.90
Pea.....	9.90
Gas coke, large size.....	10.50
Small and nut.....	8.50

ANTHRACITE (Retail)

Egg.....	\$15.90
Stove.....	16.30
Nut.....	16.15
Pea.....	13.80
Buckwheat.....	11.00

Union Official Resigns; Blames Outlaw Strikes

Because recent conventions of Subdistricts Nos. 3 and 4 of District No. 17 as well as some of the union officials of the district have put their stamp of approval on unauthorized strikes, Andrew W. McComas, president of subdistrict No. 4, has tendered his resignation to C. F. Keeney, president of District No. 17, and it has been accepted. James L. Studdard, vice-president of the district, has been designated to succeed McComas, and James McCleary, a district organizer, has been appointed as vice-president.

The resignation of McComas is an outgrowth of a strike at the Grant Town mine of the New England Fuel & Transportation Co. several months ago. When the men quit work, McComas took the position that the strike was in violation of the contract with the operators. He therefore directed that the strikers return to work. When they failed to do so, the charter of the local union was revoked and that action was upheld by the International headquarters of the union. When the matter was finally settled, however, the charter was restored and the outlawed members were reinstated.

Members of the Grant Town local wanted the scalp of the subdistrict president, however, when the subdistrict convention was held, and for a time it seemed likely that formal charges would be brought against McComas, but it was finally decided that charges could only be brought in a district convention.

The New England Fuel & Transportation Co. did not accept the Baltimore agreement.

Coal Wholesalers to Study Oil Competition

Competition of oil with coal will be one of the subjects for discussion at the annual convention of the American Wholesale Coal Association, at White Sulphur Springs, W. Va., June 3 and 4. Among the phases of the subject that will be discussed are the following: To what extent has oil displaced coal? What further inroads may be expected? Is the competition substantial and permanent or is it merely temporary and passing? Is oil an economical fuel? Is the supply regular and dependable?

It is felt that this discussion will bring out the relative values and costs of the fuels in question, together with the outlook for regular and continuous supply of each for the future. Many other questions of timely interest to those engaged in the distribution of coal will be considered.

Attorney General to Study Issuance of Trade Data

Some clarification of the subject of trade associations and statistics is in prospect as a result of the change in attorneys general. Mr. Daugherty gave this controversy very little personal attention, but he was willing to stand behind certain of his assistants who have assumed what is regarded both in and out of government circles as an unreasonable attitude. It is believed that Mr. Stone, the new Attorney General, will insist on determining this policy for himself. It is known positively that he has not given study to the subject, but he recognizes the importance of having some determination of the matter.

The same staff is on duty at the Department of Justice under the new Attorney General as when Mr. Daugherty was in office. There is reason to believe, however, that Mr. Stone will not leave the determination of such important policies to subordinates. It is understood that he is acquainting himself thoroughly with the situation and is willing to take into careful consideration any suggestions which may be forthcoming from those who believe trade statistics are in the public interest.

Strike at Glen Alden Mines Collapses

Indications point to a resumption of work at all Glen Alden Coal Co. collieries in Luzerne and Lackawanna counties, Pennsylvania, this week. The outlaw strike which broke out April 30, completely tying up the collieries and resulting in the idleness of nearly 20,000 men, collapsed over the week-end, when seven of fifteen collieries affected resumed work.

Disregarding pleas of district officers of the union that they remain at work, the men quit because of the dismissal from the company's employ of an official of a union at Edwardsville, Pa. Two collieries, the Diamond and Storrs, did not heed the strike order and continued operating.

Rinaldo Cappellini, district president, urged the men to remain at work and permit their grievance to come through the proper channels. President Cappellini announced that unless the strike was called off he would dismiss from the miners' union members of the general grievance committee who ordered the strike.

New York Anthracite Circular Prices for May 1

(Gross ton, f.o.b. mines)

	Broken	Egg	Stove	Nut	Pea	Buckwheat		
						1	2	3
Lehigh & Wilkes-Barre.....	\$8.00	\$8.35	\$8.35	\$8.35	\$5.75	\$3.00		\$1.50
Lackawanna.....	8.00	8.35	8.35	8.35	5.75	3.00	\$2.00	1.50
Patterson & Bowns (Erie).....	8.45	8.45	8.55	8.35	5.50	3.00	2.00	1.50
Hudson Coal Co.....	8.60	8.60	8.60	8.60	6.00	3.15		
Reading.....	8.75	8.75	8.90	8.75	6.00	3.00	2.25	
Lehigh Valley.....	8.50	8.60	8.75	8.75	5.75	3.00	2.25	1.50
Lehigh Coal & Nav. Co.....	8.75	8.75	9.00	8.85	6.00	3.00	2.25	1.50
Dickson & Eddy.....	8.65	8.65	8.85	8.70	5.60	On application		
M. A. Hanna & Co.....	8.50	8.60	9.00	8.85	5.75	3.00	On application	

Ninety-Three Bodies Recovered from Benwood Mine Five Days After Disaster

Ninety-three bodies had been recovered last Saturday from the Benwood mine, five days after the explosion which entombed 111 miners of the Wheeling Steel Corporation, near Wheeling, and caused the death of all in the mine at the time. Great difficulty has been encountered in penetrating to the entries where most of the miners met their death. Eight bodies were located in the main entry off entry No. 5 east, where wreckage piled in a heap impeded the work of the rescuers. Later, Chief R. M. Lambie, of the Department of Mines, sent rescue crews to the main entry, where it was expected that ten more bodies would be found.

Chief Lambie said last Saturday morning that he had made no effort to learn the cause of the explosion inasmuch as the department and rescue crews had devoted their energies to the work of recovering the dead. Late in the week two more deputy inspectors were sent for from the southern part of the state. They were C. E. Foster, of Logan County, and Thomas Stockdale, of Bramwell. About this time exploration work was taken over by the Bar-

rackville rescue team of the Bethlehem Mines Corporation. Late last Saturday afternoon they were relieved by the crack New River team, which won the championship for mine-rescue and first-aid work two years ago.

Stone falls and gas have hampered the work of rescue crews since the explosion. Many of the victims of the explosion were found in entry No. 8 north. That entry was cleared of most of the bodies by Saturday, but there was one small section where it was expected that the rescuers would find seven or eight additional bodies.

H. Foster Bain, chief of the U. S. Bureau of Mines, and T. T. Reed, of the Bureau's technical staff, reached Benwood late last week to inspect the scene of the disaster and make a thorough investigation to determine the cause of the accident.

About the middle of last week—two days after the explosion—rescue workers were drenched and their work greatly impeded when water broke through the roof and poured down the passageways.

Many parts of the mine are badly wrecked as a result of the explosion.

Program of N. C. A. Meeting Practically Complete

Four speakers of national prominence have definitely accepted invitations to make addresses at the seventh annual meeting of the National Coal Association to be held at the Sinton Hotel, in Cincinnati, Ohio, May 14-16, and plans are under way for the fifth speaker. With this exception the convention program is practically complete. The list of speakers as it now stands and the subjects of their talks are as follows:

Samuel B. Crowell, of Philadelphia, president of the National Retail Coal Merchants' Association, "Our Customers"; John Lee Mahin, president of the Federal Advertising Agency, of Chicago and New York, "Merchandising"; Melville E. Stone, of New York, counselor of the Associated Press, "The Associated Press"; George H. Cushing, editor of *Cushing's Survey*, "Trade Association Activities."

The forenoon of each day of the annual meeting will be given over to consideration of association affairs. This will enable delegates who desire to do so to attend the Exhibition of Mining Machinery and Equipment and discussions of practical mining problems to be held in Music Hall each afternoon throughout the week under the auspices of the American Mining Congress.

Plans are under way for a big public meeting to be held in Music Hall on Wednesday evening. The program for this meeting includes speeches to be made by nationally known figures, which will be broadcast by radio.

The committee of secretaries of the National Coal Association to which was delegated the duty of studying the statistical work of the national and local associations, with a view to expanding such activities and harmonizing them,

will submit the following conclusion at the national convention:

"As to the legality of statistical work of associations, doubt about which has been raised by recent decisions of federal courts, your sub-committee finds in these decisions and in the opinions of counsel that the only illegal phase of such activities is in the use made of such statistics. In every instance in which conviction has been secured, the evidence has shown conclusively that improper use has been made of the statistics. We believe, therefore, that all of the statistics herein considered, with the exception, perhaps, at this time, of past sales reports, are entirely legal.

"It is recommended that where the local associations are not now collecting production figures they arrange to do so, beginning at once, either on a daily or a weekly basis, this information to be collected on the forms prescribed by the Geological Survey."

Mine Inspectors Discuss Rock-Dusting Progress

Rock dusting received careful consideration at meetings of Pennsylvania bituminous mine inspectors called by J. J. Walsh, State Secretary of Mines, at the Seventh Avenue Hotel, Pittsburgh, April 29 and 30, to discuss accidents and the means to prevent them.

The reports of the inspectors relative to the reception of the rock-dusting movement in their respective districts is indeed encouraging. Many of the coal companies have expressed their desire and intention to adopt this measure of safety just as quickly as ways and means of so doing are provided. They are looking for means of crushing limestone or shale, preferably the former, and for ways to distribute the dust.

The Pennsylvania mine inspectors to a man are in favor of rock dusting. They, like others, see no other way to prevent coal-dust explosions, having lost all faith in methods of wetting down coal dust by sprinkling or humidification.

So firm a grip has the advantage of rock dusting on the minds of bituminous-mine operators and engineers in the State of Pennsylvania that Secretary Walsh believes it will be adopted voluntarily, and prior to the enactment of state laws. Millions of dollars no doubt will be spent during the next year in the installation and use of such equipment.

To Submit Records Promptly

Because accident and fatality statistics as compiled in annual state reports are several years old when they are made available for distribution, a plan was adopted at the meetings by which each inspector will present the companies and the workmen in his district with the various records as they are compiled and will discuss these data with them. Companies will be consulted individually or in groups. Separate conferences will be held with mine officials and workers. By an analysis of the records of each company and a comparison with those of others, the inspectors hope to impress upon the officials and miners the need for and means of accident prevention.



Bituminous Mine Inspectors of Pennsylvania Meet in Pittsburgh

When Secretary Walsh, second from the left in the front row, called a meeting of his inspectors, primarily to discuss rock dusting, he was met with a 100-per cent attendance.

Navy Department Seeks Bids For Year's Coal Supply

The Bureau of Supplies and Accounts of the Navy Department, Washington, D. C., announces the opening of bids May 21 at noon for supplying coal during the fiscal year beginning July 1, 1924, to navy yards and naval stations. Tenders are asked on bituminous or semi-bituminous coal, run of mine, for the following stations, the amounts specified being in gross tons:

Boston Navy Yard, 30,000 tons; Chelsea (Mass.) Naval Hospital, 5,500; South Brooklyn Navy Supply Depot, 8,500; New York Navy Yard and Naval Hospital, 54,500; Iona Island (N. Y.) Ammunition Depot, 2,000; Lake Denmark (N. J.) Ammunition Depot, 1,800; Lakehurst (N. J.) Naval Air Station, 12,500; Philadelphia Navy Yard, 25,000; Annapolis Naval Academy, 35,100; Annapolis Engineering Experiment Station, 1,200; Washington (D. C.) Navy Yard, 50,000; Naval Research Laboratory, Bellevue, D. C., 1,050; Indian Head (Md.) Powder Factory, 28,000; Naval Proving Ground, Dahlgren, Va., 5,000; Hampton Roads (Va.) Naval Operating Base, 21,000; Norfolk (Va.) Navy Yard, 25,000; Portsmouth (Va.) Naval Hospital, 5,500; Navy Mine Depot, Yorktown, Va., 1,500; Charleston (S. C.) Navy Yard, 4,000; Naval Air Station, Pensacola, Fla., 6,000; Great Lakes (Ill.) Naval Training Station, 5,500 tons of run of mine and 34,500 tons 1½ in. screenings.

Bids on semi-bituminous coal for ships are asked for the following amounts, in gross tons: New York Harbor, 20,000 tons; Philadelphia, 10,000; Hampton Roads, Va., 300,000. For anthracite, bids are sought on amounts from 50 to 2,000 tons for a number of posts in the East.



Courtesy U. S. Distributing Corp.

The Coal Center of New York

The Whitehall Building, 17 Battery Place, houses more coal offices than any other building in the city.

Output of German Coal Mines Attains Pre-War Level

Nearly all the branches of the German coal industry have attained the pre-war level in output. Coke and bituminous coal are slightly under the pre-war figure, but production of lignite, upon which energy has been thrown since the Ruhr occupation, has increased more than 60 per cent.

The total production in March of bituminous coal, coke and lignite throughout Germany, exclusive of the Sarre Basin, was 26,000,000 tons against 22,600,000 for March, 1913.

International First-Aid Meet Postponed

The international first-aid and mine-rescue meet, scheduled to be held at Huntington, W. Va., in September under the auspices of the U. S. Bureau of Mines, in conjunction with the Huntington Chamber of Commerce and various miners' and operators' associations and organizations, has been postponed with the approval of the Secretary of the Interior following a conference between representatives of the Bureau of Mines and the West Virginia committee in charge of arrangements.

Since the announcement of the 1924 meet was first made the Bureau of Mines has received letters from various parts of the country indicating that in view of the depression in the coal industry it would be difficult to insure enough teams attending to make the meet representative of the whole country.

Idle Miners Absorbed by Other Industries

The telegraphic survey of employment conditions throughout the nation conducted by the Labor Department immediately following the close of each month refers only incidentally to unemployment in coal-mining regions. Reference is made to decreased employment in coal mines in Pennsylvania, Ohio, Illinois and Indiana, but the general summaries of those states show no abnormal unemployment, which is interpreted at the Employment Service to indicate that coal miners are being readily absorbed by other industries. Some unemployment of coal-mine labor is reported in Alabama, but in West Virginia some of the labor released in February found work during March.

Number and Annual Output of Bituminous Coal Mines in the United States in 1922 by Classes*

State	Class 1, Producing Over 200,000 Tons			Class 2, Producing 100,000-200,000 Tons			Class 3, Producing 50,000-100,000 Tons			Class 4, Producing 10,000-50,000 Tons			Class 5, Producing Less Than 10,000 Tons			Total, All Classes	
	Num- ber of Mines	Per Cent of Total State Output	Per Cent of Total State Output	Num- ber of Mines	Per Cent of Total State Output	Per Cent of Total State Output	Num- ber of Mines	Per Cent of Total State Output	Per Cent of Total State Output	Num- ber of Mines	Per Cent of Total State Output	Per Cent of Total State Output	Num- ber of Mines	Per Cent of Total State Output	Per Cent of Total State Output	Num- ber of Mines	State Output
Alabama	18	4.8	37.5	40	10.7	28.9	46	12.3	18.0	96	25.7	13.4	174	46.5	2.2	374	18,325,000
Alaska, California, Idaho and Oregon										3	18.7	81.1	13	81.3	18.9	16	106,000
Arkansas							3	2.3	17.1	28	21.5	55.2	99	76.2	27.7	130	1,110,000
Colorado	14	5.4	39.7	16	6.2	21.5	28	10.8	19.6	59	22.6	15.1	143	55.0	4.1	260	10,020,000
Georgia							1	100.0	100.0								61,000
Illinois	103	13.5	62.8	91	11.9	21.7	69	9.0	8.7	124	16.2	5.5	378	49.4	1.3	765	58,467,000
Indiana	23	4.6	34.8	46	9.2	33.5	43	8.6	16.4	89	17.9	12.6	298	59.7	2.7	499	19,133,000
Iowa	2	0.9	10.6	7	3.4	20.2	20	9.7	31.7	56	27.1	31.6	122	58.9	5.9	207	4,335,000
Kansas				2	0.7	8.0	17	6.3	39.1	42	115.5	35.1	210	77.5	17.8	271	2,955,000
Kentucky	25	1.1	19.4	97	4.4	32.3	126	5.7	22.7	354	16.1	21.6	1,597	72.7	4.0	2,199	42,134,000
Maryland				1	0.8	9.2	6	5.1	30.3	24	20.3	42.6	87	73.8	17.9	118	1,223,000
Michigan				2	15.4	37.2	6	46.2	49.3	3	23.0	12.4	2	15.4	1.1	13	929,000
Missouri				1	0.5	6.4	15	6.8	35.1	63	28.4	46.3	143	64.3	12.2	222	2,925,000
Montana	3	4.5	45.6	4	6.1	23.8	6	9.1	17.6	11	16.7	9.8	42	63.6	3.2	66	2,572,000
New Mexico	2	3.5	19.9	17	29.8	62.8	6	10.5	12.3	4	7.0	2.8	28	49.2	2.2	57	3,147,000
North Carolina							1	50.0	72.2	1	50.0	27.8				2	79,000
North Dakota	1	0.7	18.7				5	3.5	24.6	25	17.5	36.3	112	78.3	20.4	143	1,328,000
Ohio	11	0.7	10.7	68	4.5	34.0	85	5.7	23.7	275	18.3	23.3	1,065	70.8	8.3	1,504	26,954,000
Oklahoma				4	2.4	16.0	14	8.3	33.0	57	33.7	43.3	94	55.6	7.7	169	2,802,000
Pennsylvania	105	2.4	28.1	216	4.9	26.5	292	6.6	17.9	1,023	23.0	21.5	2,809	63.1	6.0	4,445	113,148,000
South Dakota													16	100.0	100.0	16	8,000
Tennessee	1	0.4	4.4	11	4.5	29.5	14	5.7	20.8	70	28.7	36.7	148	60.7	8.6	244	4,877,000
Texas				1	2.5	10.9	2	5.1	11.1	30	77.0	75.0	6	15.4	3.0	39	1,106,000
Utah	9	20.9	58.3	10	23.3	33.1	4	9.3	5.6	4	9.3	2.4	16	37.2	0.6	43	4,992,000
Virginia	19	7.9	57.1	13	5.4	17.8	12	5.0	7.3	63	26.3	15.1	133	55.4	2.7	240	10,491,000
Washington	3	6.3	28.1	9	18.8	46.5	4	8.3	10.4	12	25.0	11.9	20	41.6	3.1	48	2,581,000
West Virginia	71	3.6	26.1	170	8.5	29.6	242	12.2	21.2	618	31.2	19.8	880	44.5	3.3	11,981	80,488,000
Wyoming	6	7.7	24.9	22	28.2	49.7	17	21.8	21.6	5	6.4	2.9	28	35.9	0.9	78	5,972,000
Total	416	2.9	31.2	848	6.0	27.8	1,084	77.7	18.3	3,139	22.1	18.3	8,663	61.3	4.4	14,150	422,268,000

* Including wagon mines.

This table represents mines, not companies, for which the showing would be very different. Statistics compiled by L. Mann, U. S. Geological Survey, May 3, 1924



Problems In Underground Management



Advice to Those Using Mechanical Loaders

Judicious Shooting Will Speed Loading—Switches Between Rooms
Will Save Time—Take Trolley Into Rooms
and Use Short Cable

BY CHARLES H. THOMPSON

Mining Engineer
Hollis, Va.

SUCCESS in operating loading machines will be determined by the degree to which all co-ordinating factors are made to synchronize and aid in the loading of the coal. It is necessary to consider not only loading but the mining and shooting of the seam, and the transportation of the product to the tippie.

In installing mechanical loaders, use only such systems of mining as already have proved successful in the seam to be worked. Room-and-pillar methods are generally preferable. Avoid the miners' habit of shooting too few shots. Use mechanical drilling, and then there will be no need to avoid the labor of putting in the requisite number of holes. The miner is sparing in the use of holes, not because he thinks large shots save labor in shoveling or produce better coal, but solely because it saves the labor of drilling holes. With more holes the coal will be shot down with less damage to both coal and roof and with greater safety to the men employed. Shoveling will be easy if the coal is properly but not excessively broken.

BETTER MAIN-LINE TRANSPORTATION

Transportation is made rapid and free of accident by maintaining good track, properly located wiring, motive power in good condition, well-ordered rolling stock and efficient bonding. The labor to afford these for a given output is greatly reduced when manual loading gives place to mechanical, and consequently with machine loaders all these items can be kept in first-class condition without excessive cost.

Lay out the plan of working so as to determine beforehand every dimension and every angle. Follow this plan with an allowable error of one foot in distance and two degrees in angle. Templates are easily made, and paint is cheap. They will guide the cutters until the surveyor puts up his points. Plan track and wire so that what will fit one place will fit another. Simplify your workings, and you will reduce costs.

Put crossovers in your rooms from one rib track to another and from one center track to the track in the next room, thus the rooms can be made twice

as long as they could be made economically without these facilities. If crossovers are put from room to room at each crosscut, much time will be saved in transferring cutters, drills and loaders from one working place to the next.

Use a small No. 2 trolley wire on one room track and work from this with a 75-ft. hand cable. Cut your wire to suit the length of room agreed on and play it out as the room is advanced. Old Ford tires make a handy insulating cover, and extended clapboards with light barn hangers make a satisfactory protection. This saves the time, trouble and expense involved in the use of clumsy duplex cables. Let your gatherer bring enough cars to clean up an entire narrow face or half a wide one. While he goes to get another turn of empties the loading machine can be moved to its next place and be ready to load when he returns. A half minute lost on a 3-ton car

means one minute on 6 tons or, where a loading machine will load a ton a minute, 16⅔ per cent of lost time.

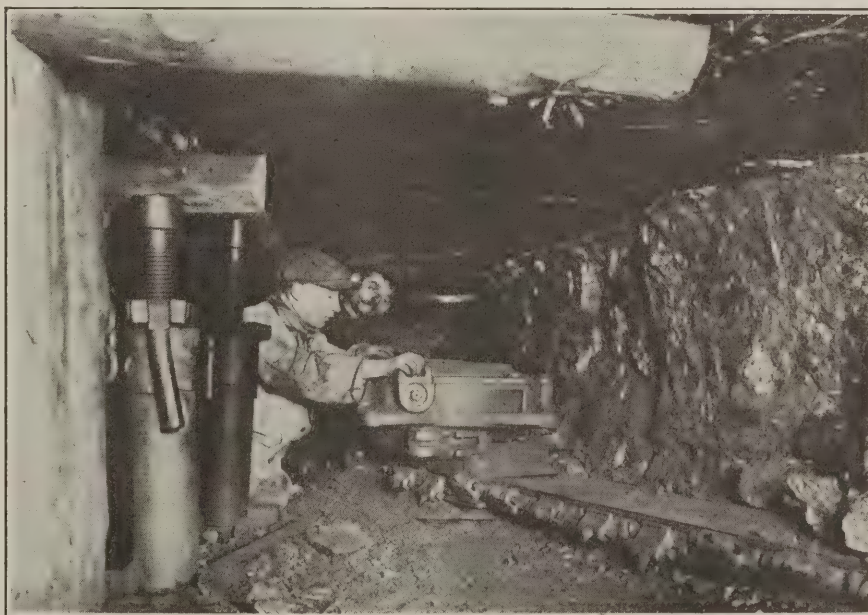
Advance your track heads by use of the inverted-rail and chair method or by the use of inside-point rails and cuffs. Don't allow jumpers to be used. Cut your straight rails to standard length.

Don't mix mechanical loading with manual in the same entry. It can't be done satisfactorily. Put a group foreman in charge of all the cutting, drilling, shooting, track, timber, wire and haulage, which one loading machine requires. The proper number of machines for the entire job soon can be discovered. Pay the men well for a fair task and offer more for a better one. The coal will then move regularly, and a healthy competition will keep the crews at their best.

PREPARE YOUR COAL ON SURFACE

If your seam carries partings, spend part of the saving in preparing the coal on the outside. The final saving in your cost for a marketable product is what you are seeking.

You will find the following advantages in mechanical loading: (1) The coal will cost less and be worth more as it will be an improved product; (2) the men will make better wages by the



Wide World Photos

Undercutter at Work in Wilhelmina Coal Mine, Holland

Note the way in which a large prop is used as a cap piece and is carried over almost to the face of the coal. Also observe the screw jacks with their rapid releasing levers. A snug place to work a coal cutter in, low as to height and narrow as to width of working space. However, the coal appears clean but with irregular cleat.



Hoisting Pit Ponies

Some of the pit ponies in England are what their names signifies, but some, as the illustration shows, are of more stalwart build. Ponies rarely come to the surface except in case of a strike.

elimination of lost time; (3) the risk of serious accident will be reduced as fewer men will be employed; (4) less territory will be opened for a given output with attendant savings in operation; (5) a premium will be laid on intelligence and skill, and hence the living conditions in mining communities will be improved; (6) excavation will be speeded with consequent advantages in handling roof, in recovering ribs, in salvaging of timber and track etc.; (7) the overall investment for a given output will be lowered.

What Rock Dust Costs and How Much Is Needed

By JOHN T. RYAN*

Concurrently with undertaking any program for rock dusting coal mines the relative flammability of the coal should be determined. The Bureau of Mines is always glad to co-operate in this matter and is in a position to render this service.

The raw material for rock dusting should contain little or no free silica and be low in combustible matter. Pure limestone is an admirable material and shale is good. Usually one of the shale formations associated with the coal measures is suitable for rock dusting and it should be given preference, for it is economical to have the source of supply at the mine.

A plant to pulverize the dust to the proper fineness should consist of a simple preliminary crusher to reduce the material to $\frac{3}{4}$ in. and a pulverizer which will grind the material to powder so that it will all pass through a 50-mesh, and so that at least 70 per cent will pass through a 200-mesh screen. This equipment preferably should be installed at the mine or underground if possible, and an equipment having a capacity of 1,000 lb. per hour is ample.

The next essential equipment is a distributor that will spread the dust properly underground. This equipment should be so designed that it will first air-blast the coal dust from the ribs, roofs, etc., and then dust the same faces with the shale dust. It should have a capacity of 1 lb. per second at a speed of not less than one mile per hour. It should be able, also, to de-

liver dust to the back of trackless entries at desirable points, relying on the ventilating current to act as the distributor.

Rock-dusting should be done first on all haulageways up to and including room-necks, and up to and including the face of all development workings.

A simple sampling kit should be installed. The purpose of this is to take samples and analyze them for determining the quantity of incombustible material. This should be so simple that the average man about the mine could operate it and run a test in a few minutes. Such a kit has been developed by the Bureau of Mines and is now ready for the market. Samples should be taken twice a month at predetermined points, except in heavy haulage entries where it may be necessary to distribute the dust once a week. A month should never pass without an application of rock dust. Experience will quickly show where and how often samples should be taken.

CLEAN AND ROCK-DUST ENTRIES

All entries should be cleaned up as thoroughly and frequently as necessary and should be rock-dusted so there will be no more than 50 per cent combustible matter present at all times. The explosibility tests of some coals may indicate that there should be 70 per cent of incombustible material.

Mine operators are compelled to study the rock-dusting problem from a viewpoint of cost and the scientific facts must be reduced to an economic, commercial basis. We cannot rock dust our mines as they are rock dusted in Europe, because our mining and labor

Table I—Cost of Crushing and Pulverizing Plant

Pulverizer	\$1,500	
Crusher	500	
Two elevators	350	
Two bins	150	
Motor and accessories (20 hp.)	350	
Sampling and analytical kit	75	
Distributor	500	
Auxiliary car	100	
Building	1,800	
	\$5,325	
Total cost of installation		\$5,325.00
Interest at 6 per cent for 20 years		6,390.00
Amortization, 20 years		5,325.00
		\$17,040.00
Cost per ton on an 8,000,000-ton (or 20-year basis)		\$0.00213

conditions are vastly different. It is claimed in Great Britain that rock-dusting costs 0.1c. per ton of coal mined. Costs in America on a twenty-year basis should be less than 1c. per ton. A reliable commercial pulverizing company quoted an operator in the Pittsburgh district \$4 per ton for limestone dust in carload lots, f.o.b. factory. To this would have to be added about \$2.50 for transportation and handling.

Tables I and II give respectively an estimate of the initial cost of rock dusting equipment for a 400,000-ton mine on a twenty-year basis, and data regarding the cost of making and distributing rock dust with the basis for the estimate.

Table II—Cost of Making and Distributing Rock Dust

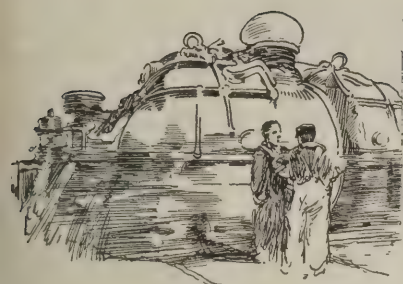
Crushing and pulverizing	\$1.00	
Distributing		1.55
		\$2.55
Approximate length of entries to be dusted in an average 400,000-ton per year mine, miles ..	50	
Average quantity of dust required for each mile, tons	1.8	
Quantity required for one dusting, tons	90	
Quantity required per year, tons ..	360	
Cost at \$2.55 per ton		\$918.00
Cost per ton of coal on yearly production of 400,000 tons		\$0.0023
Installation and depreciation ..		0.00213
		\$0.00443

Rock dusting has many added advantages; for instance about 90 per cent of the light underground is absorbed by the coal. Rock dust, and particularly that prepared from limestone, greatly improves the illumination, and consequently increases the efficiency of the workman and decreases accidents. Rock dust is an efficient fire-fighting material, and is no doubt much safer to use than either water or chemicals. It is likewise believed that it has special merits as a stemming material for shotholes as compared with clay and many other inert substances.

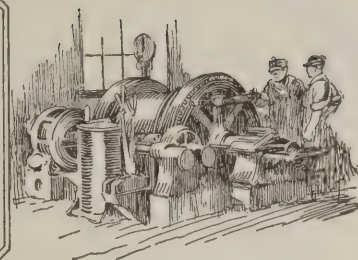
Danger in Driving Rooms Up the Coal Pitch

In the current issue of the Union Pacific Coal Co.'s *Employees' Magazine*, Thomas Fraser, superintendent of the Reliance mine, declares that accidents are more frequent when rooms are driven up the pitch than when directed along the strike. Snubbing and spragging cars are alike dangerous. When they are snubbed the rope sometimes breaks and allows the car to run down the inclination at a high rate of speed. Occasionally the snubbing post is pulled out. Legs and arms are caught in the snubbing rope. More accidents, however, probably are caused by spragging. When the roof is bad or the coal is dirty, the track becomes littered, and the miners are liable to have their hands injured when trying to sprag cars. Another danger is from the coal at the face which overhangs the working face when the room is driven up the pitch. When the miner pulls down the coal from a down-pitch position the coal is likely to fall on him and injure him. In work parallel with the strike of the seam the risk is far less.

*Vice-president and general manager, Mine Safety Appliances Co., Pittsburgh, Pa.



Practical Pointers For Electrical And Mechanical Men



Protective Apparatus for Substation Equipment

The articles which recently have appeared in *Coal Age* on the protection of the motor-generator sets and rotary converters used at mining properties have attracted much attention among the electricians at our mines. The main reason for the interest these men have shown is due probably to troubles which have been experienced by some of the mining companies located near us.

Our company has now almost established standards for the protective equipment used in our power-converting substations. The main incoming alternating-current circuit is protected by three overload induction-type relays. These relays are set so that they will trip only when the load on the alternating-current circuit has reached a

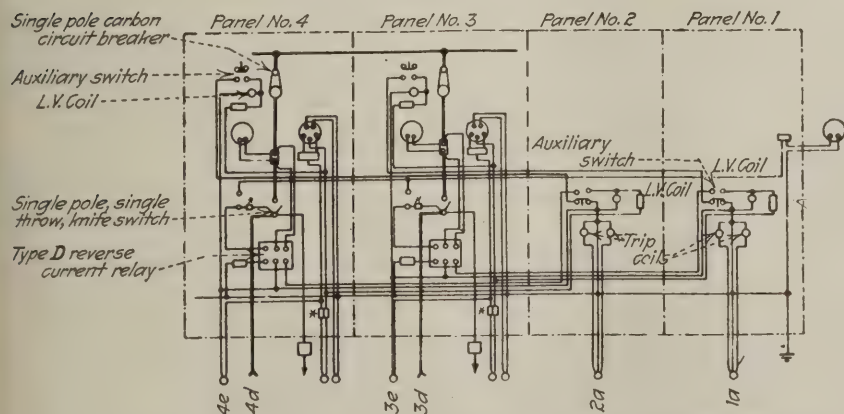
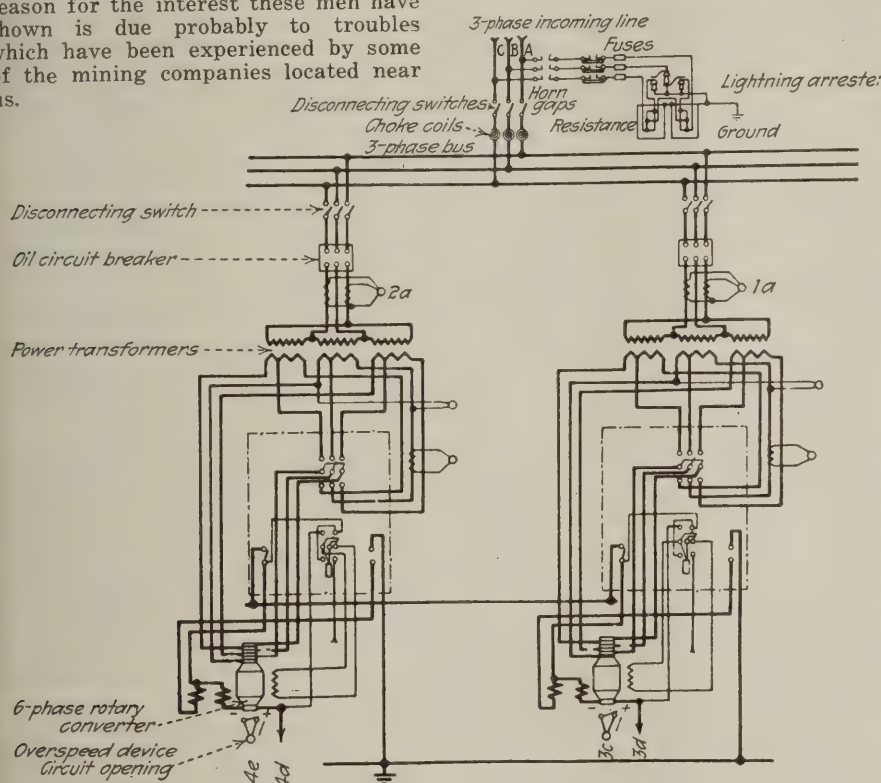
value about 200 per cent over the full-load capacity of the converting equipment. The direct-current circuit is protected by a main-generator breaker and several independent feeder breakers. With this arrangement the direct-current end of the power-converting system is doubly protected against overload because an overload on any of the feeders is taken care of by a feeder breaker before the main-generator breaker is affected.

Another important feature is the overspeed device located on the shaft of the motor-generator set or the rotary converter. Whenever any circumstance arises which causes the converting equipment to run at a speed higher than normal this little device operates and disconnects the equipment from both the alternating- and direct-current lines.

A reverse-current relay generally is connected in the direct-current line. Its function is to open the main direct-current circuit breaker should the generator be motored from another source of direct-current energy either in the same station or a remote substation.

It is our general practice to order all our substation equipment furnished with all these protective features, because we feel that the extra cost of having these parts supplied with the original order is much less than the cost of adding them at some later date when we desire to interconnect our machines.

G. D. CAMERON.



Two Rotaries Completely Protected With Auxiliary Tripping Relays

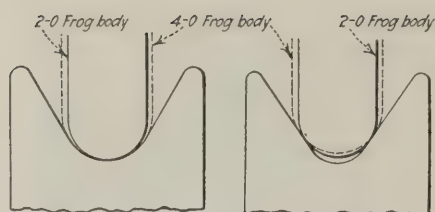
When machines operate in parallel the liability of damage to one or the other is increased. However, when properly protected there is little danger of accident or breakdown. Standardization of switchboard panels and equipment greatly simplifies the work of inspection and protection.

Match Trolley-Wheel Grooves To Overhead Fittings

How the size, kind and shape of trolley wheels affect the proper maintenance of the trolley wire and its attachments is a subject more or less neglected, but nevertheless of great importance. The specifications for trolley wheels are broad enough to allow the selection of wheels varying in width from 1½ in. to 1¾ in., the grooves of which may be of any one of various shapes. The company by which the wheel is supplied frequently gives no consideration whatever to the path over which the wheel must operate.

The trolley wire itself may vary from 1-0 round with a diameter of 0.324 in. when new to 4-0 grooved with a diameter of 0.482 in. as it comes from the factory. After being in service, the diameter is often reduced to 0.25 in. or even less, which undoubtedly causes a deeper groove to be worn in the wheel.

If the wire only were to be considered the problem would be much simpler, but wire must have attachments,



Figs. 1 and 2—U-Shaped Wheel Fits Wire Best

The first figure showing the U-shaped wheel makes a better contact with the wire than the V-shaped wheel which makes contact only on the sides of the groove.

such as frogs, section insulators, splicers and cross-overs, which sometimes more than double the diameter of the path for the wheel.

POOR FIT OF WHEEL IS EXPENSIVE

There is no way to compute how greatly the cost of repairs, replacements and maintenance of an overhead system is increased by the general indifference as to the fit of the trolley wheel and the trolley wire. In my opinion, formed from my own experience and talks with many active operating men, much of this maintenance expense could be eliminated were more consideration given to this important point. I have been given so many greatly varying figures on wheel mileage that it is impossible to strike an average. These figures vary from 100 to 20,000 miles per wheel.

There is a vast difference between the service demands on trolley wheels, but the life of the wheel should depend mainly on the speed and tonnage of the equipment and not on factors which we are better able to control. Most mines use grooved trolley wire which almost entirely removes the trolley ear from direct contact with the wheel.

Much could be said also of poor maintenance of current collector equipment, such as stiff, sluggish bases, bent trolley poles, lack of proper and uniform trolley-base tension. The trolley wire, besides acting as a current supply to the locomotive, must also act as a track or guide for the wheel, and a trolley wire even if in proper alignment will be subjected to unusual wear and burning if the collector is not properly maintained.

ELIMINATE OBSTRUCTIONS ON WIRE

Dewirements of trolley poles, like derailments of locomotives, are caused by obstructions. These are often absolutely necessary overhead appliances, but with properly maintained collectors they would not be obstructions and would not cause dewirements. We have all seen many locomotives pass successfully through complicated overhead work only to note another locomotive dewatered when passing the same point, suspending or delaying all traffic. The cause of this could usually be found on that individual locomotive, but it is frequently necessary to call out the electrician to repair the damage and replace broken wire or appliances.

A considerable saving may be obtained by a closer study of trolley wire; its necessary attachments and the collector equipment, consisting of bases, poles, harps and wheels. Trolley wire

and the entire overhead current-carrying equipment is burned out rather than worn out by service, and anything which can be done to obtain at all times a better electrical contact between wheel and overhead wire and fittings will tend to increase the life of the equipment and decrease costs.

G. F. ROACH.

The Ohio Brass Co.

Metal Electrode Welding

There are several different methods of welding by electricity, but the one most commonly used is by means of a metal electrode. The operator uses a rod of low carbon steel with which he draws an arc, fusing the metal of the electrode onto the work. The process is comparatively slow but uses a relatively small amount of energy. The metal is deposited more uniformly, the weld is stronger and the finished work is more regular in appearance than when done by the carbon electrode method. As the deposited metal is carried directly to the weld by the arc, this method of welding can be used on vertical surfaces and overhead work. For these reasons the metal electrode weld is more generally used in connection with all-round repair work.

An Economical Way to Cut Slots in a Spray Pipe

Nozzles for spraying water over the long screens used in coal washers do not always satisfy the requirements. If a large number of nozzles are provided it is necessary to use many pipe couplings at the expense of much fitting, whereas if only a few are used they must be operated under such high water pressures that most of the water is lost due to the high velocity with which it strikes the coal or screen.

Pipe, however, can be slotted so as to give satisfactory service, for the slots may be located exactly where needed. Slotted pipe have the further advantage that several orifices are located in a single pipe and thus few couplings or fittings are required, which to connect consume too much of the repairman's time.

OXYACETYLENE PROCESS IS BEST

When our company first resorted to the use of slotted pipe, short holes were cut into the side of the pipe by a milling machine. This method was slow and consequently expensive. When the demand for slotted pipe increased, it was necessary to find some quick and economical method for doing the cutting in the shop, and, when necessary, in the field.

After trying several methods, the oxyacetylene process was tried and it proved to be the most economical, quickest and most adaptable. The position of the slots is chalked on the pipe in accordance with specification, which state the number of slots per foot. By using a two-wheel guide attached to a hand-cutting blow pipe, the cutting is made simple and easy. The slot is narrower at the outside surface of the pipe, the cutting jet being purposely directed

so as to make a bevel cut into the pipe wall. In many cases the slot must be so narrow that a dime will just pass through under finger pressure.

Pipes 6, 8 and 10 in. in diameter may be slotted by this method. An operator can slot an average of three standard lengths of 8-in. pipe in one day. The cost of cutting is from 60 to 80 per cent less than by the old method of milling.

Perforated pipe have many uses. They may serve as strainers, sprays and sprinklers, also as injectors and drain pipes. Even where large quantities are not needed it is well to take advantage of the economy and utility of this method of perforating them.

P. T. CONNELLY.

Stopping Flash-Over on Rotary Converters

A mine rotary of reliable design had been flashing from the alternating-current rings to ground and from phase to phase, with the usual results of melted brass and iron, damaged brushes and ruined pigtails, when an investigation by our department was requested. Every electrical test that could have a bearing on the case was made, with the hope of finding transformer trouble, sudden overloads, etc., but nothing unusual was discovered. No trouble was experienced from other rotaries which took power from the same alternating-current supply and delivered direct-current into the same distributing system. The problem was perplexing.

Transformer cores were taken out of their tanks for careful inspection; low-voltage compression chamber arresters were connected from phase to phase near the alternating-current rings to drain or equalize any high-frequency current that might build up. Field circuits and air gaps were tested, and recording instruments were placed in the field circuit and main circuit to ascertain the behavior of the machine when it flashed over.

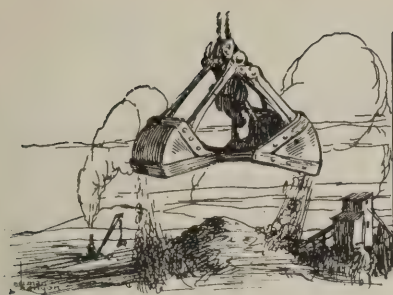
SAME MACHINE GAVE GOOD RESULTS

In conversation with some of the operatives at the plant it was learned that all these tests had been made by the local electrician. A machine, the exact duplicate of the one giving so much trouble was being operated in a nearby station and gave excellent results requiring little or no attention.

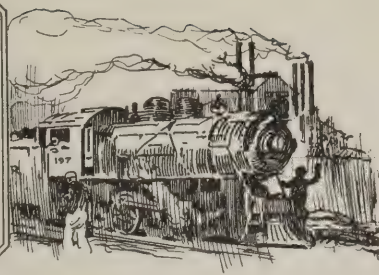
Visual observation of the machine disclosed the following facts: one of the alternating-current metal and carbon brushes would start a small spark, and in a few minutes long streaming flashes developed until finally the rings flashed over.

Barriers made of asbestos and tape were built up between the slip rings and placed so as to avoid air blasts and dust traps. A slight vibration of the top of the alternating-current yokes was stopped by tying them securely to the bearing pedestal cap. Since that time the brushes have been kept properly lubricated and no further trouble has been experienced.

ENGINEER.



Production And the Market



Sogginess Lingers in Bituminous-Coal Markets; Prices Sag; Production Lower

There has been no discernible upturn from the soggy condition prevailing of late throughout the bituminous coal trade. Reports of shutdowns are less frequent, probably for the reason that they could not go much further, but the operations that are working are on low running time. Most of the business being placed is from railroads, with the usual scattered emergency buying accounting for a large proportion of the remainder. Placement of contracts is still noticeably backward and the movement of tonnage destined for shipment up the lakes is far from impressive. Nevertheless an improvement of undertone is perceptible, the diminished movement of tonnage having served to stabilize the markets by eliminating distress coal as a disturbing factor.

Prelude to a Busy Season?

A number of close observers profess to see the present as a transition period—a between-season pause preceding the usual preparations for an autumn revival of business. Speaking of preparations, the New York Central R.R. and allied lines plan enormous additions to rolling stock, the purchase including 189 locomotives and 15,250 freight cars. The new equipment will involve an outlay of \$45,630,000, the roads having applied to the Interstate Commerce Commission for permission to issue equipment certificates for that amount. This, taken in conjunction with the recent \$28,000,000 order placed by the Chesapeake & Ohio and the reported intention of the Pennsylvania to make a large outlay for the same purpose is convincing proof that the railroads of the country are getting themselves in readiness for a revivification of industry.

The wage dispute that caused a shutdown of the union mines of the Southwest was settled May 3 with a victory for the miners, the joint scale committee of

miners and operators having agreed to renew the old scale for three years, the only change in the contract being a provision for submitting matters in dispute to an arbitration commission. The operators sought a 20-per cent reduction in wages.

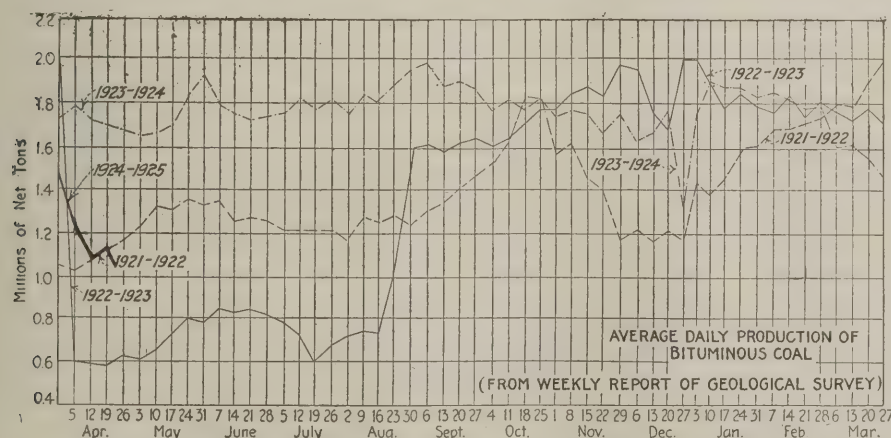
Coal Age Index of spot prices of bituminous coal resumed its recent downward trend during the last week, the May 5 figure being 169 and the corresponding price \$2.05. This compares with \$2.07 on April 28 and \$2.66 at this time last year.

Dumpings at Hampton Roads for all accounts during the week ended May 1 totaled 326,962 net tons, as compared with dumpings of 264,758 net tons in the preceding week.

Dumpings of cargo coal at Lake Erie ports during the week ended May 3, according to the Ore & Coal Exchange, totaled 500,740 net tons; fuel, 20,708 tons. This compares with 341,231 tons of cargo coal and 23,259 tons of fuel coal dumped during the previous week.

Production of bituminous coal took another flop during the week ended April 26, when, according to the report of the Geological Survey, the output totaled 6,726,000 net tons, a decline of 192,000 tons from the previous week. The decrease is attributed largely to the partial observance of Easter Monday as a holiday. Anthracite output also declined, 1,205,000 net tons having been produced, compared with 1,623,000 tons during the week before.

Demand for anthracite continues strong, much of the last-minute April business carrying over into May. Consumers are placing orders in such volume that retailers' yard stocks are not accumulating appreciably. All of the companies and most of the independents advanced prices on domestic sizes 10c. to 20c. per ton May 1.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
April 12.....	10,401,000	6,834,000
April 19 (a).....	10,221,000	6,918,000
April 26 (b).....	10,103,000	6,726,000
Daily average.....	1,684,000	1,121,000
Cal. yr. to date (c)...	177,036,000	162,331,000
Daily av. to date.....	1,776,000	1,631,000

ANTHRACITE

April 12.....	2,067,000	1,856,000
April 19.....	2,065,000	1,623,000
April 26.....	2,116,000	1,205,000
Cal. year to date.....	33,718,000	29,633,000

COKE

April 19 (a).....	436,000	256,000
April 26 (b).....	424,000	225,000
Cal. yr. to date (c)...	6,366,000	4,684,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

No Life Yet In Midwest

General sogginess of the market continues throughout the Midwest. Some screenings business always is available at fair prices but there is no demand for prepared sizes and all the usual troubles of such a situation are experienced. Midwest fields are shut down as low as ever in history, so that production is down almost out of sight. A survey of operating conditions in Illinois shows well over 100 mines of the 393 shipping units of the state shut down for good with fans and pumps stopped. Almost as many are down with indefinite plans for reopening, thus leaving possibly 150 in active condition. These are getting slim running time except the few having contracts for their entire output.

The only events of interest in domestic business that marked the incoming of May were a definite drop in Pocahontas mine run to \$2 by all companies and an increase of about 10c. on all sizes of anthracite by both old-line companies and independents. There is practically no anthracite business. The dealers have been thinking there might be further drops in hard coal at the mines and have declined to stock. The May 1 hoist and the promise of further upward movements each month hereafter are calculated to stir dealers to buy.

Railroad tonnage has fallen off and an air of quietness has crept over the southern Illinois field in the last two weeks that is discouraging to the miners and the only ray of hope lies in the fact that the west Kentucky miners who are on strike may continue out. No change is noted in the situation in Duquoin and Jackson County. Running time is low and there is little business except for railroads. In the Mt. Olive field things are practically at a standstill, excepting on railroad tonnage, with no change in prices. In the Standard field the few mines that are working are selling at production cost or lower.

Business is quiet at St. Louis. Practically nothing is doing in domestic excepting the movement of small cars for emergency purposes. Buying of high-grade Illinois, smokeless, anthracite, coke and Arkansas has not started, but it is expected to get under way this month. Wagonload steam has practically stopped.

Kentucky Business Slow

Operating mines in the western Kentucky field are fairly busy on account of the large number of mines tied up by the miners' strike, but there is little business on prepared sizes, so it is hard to produce enough screenings to meet the demand. Screenings are selling at the mine-run price,

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern	Market Quoted	May 7, 1923	Apr. 21, 1924	Apr. 28, 1924	May 5, 1924†
Smokeless lump	Columbus	\$6.15	\$3.35	\$3.40	\$3.30@ \$3.50
Smokeless mine run	Columbus	4.00	2.25	2.25	2.20@ 2.35
Smokeless screenings	Columbus	3.75	1.85	1.85	1.75@ 2.00
Smokeless lump	Chicago	6.10	3.10	3.10	3.00@ 3.25
Smokeless mine run	Chicago	3.85	2.10	2.10	2.00
Smokeless lump	Cincinnati	6.00	3.35	3.50	3.25@ 3.50
Smokeless mine run	Cincinnati	3.85	2.05	2.10	1.85@ 2.25
Smokeless screenings	Cincinnati	3.85	1.75	1.85	1.50@ 2.00
*Smokeless mine run	Boston	6.35	4.20	4.45	4.35@ 4.60
Clearfield mine run	Boston	2.50	2.00	2.05	1.65@ 2.40
Cambria mine run	Boston	3.10	2.50	2.50	2.25@ 2.90
Somerset mine run	Boston	2.75	2.15	2.25	2.00@ 2.65
Pool I (Navy Standard)	New York	3.75	2.85	2.85	2.75@ 3.00
Pool I (Navy Standard)	Philadelphia	4.05	3.00	3.00	2.75@ 3.25
Pool I (Navy Standard)	Baltimore				
Pool 9 (Super, Low Vol.)	New York	2.80	2.20	2.20	2.00@ 2.40
Pool 9 (Super, Low Vol.)	Philadelphia	3.05	2.20	2.20	2.00@ 2.45
Pool 9 (Super, Low Vol.)	Baltimore	2.80	1.80	1.80	1.75@ 1.90
Pool 10 (H. Gr. Low Vol.)	New York	2.50	1.85	1.85	1.70@ 2.15
Pool 10 (H. Gr. Low Vol.)	Philadelphia	2.45	1.85	1.85	1.70@ 2.00
Pool 10 (H. Gr. Low Vol.)	Baltimore	2.25	1.65	1.65	1.60@ 1.70
Pool 11 (Low Vol.)	New York	2.20	1.50	1.50	1.35@ 1.75
Pool 11 (Low Vol.)	Philadelphia	2.00	1.50	1.50	1.30@ 1.70
Pool 11 (Low Vol.)	Baltimore	2.00	1.50	1.50	1.50@ 1.60

High-Volatile, Eastern

Pool 54-64 (Gas and St.)	New York	1.80	1.45	1.50	1.40@ 1.65
Pool 54-64 (Gas and St.)	Philadelphia	1.85	1.55	1.55	1.45@ 1.70
Pool 54-64 (Gas and St.)	Baltimore	1.80	1.60	1.60	1.40@ 1.50
Pittsburgh ac'd gas	Pittsburgh	2.85	2.40	2.40	2.30@ 2.50
Pittsburgh gas mine run	Pittsburgh		2.10	2.10	2.00@ 2.25
Pittsburgh mine run (St.)	Pittsburgh	2.00	1.85	1.85	1.75@ 2.00
Pittsburgh slack (Gas)	Pittsburgh	1.75	1.30	1.40	1.30@ 1.40
Kanawha lump	Columbus	3.50			
Kanawha mine run	Columbus	2.25			
Kanawha screenings	Columbus	2.05			
W. Va. lump	Cincinnati	3.50	2.25	2.35	1.75@ 2.25
W. Va. gas mine run	Cincinnati	2.35	1.30	1.40	1.25@ 1.50
W. Va. steam mine run	Cincinnati	2.35	1.30	1.40	1.25@ 1.50
W. Va. screenings	Cincinnati	2.10	1.00	1.05	.80@ 1.00
Hocking lump	Columbus	2.85	2.40	2.45	2.25@ 2.65
Hocking mine run	Columbus	1.95	1.60	1.60	1.50@ 1.75
Hocking screenings	Columbus	1.60	1.30	1.30	1.25@ 1.40
Pitts. No. 8 lump	Cleveland	2.90	2.35	2.35	2.10@ 2.75
Pitts. No. 8 mine run	Cleveland	2.15	1.80	1.80	1.85@ 1.90
Pitts. No. 8 screenings	Cleveland	1.80	1.40	1.50	1.50@ 1.60

Midwest	Market Quoted	May 7, 1923	Apr. 21, 1924	Apr. 28, 1924	May 5, 1924†
Franklin, Ill. lump	Chicago	\$3.80	\$2.75	\$2.75	\$2.50@ \$3.00
Franklin, Ill. mine run	Chicago	3.10	2.35	2.35	2.25@ 2.50
Franklin, Ill. screenings	Chicago	1.85	2.15	2.15	2.10@ 2.25
Central, Ill. lump	Chicago	2.30	2.60	2.60	2.50@ 2.75
Central, Ill. mine run	Chicago	2.10	2.10	2.10	2.00@ 2.25
Central, Ill. screenings	Chicago	1.55	1.90	1.90	1.80@ 2.00
Ind. 4th Vein lump	Chicago	3.35	2.85	2.85	2.75@ 3.00
Ind. 4th Vein mine run	Chicago	2.85	2.35	2.35	2.25@ 2.50
Ind. 4th Vein screenings	Chicago	1.85	1.95	1.95	1.90@ 2.00
Ind. 5th Vein lump	Chicago	2.85	2.35	2.35	2.25@ 2.50
Ind. 5th Vein mine run	Chicago	2.10	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings	Chicago	1.55	1.80	1.80	1.75@ 1.85
Mt. Olive lump	St. Louis		2.85	2.85	2.75@ 3.00
Mt. Olive mine run	St. Louis		2.50	2.50	2.50
Mt. Olive screenings	St. Louis		1.50	2.00	2.00
Standard lump	St. Louis	2.50	2.35	2.15	2.00@ 2.35
Standard mine run	St. Louis	1.85	1.95	1.95	1.90@ 2.00
Standard screenings	St. Louis	1.50	1.85	1.80	1.75@ 1.90
West Ky. lump	Louisville	2.60	2.25	2.35	2.25@ 2.50
West Ky. mine run	Louisville	1.90	1.60	1.60	1.50@ 1.75
West Ky. screenings	Louisville	1.75	1.60	1.65	1.60@ 1.75
West Ky. lump	Chicago	2.60	2.25	2.25	2.00@ 2.50
West Ky. mine run	Chicago	1.80	1.60	1.60	1.50@ 1.75

South and Southwest

Big Seam lump	Birmingham	2.70	2.60	2.60	2.70@ 2.90
Big Seam mine run	Birmingham	2.05	2.00	2.00	1.75@ 2.25
Big Seam (washed)	Birmingham	2.35	2.20	2.20	2.00@ 2.40
S. E. Ky. lump	Chicago	3.75	2.25	2.25	2.00@ 2.50
S. E. Ky. mine run	Chicago	2.85	1.60	1.60	1.25@ 2.00
S. E. Ky. lump	Louisville	4.10	2.35	2.10	2.00@ 2.25
S. E. Ky. mine run	Louisville	2.45	1.50	1.50	1.50@ 1.75
S. E. Ky. screenings	Louisville	1.90	1.25	1.10	.90@ 1.25
S. E. Ky. lump	Cincinnati	3.35	2.25	2.25	1.85@ 2.25
S. E. Ky. mine run	Cincinnati	2.25	1.30	1.35	1.25@ 1.50
S. E. Ky. screenings	Cincinnati	2.00	.90	1.10	.75@ 1.00
Kansas lump	Kansas City	3.85	4.50	4.50	4.50
Kansas mine run	Kansas City	3.25	3.25	3.25	3.25
Kansas screenings	Kansas City	2.60	2.50	2.50	2.50

* Gross tons, f.o.b. vessel, Hampton Roads.

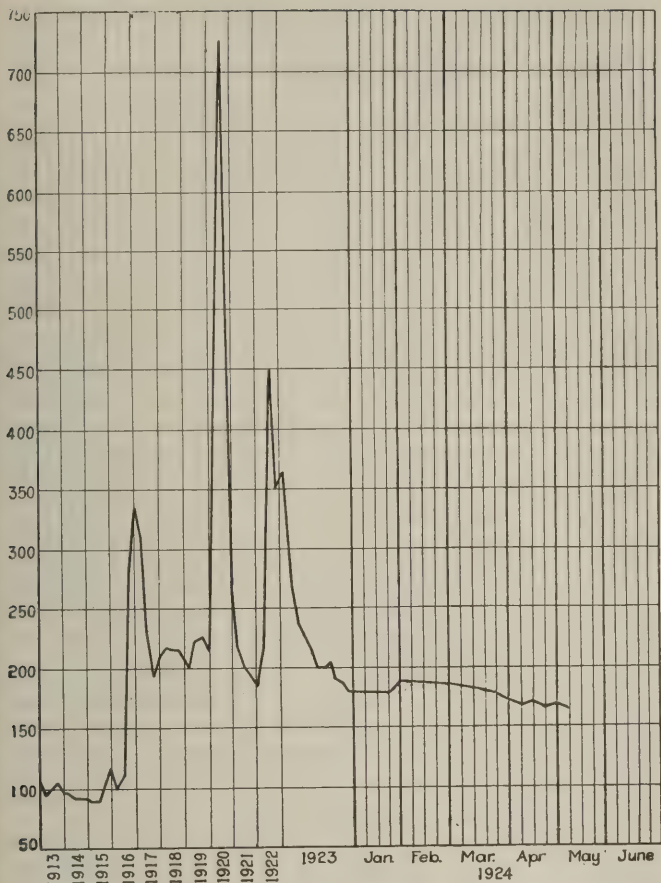
† Advances over previous week shown in heavy type, declines in italics

‡ Strike on.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	May 7, 1923	Company	April 28, 1924	Company	May 5, 1924†	Company
Broken	New York	\$2.34		\$7.75@ \$8.35		\$8.00@ \$8.65		\$8.20@ \$8.50
Broken	Philadelphia	2.39		7.90@ 8.10		8.50@ 8.65		8.60@ 8.75
Egg	New York	2.34	\$8.50@ \$11.00	8.00@ 8.35	\$8.35@ \$8.65	8.25@ 8.65	8.75@ 9.00	8.35@ 8.75
Egg	Philadelphia	2.39	9.25@ 9.50	8.10@ 8.35	8.25@ 9.40	8.60@ 8.65	8.35@ 9.50	8.70@ 8.75
Egg	Chicago	5.06	12.00@ 12.50	7.20@ 8.25	7.59@ 7.81	7.65@ 7.72	7.68@ 7.77	7.73@ 7.81
Stove	New York	2.34	8.50@ 11.00	8.00@ 8.35	8.50@ 9.00	8.25@ 8.85	8.75@ 9.25	8.35@ 9.00
Stove	Philadelphia	2.39	9.25@ 9.50	8.15@ 8.35	8.60@ 9.50	8.65@ 8.85	8.70@ 9.60	8.75@ 8.95
Stove	Chicago	5.06	12.00@ 12.50	7.35@ 8.25	7.90@ 8.03	7.81@ 8.03	8.03@ 8.17	7.94@ 8.14
Chestnut	New York	2.34	8.50@ 11.00	8.00@ 8.35	8.25@ 8.75	8.25@ 8.75	8.65@ 9.00	8.35@ 8.85
Chestnut	Philadelphia	2.39	9.25@ 9.50	8.15@ 8.35	8.60@ 9.50	8.65@ 8.75	8.75@ 8.85	8.70@ 9.60
Chestnut	Chicago	5.06	12.00@ 12.50	7.35@ 8.35	7.81@ 7.94	7.72@ 7.95	7.90@ 8.03	7.81@ 7.99
Range	New York	2.34		8.30		8.50		8.60
Pea	New York	2.22	6.30@ 7.25	6.00@ 6.30	4.50@ 5.25	5.50@ 6.00	4.75@ 5.50	5.50@ 6.00
Pea	Philadelphia	2.14	7.00@ 7.25	6.15@ 6.20	5.25@ 6.50	6.00	5.75@ 6.25	5.75@ 6.00
Pea	Chicago	4.79	7.00@ 8.00	5.49@ 6.03	5.13@ 5.36	5.36@ 5.55	5.36	5.36@ 5.91
Buckwheat No. 1	New York	2.22	2.25@ 3.50	3.50@ 4.15	2.25@ 2.75	3.00@ 3.15	2.25@ 3.00	3.00@ 3.15
Buckwheat No. 1	Philadelphia	2.14	3.00@ 3.50	3.50	2.75@ 3.00	3.00	2.50@ 3.00	3.00
Rice	New York	2.22	1.60@ 2.50	2.50	1.75@ 2.00	2.00@ 2.25	1.90@ 2.25	2.00@ 2.25
Rice	Philadelphia	2.14	2.00@ 2.50	2.50	2.00@ 2.25	2.25	2.00@ 2.25	2.25
Barley	New York	2.22	1.00@ 1.50	1.50	1.50@ 1.75	1.50	1.40@ 1.75	1.50
Barley	Philadelphia	2.14	1.15@ 1.50	1.50	1.50	1.50	1.50	1.50
Barley	New York	2.22	1.50@ 1.60	1.60		1.60	1.40@ 1.65	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines				
Index	1924			1923
	May 5	April 28	April 21	May 7
Index	169	171	169	220
Weighted average price.....	\$2.05	\$2.07	\$2.04	\$2.66

This diagram shows the relative, not the actual prices, on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

\$1.60@ \$1.75 to the trade, while some mines are unable to accept screenings orders unless the buyer will take lump and egg too. West Kentucky strippers are reported as busy producing something over 120 cars a day. The strike is not having any material effect on the market, as with the present lack of demand for prepared, screenings would be scarce and high.

The Louisville trade reports a continuation of slow business, due to general lack of demand. A little tonnage is moving from the Hazard field to lake ports and there also is some steel-mill business. Utilities and large industries are not buying much coal, and steam-plant demand is slowing up fast, while retailers are buying only very small lots. There has been some railroad contract business placed, but the volume as a whole has been small.

In spite of relatively small production of prepared sizes in eastern Kentucky, screenings are being offered as low as 90c. in the Hazard field, and up to around \$1.25 for the best grades of Harlan gas screenings. High prices and small production of screenings in western Kentucky are resulting in a better consumption of eastern Kentucky screenings in the Louisville market, as they can compete on price in spite of a 43c. to 53c. freight-rate differential in favor of western Kentucky.

Northwest Prices Flutter

Soft-coal prices rose in Duluth May 1 and fell in Milwaukee, indicating the Duluth-Superior docks are going to quit giving coal away. Arrival of cargoes and a raise in price of bituminous are the only features of a very dull market at the Head-of-the-Lakes. Since the opening of navigation 31 boats have arrived, 10 bringing anthracite.

New soft-coal prices at Duluth are: Kentucky lump, \$7; run of pile, \$6; screenings, \$4.25; Youghiogheny lump, \$6; run of pile, \$4.50; screenings, \$4.25; Hocking lump, \$5.75; run of pile, \$4.50; screenings, \$4; splint lump, \$6; run of pile \$5.25; screenings, \$4.25; Pocahontas lump, \$7; run of pile, \$5; screenings, \$4.75.

Duluth docks are ready to ship anthracite to the Twin Cities as soon as the rate on all-rail coal becomes effective, May 27. The soft-coal situation is still waiting, as it has been for two years, on the I.C.C. decision in the Illinois mine-rate case.

The Milwaukee market continues dull, but dealers are looking forward to a moderate revival of trade as a result of a reduction in soft-coal prices which became effective May 1. The cut in prices ranges from \$1 to \$1.50 per ton. Screened Pocahontas, however, was reduced \$2.25 per ton. Coal cargoes continue to arrive. The movement will be much slower than last season, however, because of the large amount of carry-over. April arrivals embrace four cargoes of anthracite and eight cargoes of soft coal, the former aggregating 40,576 tons and the latter 61,499 tons.

Western Business Spotted

Scale committees of operators and miners of the South-western district, in joint session in Kansas City since March 28, finally agreed May 3 to a renewal for three years of the old contract. Mines through Oklahoma, Kansas, Missouri and Arkansas operated by members of the South-western Interstate Coal Operators' Association still are closed, but a few mines outside the operators' association, for which contracts have been signed, are putting some coal on the market. This augments the steady flow to the Kansas City market of coal from other districts, so there has been no hint of shortages.

The coal market in Colorado experienced another dull week. Very little movement of anything but domestic sizes was noted. Mines worked on an average of a little less than half time and the operators report 36 per cent of the lost time due to no market.

In Utah the retailers are buying a little more coal as a result of weather conditions. Mining, smelting and cement plants are providing the best coal market among the industrial concerns. Railroads are buying from hand to mouth. Working time at the mines is around two and a half days a week. Operators are now able to care for all slack orders, due to a slower market rather than an increase in production. The railroad tracks at the mines are still crowded with "no bill" cars.

Ohio Markets Dull; Prices on Firm Basis

Dullness still characterizes the Ohio trade. Steam buying at Columbus is low, as consumers are still using reserves. Although some of the heavier consumers have reduced their accumulations to normal and are coming into the market, many others are content to rely on stocks. The net result is a reduced demand, which is reflected in lesser output in all fields of the state. Little contracting outside of railroad fuel is reported, although there are inquiries. Consumers are content to buy on the open market, believing that contract prices may be reduced later. There is still quite a spread between contract and spot quotations. Little movement in domestic sizes is reported. Lake trade is showing some signs of revival, as there has been some inquiry for tonnage for Lake shipment. But so far little has been done outside of the companies having their own dock connections.

There is sentiment in the Cincinnati market that values have reached a firmer plane than for some time past. The marked strength of the domestic smokeless sizes is one of the features of the market. River business is proceeding in good volume by the shippers who have an outlet through Huntington. A cargo or two has come through from the Kanawha and the word is that some of the operators there that formerly were in agreement with District 17 of the United Mine Workers are getting ready to run on a large scale on the open-shop basis. Only one change has been made in the local retail prices and this was the dropping of the bituminous lump to \$6 a ton. Quotations on specialized coals are as follows: Lump, \$3@ \$3.50; egg, \$2.50@ \$3.

Cleveland consumers seem bent on consuming stockpiles before entering the market for additional fuel in any significant quantities. Most of the inquiries are confined to slack

and nut and slack, and these grades continue scarce, as lump is not being produced either for the Lake trade or domestic purposes. Generally speaking, there is little contracting, and steam buyers depend largely on the open market. Of course, the railroads are expected to be contracting right along, where they and the operators can get together on prices. The first season charters in the coal trade are reported to have been made during the past few days. The railroads have about 8,000 cars at the lower Lake ports.

Production in the Pittsburgh district is at 15 to 20 per cent of capacity. Consumer-owned mines are running better than the merchant mines. Line consumption is decreasing and the spot market continues extremely quiet.

Trade at Buffalo is still quiet, though there is more hopefulness in the tone of the reports made by shippers. Some look for a recovery by July, basing their ideas mainly on the reduction of output.

New England Trade Healthier

The steam trade in New England continues to develop a rather healthier condition, but there has not yet been any comprehensive buying outside of railroad circles. New England shares the general dullness in industry, and in no part of the territory is there much interest in spot prices. The low levels of a fortnight ago have practically disappeared, and quotations seem to show a steadier tone. The trade realizes there is a long distance to go before prices can be influenced by demand, but there is a disposition to counsel operators against mining coal in advance of definite prospects, and if this can be followed for another month or so there will be a better outlook for June and July.

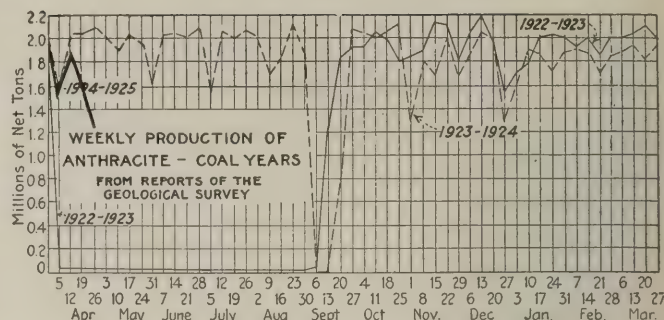
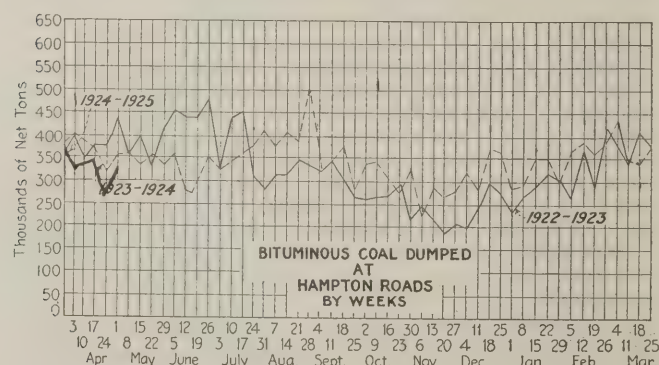
At Hampton Roads the accumulations of Pocahontas and New River average much less than during the early part of April. Prices are measurably improved in consequence, and it may be we have heard the last of "distress" coal for the season. Spot figures are \$4.35@4.50, depending upon grade, and there is a fair chance of the price level being raised another 15c. or so during the week. There is a certain amount of over-sea business offering, although the tonnage is only of moderate size, and this with staple contracts coastwise gives the agencies some encouragement.

Meanwhile, low prices on Navy standard coals have been named for retail delivery through the season, especially in Boston. The School Department of the city was offered New River at \$6.29 per net ton delivered by truck, long hauls as well as short, and this does not argue for sharp advances at wholesale during the summer. It should be said, however, that anthracite trade also is dull, and the retail dealers find themselves in position where their equipment needs to be kept in service on something.

Smokeless coals are being quoted on cars at Boston, Providence and Portland on about the same basis as a week ago. There is only scattering request, and practically all the factors are carrying heavy stocks.

Seaboard Markets Inactive

There is little activity in the New York market. Movement of coal at tidewater has been sufficient to clean up "distress" coal, but occasionally buyers are able to pick up a cargo of good coal at a low figure. Cars at the local terminals during the first five days of last week ranged from 1,060 cars on May 2 to 1,260 cars on April 29, while dumpings ranged from 174 cars on May 1 to 436 cars on April 30. Some hope is being placed in Lake shipments, many coal men expecting that with the Northwest taking its normal tonnage the Eastern situation will be strengthened.



ened. Local demand has been affected by the dullness in industrial lines in northern New York and New England.

Demand at Philadelphia continues to slip and the end of the slump is not in sight. One of the greatest disappointments is the contract trade. Consumers continue a waiting game, buying blocks of coal in the open market from time to time, with the intention of coming into the spot market again.

Buying at Baltimore is about on the basis that has existed for several weeks past and the offerings to consumers remain about the same also. Scarcity of contracts continues, but the trade feels that as soon as an upward tendency appears in the spot market there will be a move by industries both large and small to get under contract cover for deliveries for the coming autumn and winter.

Dullness is still marked throughout the West Virginia fields, many mines being idle. A few companies manage to obtain short-time contracts, but as a rule there is little spot business to be had. The circular price on smokeless mine run for May has been reduced to \$2 as compared with the April circular price of \$2.25 a ton. High-volatile mines also suffer from marked sluggishness in demand.

Trade in Birmingham has improved none during the past week. Buying is confined largely to lots of a few cars in the spot market and amounts in the total to a comparatively light tonnage.

Strong Demand for Anthracite

Demand for all sizes of anthracite continues strong at New York, although pea coal moved a trifle easier at the end of the week. With output curtailed by numerous local labor troubles throughout the hard-coal fields, operators have no difficulty in moving their product. The last week of April was active for shippers, who were rushed for deliveries on account of the increase in prices which went into effect May 1. All of the large operators as well as most independents added from 10c. to 20c. on all domestic coals, including pea coal in one instance, while one of the companies made its prices for broken 45c. higher than during April. Retail prices were not advanced on May 1. Stove coal continues the shortest of the larger sizes. Egg and chestnut are strong. Steam coals are holding steady and with the output down there is little chance of accumulation.

Cool weather in Philadelphia is keeping up a fair trade for current consumption. Though there has been a general increase in mine prices, dealers have not increased their prices, but it is likely that they will do so when the next monthly advance comes along. Dealers are using these advances in mine prices to encourage consumers to order at once, but the response is only moderate. Increased orders for domestic coal to be stored in cellars for the coming fall and winter has proved an encouragement to Baltimore dealers. There is no rush, but enough business is now developing to keep most of the dealers fairly busy.

Stagnation still prevails in the coke market at Connellsville. Output of beehive coke during the week ended April 26 was 225,000 net tons, according to the Geological Survey, compared with 256,000 net tons during the previous week.

Car Loadings, Surpluses and Shortages

	Cars Loaded			
	All Cars	Coal Cars	Surplus	Car Shortage
Week ended April 19	876,923	124,750		
Previous week	881,299	127,792		
Same week in 1923	958,042	179,781		
			All Cars	Coal Cars
April 22, 1924	321,832	189,600		
Previous week	305,981	180,620		
Same date in 1923	11,062	2,582	44,299	20,725

Foreign Market And Export News

Reaction Grips British Coal Markets; Prices and Output Slump

The South Wales coal market is very irregular and somewhat difficult conditions prevail. Under a strike menace the market was buoyed up and prices soared; now that a strike is unlikely a reaction has set in and buyers are holding off. In any case the miners have agreed to remain at work until the findings of the Court of Inquiry become known, and even then a majority by ballot of two-thirds is necessary before a strike can take place. Owing to the superabundance of stocks three collieries have been closed down. The tendency of prices is steadily downward and the outlook is unpromising. Much business is being lost to the United States and Germany.

The Newcastle market is easier, though any available coal is readily disposed of. Most of the collieries are busy overtaking arrears of delivery and many buyers are waiting further developments before placing contracts for heavy delivery during May and June. Several orders from European gas works are being handled in the north of England, the heaviest being in the neighborhood of 6,000 tons.

Coal output by British mines during the week ended April 19, a cable to *Coal Age* states, was 4,994,000 tons, according to official reports. This compares with 5,843,000 tons in the week ended April 12.

French Industrial Demand Holds; Domestic Inquiry Declines

The situation in the French coal market shows little change, demand for industrial fuel holding well, but inquiry for household coal showing a decline since the beginning of the month.

In the regions of France ordinarily dependent upon British fuels there has been an increased demand since the decline of sterling, and with the decline at the shipping docks, since the passing of the strike menace, prices of British fuels in France are more acces-

sible than a month ago. In certain parts of France they work out cheaper, for coke and coking smalls for instance, than some of the German indemnity fuels of corresponding grades.

As the difference in price of British and French coals gets lower, there is less stimulation to purchase home output; even so French collieries are unable to meet all requirements.

Supplies of coke to the O.R.C.A. continue to exceed the level prevailing before the occupation.

The O.R.C.A. statutes will be those of the S.C.O.F. Apportionment of German fuels (coke and coking smalls) to metallurgists will be in proportion to their consumption capacity based on the number of furnaces in blast and not on their capacity of production, as previously arranged. The prices and quantities of coke and smalls bought by the consumers apart from the indemnity fuels also will be considered in apportioning deliveries.

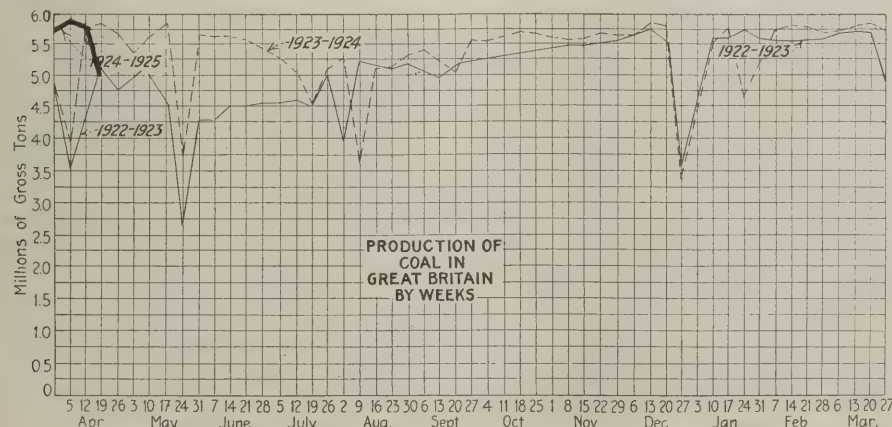
Receipts of indemnity fuels in March totaled 1,001,900 tons, comprising 363,200 tons of coal, 589,900 tons of coke and 57,800 tons of lignite briquets, compared with 808,700 tons in February and 775,900 tons in January last.

Trade Slack at Hampton Roads; Market Tone Weak

Business at Hampton Roads is slack, with demand light, except in bunker trade, where business is fair to good. Coastwise and foreign movement is light, with little increase in this trade in immediate prospect.

Supplies at the piers continue to dwindle, being far below the average, although the supply is equal to demand. Shippers report operations running on reduced schedules or shut down pending a pick-up in the trade.

Prices remain about the same, and the tone of the market is weak. The general impression in the trade is that prices are too low to make good business possible at this time.



Export Clearances Week Ended May 3, 1924

FROM BALTIMORE

For France:	Tons
Bel. Str. Menapier.....	7,232
For Porto Rico:	
Am. Schr. Delfina	486

FROM HAMPTON ROADS

For Argentina:	
Br. Schr. North Pacific for Buenos Aires.....	5,924
For Brazil:	
Nor. Schr. Romsdalshorn for Rio de Janeiro.....	8,480
Br. Schr. Blythmoor for Rio de Janeiro.....	8,906
Br. Schr. New Town for Rio de Janeiro.....	7,406

For Canada:

Nor. Schr. John Bakke for Kingston.....	2,018
Ital. Schr. Vesuvio for St. John.....	6,712

For Cuba:

Nor. Schr. Sagoland for Havana.....	2,533
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For Hawaii:

Amer. Schr. Orleans for Pearl Harbor.....	9,137
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For Italy:

Dan. Schr. Gudron Maersk for Porto Ferrajo	6,616
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Grk. Schr. Eugenie S. Embiricos for Genoa	8,149
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For West Indies:

Br. Schr. Berwindmoor for Port de France	7,526
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FROM PHILADELPHIA

For Canada:

Br. Schr. Nettie for St. John.....	
Br. Schr. Minas for St. John.....	

For Cuba:

Swed. Schr. Thyra for Havana.....	
Nor. Schr. Andersen for Antilla.....	

For Porto Rico:

Am. Schr. Millinocket for San Juan.....	
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Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	April 24	May 1
Cars on hand.....	1,617	985
Tons on hand.....	98,836	61,183
Tons dumped for week.....	106,026	145,413
Tonnage waiting.....	12,000	16,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,114	1,151
Tons on hand.....	73,600	78,850
Tons dumped for week.....	64,516	77,116
Tonnage waiting.....	2,576	10,773
C. & O. Piers, Newport News:		
Cars on hand.....	1,228	1,070
Tons on hand.....	64,012	53,070
Tons dumped for week.....	65,849	68,598
Tonnage waiting.....		625

Pier and Bunker Prices, Gross Tons

PIERS	April 26	May 3†
Pool 9, New York.....	\$4.74@55.00	\$4.70@56.00
Pool 10, New York.....	4.40@ 4.75	4.40@ 4.75
Pool 11, New York.....	4.25@ 4.50	4.25@ 4.50
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55
Pool 1, Hamp. Roads.....	4.35@ 4.60	4.35@ 4.60
Pool 2, Hamp. Roads.....	5.15@ 4.30	4.15@ 4.25
Pools 5-6-7 Hamp. Rds....	4.00@ 4.15	4.00@ 4.15
BUNKERS		
Pool 9, New York.....	5.05@ 5.30	5.00@ 5.30
Pool 10, New York.....	4.70@ 5.05	4.70@ 5.05
Pool 11, New York.....	4.55@ 4.80	4.55@ 4.80
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80
Pool 1, Hamp. Roads.....	4.35@ 4.60	4.35@ 4.60
Pool 2, Hamp. Roads.....	4.15@ 4.30	4.15@ 4.25
Pools 5-6-7 Hamp. Rds....	4.15	4.00@ 4.15

Current Quotations British Coal f.o.b.

Port, Gross Tons

Quotations by Cable to Coal Age

Cardiff:	April 26	May 3†
Admiralty, large....	29s.@30s.	27s.6d.@28s.
Steam smalls.....	21s.	18s.@19s.
Newcastle:		
Best steams.....	25s.6d.@27s.6d.	27s.
Best gas.....	25s.@25s.6d.	24s.6d.
Best bunkers.....	24s.6d.@25s.	23s.6d.@24s.

†Advances over previous week shown in heavy type; declines in italics.



News Items From Field and Trade



ALABAMA

Herman V. G. Lwowski, president of the Ruhr section of the Association of German engineers and manager of the Hugo Stinnes Coal Mines at Essen, Ruhr, accompanied by two associates, visited the Birmingham district recently, inspecting the plants of the Alabama Power Co., having come to this country to make a study of hydro-electrical problems.

The Bankhead Coal Co., Bankhead, has opened a new seam at its mine in Jasper, with a daily capacity of 2,000 tons, giving it an output of about 3,000 tons. The company contemplates erecting a five-car tippie at the new opening.

Chicago capitalists owning about 3,000 acres of coal lands near Morris, in the upper part of Jefferson County, inspected the properties recently, and it is understood will commence development of the lands in the near future. The visitors were shown over the properties by Chas. F. Wheelock, a mining engineer, of Birmingham.

The Hercules Powder Co. has begun the construction of its new plant on a tract of 1,280 acres of land recently purchased near Bessemer, which it is estimated will cost about \$300,000 and will have a capacity of 750,000 lb. of explosives monthly, with provisions to double this output if needed. J. J. Grimes is manager of the local branch of the company. The present plant near North Birmingham will be abandoned when the new works are completed.

ARKANSAS

The Paris Coal Basin Mining Co. has been incorporated in Fort Smith with a capital stock of \$25,000. Henry Stroupe is president, and E. H. McCulloch is secretary.

IDAHO

The Oregon Short Line is putting it up to the Teton Coal Mine Co. in a case now before the State Public Utilities Commission. The mining company, which is reopening the old Teton basin mines, wants the commission to order the railroad to repair and operate the nine-mile Short Line branch from Teton Junction to the mines, so that the mining company can ship the possible 500 tons of coal daily which it may produce. The railroad company answers that the repair bill would be \$32,000 and asks the coal company to finance

the work, the railroad to return 2 per cent of the gross transportation revenue of the line for five years. The road contends that the branch was built in 1918 for \$290,433 by order of the U. S. Railroad Administration and that the mines never shipped much coal because of its quality and the fact that the market was and is well supplied from Utah and Wyoming. Therefore it holds that if any further expenditure is to be made on the branch line, the coal company, and not the railroad, ought to assume all liability of loss. The coal company declines, and claims the cost of conditioning the line will be only \$1,000 instead of \$32,000. The commission has not made its decision.

ILLINOIS

The entire sales organization of both the St. Louis and the Chicago offices of the Lake & Export Sales Corporation recently made a trip from Chicago to the Lesco-Scranton mine at Marion, and then to St. Louis. An inspection was made of this mining property, as well as a visit to the Pyramid strip operation, also near Marion, the output of which is handled by the Lesco organization. The party was under the direction of D. S. Gent, president, and W. L. Walton, vice-president of the Lake & Export Sales Corporation.

The Chicago Coke & Coal Corporation, 3,600 Princeton Ave., Chicago, has been incorporated, with a capital of \$100,000, to mine, ship, prepare for market and deal in coal, coke, building materials and products. The incorporators are F. R. Gregg, F. Trilling, George D. Kimball, L. L. Gowan and V. L. Abbey.

Fire about midnight on the 27th destroyed \$65,000 worth of buildings of the Williamson County Mine, near Johnston City, owned by the St. Louis Coal & Iron Co., of St. Louis. All the surface buildings were destroyed except the tippie, which was slightly damaged. It is undecided at this time whether this mine will be reopened at this point. The company is at the present time sinking a shaft east of Johnston City to tap No. 5 vein, and if found satisfactory further development of the property may be worked in this vein. The acreage of the No. 5 vein in these holdings has been practically worked out. This is the oldest operating mine in Williamson County.

Henry Wonder and Thomas Wonder have purchased the mine of the Clift Coal Co., west of Henry, and will operate the business.

The Frisco Railroad contract at St. Louis went to the Indiana & Illinois Coal Corporation for mine run from the central Illinois field at \$1.77, it is reported. The lowest bid on Standard coal was \$1.80, and this coal is graded above Standard. It is understood that the operator really makes more on his coal than \$1.77 on account of a division of rates between the C. & E. I. and the Frisco lines. These mines are located on the C. & E. I. and owned by that railroad. Other contracts recently were the Rock Island, reported for mine run at \$1.78. This tonnage all moves through the St. Louis gateway and the Frisco amounts to 900 tons per day.

The Standard Oil Co. is preparing to resume mining at its Schoper mine at Carlinville. The company has been operating two mines in the vicinity of Carlinville, but will not reopen the Berry mine.

George W. Reed, vice-president in charge of sales for the Peabody Coal Co. of Chicago, is vacationing at Hot Springs, Ark.

The office of the Big Creek Coal Co., at Harrisburg, was destroyed by a fire which swept a business block in that city with total loss of \$150,000.

KANSAS

Thirty days in which to be reinstated in the United Mine Workers was granted miners of the Kansas field who worked during the strike of 1922 and since had not established their union membership, Harry W. Burr, secretary of District No. 14, announced April 28. The dispensation was recommended by a committee from the international board which recently investigated conditions in the district.

Alex Howat has caused another disturbance in Kansas. This deposed district president of the United Mine Workers asserts that the Sheridan Coal Co., which operates in the southwestern district but which does not belong to the operators' association there, offered him \$6,000 a year to become superintendent of its mines. Alex says he refused and declares nobly: "I refused because I am resolved to stay on the miners' side as long as I have anything to do with the mining business in any way. The miners have stood by me through all my fights in the past 22 years and I will stand by them." But both W. F. Megeath, president, and J. E. Megeath, vice-president, of the Sheridan Coal Co. and both of Omaha, Neb., deny they ever offered the job to Howat. They visited Pittsburg recently and were in conference with him.

KENTUCKY

National guardsmen protecting the property of the Liberty Coal & Coke Co., at Straight Creek, were fired upon from the surrounding hills on the night of April 27. After several shots were fired the guardsmen returned the fire with machine guns. So far as known no one was struck. There are about twenty troopers in charge of the plant.

The John P. Gorman Coal Co., Lexington, has purchased the Elk Creek Coal Co. holdings at Blackey, Letcher County, for a reported price of \$400,000. The former owners had their principal office at Knoxville. The mines have a rated capacity of 750 tons daily. The Elk Creek company has Arthur Groves as president; F. F. Floyd, vice-president; both of Knoxville. The Gorman company has a large mine at Fourseam, in the Hazard field.

The Pike Fuel Co., which was recently incorporated in Pikeville, with a capital of \$10,000, has been organized with Willis Staton, president; G. W. Hoskins, secretary and treasurer, and has 150 acres of coal land under development. Present output is 50 tons per day.

Better power is in prospect in southeastern Kentucky as a result of opening the first unit of the new 44,000-hp. steam plant of the Kentucky Utilities Co., at Pineville. The company furnishes most of the power used in both the eastern and western state fields. A high-tension line will connect the Varilla and Pocket plants with the Pineville plant, and also with a new hydroelectric plant, at Dix River, which will be completed within a year.

The Chickasaw Coal Co., recently incorporated in Madisonville, with a capital of \$25,000, has been organized with B. C. Mitchell as president, and is developing 100 acres. The output is to be 150 tons per day.

Coal men of Southeastern Kentucky are much interested in the appointment of Major E. S. Helburn as a member of the Highway Commission of Kentucky by Governor Fields. Major Helburn is the president of the Log Mountain Coal Co., with headquarters at Middlesboro and it is felt that with his intimate knowledge of the needs of the coal-producing districts the long-delayed highway program is in a fair way to be started.

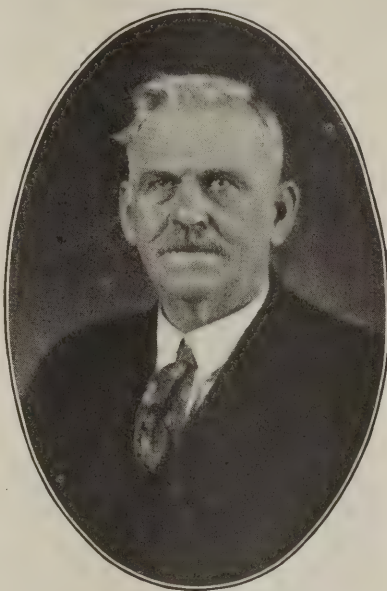
NEW YORK

A device perfected by C. L. Shaw, superintendent of the Lehigh Coal Sales Co., Buffalo, promises to put the small sizes of anthracite into the regular consumer's bin. It consists of a chain, similar in appearance to an automobile wheel chain, intertwined between the teeth of an ordinary triangular furnace grate, which keeps the fine coal from running through the grate. The grates can be operated as usual. A blower and thermostat complete the arrangement and enable any furnace to reduce the cost of coal about \$5 a ton.

All retiring directors of the Maryland Coal Co. were re-elected at the annual meeting of stockholders April

21. At the organization meeting of directors all officers were re-elected.

Public offering was made April 30 at par of \$5,000,000 West Kentucky Coal Co. first mortgage 7 per cent sinking fund gold bonds, Series A, due 1944. The coal company is controlled by the North American Co. The equity over and above the bonds, according to the bankers, is represented by \$6,000,000 of preferred stock and \$7,000,000



J. C. Baker

One of the pioneer mine managers of the Winding Gulf District who has lately become identified with the Newport News Coal Exchange as a field representative in the New River field. He will have his headquarters at Beckley.

of common, the North American Co. having a cash investment in the equity amounting to more than \$6,000,000. The bonds will be secured by a first mortgage on properties appraised in excess of \$11,800,000. A sinking fund of 10c. per ton of coal mined will be used for retirement, the minimum sinking fund requirement being sufficient to retire the entire issue in equal annual instalments by maturity. Net earnings for the six years ended with 1923 averaged \$1,762,438 annually, which is equivalent to about three times the combined interest and minimum sinking fund charges on this issue.

Royal C. Gillespie, formerly with the Eastern Coal & Export Corporation, became associated with the Independent Coal Corporation, New York City, as director, and George H. Pendleton, as assistant to the president, effective May 1.

J. Fred Morlock has taken the Buffalo agency of the Akron Coal Co. of Akron, Ohio, and of the Sunday Creek Coal Co., of Columbus.

Dr. W. S. Blaisdell of Punxsutawney, Pa., who is extensively engaged in bituminous mining in that section, being connected with the Harry Yates interests of Buffalo, has been nominated as the Republican candidate for the Pennsylvania State Senate against heavy opposition.

OHIO

W. J. McFarland has been elected president of the National Coal Co., with mines in the Guernsey and Eastern Ohio fields, succeeding Harry F. Loomis, of Cleveland, who died April 13. Mr. Loomis was president and general manager and Mr. McFarland, who was treasurer, assumes part of his duties, while George J. Kelly, Cambridge, who was general superintendent, succeeds to the general managership.

Lee Llewellyn has been appointed general manager of the Houston Coal Co., Cincinnati, succeeding the late Kuper Hood. Mr. Llewellyn has been connected with Heyl & Patterson and the Pittsburgh Coal Washer Co. for the last twenty years and is regarded as an authority on the preparation and cleaning of coal for the market.

The Southeastern Coal Co., Cincinnati, which was started a little over three years ago by Robert S. Magee and E. L. Moses and has seen various changes in its personnel since that time, liquidated in Cincinnati on May 1. Last fall Mr. Magee, who was president of the Cincinnati Coal Exchange, was forced to go to California for his health and sold out his holdings at that time.

Tow Dew, who was vice-president of the Western Coal Co., Cincinnati, is now connected with the Humphrey Coal Co., of which he has been the secretary since the company was formed.

Walter D. Bledsoe & Co., Cincinnati, have opened a new mine at Martin, where the Elkhorn seam is being tapped. Officials from the Chicago, Indianapolis and Cincinnati offices recently made a trip of inspection.

PENNSYLVANIA

The Bear Ridge Coal Co., operating mines near Frackville and in whose success many Hazleton investors are interested, has started a safety campaign. Signs, "Examine Your Working Place First," are being posted throughout the workings.

The John Mitchell memorial, on the court house square at Scranton, was completed last week and will be formally dedicated May 30, when it is expected that 50,000 miners will parade and addresses will be delivered by labor leaders from all sections of the country. Peter B. Sheridan, of Hazleton, designed the monument.

Officials of District 1, United Mine Workers, are making efforts to avert a threatened outlaw strike of 20,000 Hudson Coal Co. mine workers in the Lackawanna and Wyoming Valley field. The threat of a general strike is made by members of the general grievance committee, who claim grievances are not receiving proper attention.

An explosion of dynamite recently blew up a big tool box at the new No. 6 slope of the Harwood Coal Co., which is being driven from the surface below the baseball grounds in Harwood to reach underlying seams that cannot be located through the operation of other slopes. Ten sticks of dynamite connected by a fuse were found at the mouth of the workings.

Seven miners were saved after a brief entombment May 1 and a total of 107 escaped without injury when fire broke out in the Lee mine of the West End Coal Co., at Mocanaqua. The blaze started in the 240 ft. level. One hundred men in other parts of the mine were taken out the main entry, but seven were caught behind the fire, and the roof caved in, blocking their escape. William Talbot, a foreman, led the men through an abandoned working to the 330 ft. level and then through old workings to the surface. The fire was extinguished after a two-hour fight in the smoke-filled workings, the fan having been stopped when the blaze was discovered.

An opinion by Deputy Attorney General Philip S. Moyer of Pennsylvania, given to Joseph J. Walsh, Secretary of Mines, holds that a bituminous-coal inspector who resigns from office is not entitled to have his name on the eligible list of inspectors on file in the State Department of Mines, and that before he can be reappointed as a coal inspector he must be re-examined in the manner prescribed by law.

Removal of the burning culm bank at the Pennsylvania colliery in Shamokin is progressing rapidly. A big steam shovel is removing the coal refuse between the burned and unburned sections in the hope of keeping the fire from spreading and perhaps igniting one of the near surface veins underlying the bank. The operations are under the supervision of William B. Geise, division engineer of the Susquehanna Collieries Co. The steam shovel will be kept in operation all summer.

Rinaldo Cappellini, president of District No. 1, United Mine Workers, censured employees of the Woodward colliery of the Glen Alden Coal Co., at Edwardsville for calling and maintaining an unauthorized and illegal strike at the workings for five days. The men quit when the president of the local was discharged. The district union president succeeded in having the strike declared off.

James F. Gildea, a prominent mining man, of Plains, Luzerne County, is acting temporarily on the mine examining board until the Luzerne County Court names a man to succeed the late Patrick McGuire, who was killed by an explosion in the Hazleton shaft operations six weeks ago.

UTAH

Utah mines produced 259,585 tons of coal in March, compared with 339,801 in March of last year and 527,606 in March of 1920.

R. M. Magraw, general superintendent of the U. S. Fuel Co. of Salt Lake City, underwent an operation for appendicitis at the Hiawath Hospital last week. His condition is serious. The operation was of an emergency nature.

H. E. Munn, in charge of one of the U. S. Bureau of Mines rescue cars, has become associated with the Utah Copper Co. as coal supervisor.

The new mine of the Black Diamond Fuel Co., at Clear Creek, has reached

the productive stage and coal is now being shipped to Salt Lake City. It is asserted that the coal property of this concern contains 52,000,000 tons of coal. This is one of the new mutual companies.

The final reports on the Castlegate explosion of March 8 show that 171 men lost their lives. Earlier reports set the loss of life at 173.

It is stated that more than half a million dollars will be expended this year in development of Utah coal properties. This estimate is made as a result of leasing activities at the U. S. Land office in Salt Lake City.



R. R. McFall

Who has relinquished the management of the Southern Fuel Co. of Morgantown to become vice-president and general manager of the Universal Fuel Co. of Pittsburgh, Pa.

WEST VIRGINIA

The Gauley Power Co. is planning the construction of two power projects on Gauley River and three on Meadow River, near Gauley and Kanawha Falls, to develop power to operate coal mines which the company is opening up on these rivers.

The La-Go Pocahontas Coal Co. is preparing to begin operations in the near future near Iaeger, the necessary authority having been granted for the installation of a siding. Finishing touches are being put on a large tippie and entries have been driven, so that little remains to be done before the company begins operations. Officers of this concern are H. H. Liggett, of Cincinnati, president; George H. Wise, secretary and treasurer, and C. L. Gaujot, vice-president and general manager. The La-Go company has 1,100 acres under lease and will be able to produce from 600 to 800 tons a day at normal capacity.

L. E. Wood, president of the Central Pocahontas Coal Co., has announced his candidacy for the nomination for the State Senate in the Sixth Senatorial district of West Virginia.

Dan R. Lawson, formerly located at Fairmont, is now connected with the

Philadelphia office of W. A. Marshall & Co., wholesale coal dealers.

The Arlington Coal & Coke Co., of which Morris Watts of Bluefield is general manager, put a new tippie in commission at the Arlington mine last week. This tippie is equipped with modern shaker screens and other equipment for the complete preparation of coal. This makes the third mine recently opened in the same group of interests, the Premier Pocahontas Coal Co. having put up a new tippie a few weeks ago at Premier. A few months ago work was completed for the Gillam Coal & Coke Co.

According to a compilation made by the Pocahontas Operators Association 390,010,346 net tons of coal have been mined in the Mercer and McDowell County fields and approximately 4,287,931,640 net tons remain.

The Weyanoke Coal & Coke Co., of Widemouth, in the Pocahontas field, has just completed work on a new fan for the mine and arrangements are being made to install additional electrical equipment and to re-equip the mine in that respect.

The Coe Pocahontas Coal Co., of McComas, is formulating plans to increase the productive capacity of its mines. The capital stock of the company will be increased from \$200,000 to \$300,000 to finance the project.

CANADA

G. M. Campbell, who has resigned as manager of the Cassidy Collieries, Granby Consolidated Mining, Smelting & Power Co., Ltd., Vancouver Island, was the guest of honor at a banquet March 28, at Nanaimo, B. C., given by the Vancouver Island Branch of the Canadian Institute of Mining & Metallurgy. Charles Graham, of Cumberland, district superintendent of the Canadian Collieries (D) Ltd., was chairman. Nichol Thompson, of Vancouver; T. A. Spruston, of Ladysmith; (Canadian Collieries); John Hunt, Nanaimo, Western Fuel Corporation of Canada; V. Quinn, of Vancouver, Granby Consolidated Co., and J. W. Jensen, Lantzville, Nanoose-Wellington Collieries, who made addresses, expressed regret over Vancouver's loss in the departure of a man of Mr. Campbell's outstanding ability.

A new company headed by A. J. Tonge, former general manager of the Dominion Coal Co., propose to expend \$7,000,000 in the development of the Inverness County coal fields, North Cape Breton, and to control the areas at Mabou, Chimney Corner and Craigness. This development will include the building of a modern town on the banks of the North East River at Cape Mabou, the dredging of Mabou Harbor, the building of a large breakwater, and the putting into commission of a fleet of steamers for the St. Lawrence River trade. The new company intends to compete with the British Empire Steel Corporation for control of the St. Lawrence River business. The deposits of the Inverness basin are estimated at 900,000,000 tons of varying quality suited to any purpose for which bituminous coal can be used.

Traffic News

Through Rate on Virginian to Deepwater Recommended

According to an announcement from Washington, the examining commissioner of the Interstate Commerce Commission has reported favorably upon the petition of certain shippers on the Virginian lines that all-rail through freight rates be established by the Virginian to Deepwater, W. Va.

More than a year ago Major W. P. Tams, Jr., president of the Gulf Smokeless Coal Co., of Tams, W. Va., together with several other operators in the Winding Gulf district, filed a petition with the I. C. C. that the Virginian Ry. be forced to give all-rail through freight rates on coal west so as to relieve the congestion of Virginian coal tonnage at tidewater ports.

The Virginian objected to this request on the ground of a limited number of coal cars and if forced to ship west the road's equipment would be off its rails beyond its control and would be months getting back into the field. Advices from Washington carry the information that the Virginian Ry. will have until May 20 to file objections and argue before the full membership of the commission. It is felt that the Virginian Ry. will continue active objections and that it will take the final decision of the full membership of the I. C. C. to settle the question.

I. C. C. Issues Rate Rulings

Proposed increases in rates on bituminous coal from Green Bay group points in Wisconsin to various destinations have been found by the Interstate Commerce Commission not to be justified.

Certain increases and certain reductions in rates on coal from points in Illinois and Indiana and from St. Louis to various destinations on the Great Northern in Iowa, Minnesota, North Dakota and South Dakota have been found justified.

Rates on coal and coke from Pittsburgh, Connellsville and Reynoldsville to Buffalo are not unreasonable, the commission has found. The relationship between ore and coal rates from lower Lake Erie ports to certain interior points does not result in undue preference or prejudice, the commission has found.

Great Western Disturbs Northwest

Just what the outcome will be of the lower rates on coal from western Kentucky to southeastern Minnesota points via the L. & N. and the C. G. W. remain to be seen. They meet and in some cases cut the low rates made to points on the M. & St. L. Whether this will start something generally remains to be seen. The immediate effect will be to divert some business from southern Illinois to western Kentucky and to cut into the tonnage of eastern Kentucky coal moved off the docks into this district. But if there is not a move in retaliation, it will be strange, and this may start something quite gen-

erally in coal freights, unless it is hindered by some move by the Interstate Commerce Commission. The latter has the subject before it and may not allow the rates to continue, something that seems quite likely in view of the commission's predilection toward averting any serious consideration of the entire subject.

Lignite Rate Hearing Resumed

The hearing on the proposed higher rates on lignite in North Dakota has been resumed at Bismarck, N. D. Representatives from the state railroad and warehouse commissions of South Dakota, Minnesota and North Dakota have presented opposing testimony, indicating the changes would cause increased fuel costs to their respective states. It was estimated that the state institutions of North Dakota, which all burn lignite, would have to pay \$40,000 more a year on coal freight under the proposed rates.

Coming Meetings

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

West Virginia Coal Association, Annual meeting May 13-17, Cincinnati, Ohio. Secretary, W. H. Cunningham, First National Bank Building, Huntington, W. Va.

National Coal Association, Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

Mine Inspectors Institute of America, Annual meeting, Sinton Hotel, Cincinnati, Ohio, May 14-16. Secretary, Martin Bolt, State House, Springfield.

Retail Coal Dealers Association of Texas, Nineteenth annual convention, May 20 and 21, Vernon, Texas. Secretary, C. R. Goldman, Dallas, Texas.

Pennsylvania Retail Coal Merchants Association, Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association, Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers, Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association, Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

West Virginia Coal Mining Institute, Annual meeting June 3 and 4, Elkins, W. Va. Secretary, R. E. Sherwood, Box 1026, Charleston, W. Va.

The National Foreign Trade Convention, June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association, Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association, Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association, Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute, Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

American Society for Testing Materials, Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

New Equipment

Improved Lubricating System For Rod Bearings

The Alemite lubricating system, developed by the Bassick Manufacturing Co., Chicago, recently has been adapted to the lubrication of rod bearings. Briefly, the system consists of a large Alemite grease gun which can be quickly applied, without threading, over the end of a nipple, the latter taking the place of the ordinary rod grease-cup plug or cap. These nipples are turned into the grease cups and spot-welded in place so that they cannot work out or be lost, thus saving a considerable item of expense in ordinary operation. This loss is well worth while avoiding, both because of the cost of the caps and, because, and perhaps this is more serious consideration, the loss of a cap gives dirt or grit an opportunity to get into the grease.

The way in which the gun fits over the end of the nipple can be seen in the illustration, as also the powerful gearing arrangement for forcing hard grease through the $\frac{1}{4}$ -in. hole into the grease cup. Pressures up to 2,500 lb. per sq. in. are said to be obtained by turning the long handle which moves the piston through a threaded spindle and gearing arrangement. Friction on the large gear is greatly reduced by means of a ball thrust bearing. The leather and spring in the end of the gun are so designed as to take care of slight irregularities in the nipple ends and to prevent the leakage of grease when the gun is first applied. After

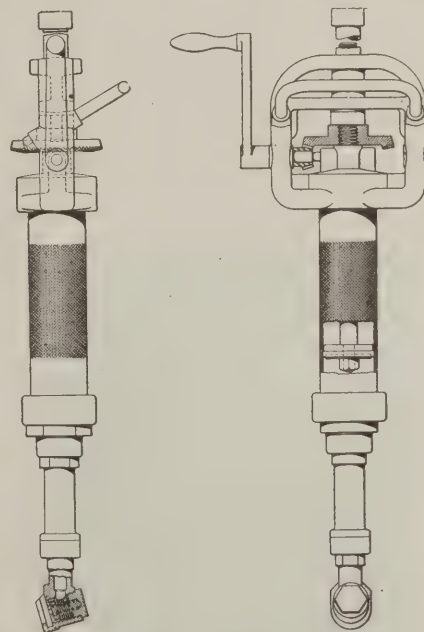


Fig. 1—High-Pressure Grease Gun

A special attachment on the end of the gun prevents any grease from leaking from the fitting. With little effort on the part of the workman 2,500 lb. pressure can be generated to force the grease into the bearing.

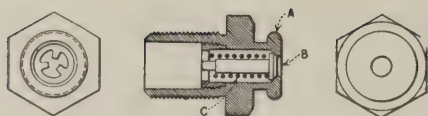


Fig. 2—New Nipple Replaces Cap

The shoulder A holds the gun fitting without the necessity of any threading; valve B excludes dirt or other foreign matter. Spring C closes the valve as soon as the pressure of the grease gun is relieved.

pressure is developed in the gun, the leather is held against the nipple with a heavy pressure, and no grease can be forced out except to the grease cup.

Referring to the illustration of the nipple, A is the shoulder over which the grease gun fitting is applied. The valve B and spring are so arranged that hard grease can enter the nipple, but as soon as the pressure is relieved the valve will seat and prevent the entrance of dirt or other foreign matter.

Probably the outstanding advantage of the system is in the better lubrication which it provides. With reasonable care in filling the gun, clean grease can be applied to rod bearings with no danger of cinders, dust and dirt entering with it as too often happens with present methods. Men assigned to the duty of filling rod grease cups do not always realize the importance of keeping the grease clean and even with the best of intentions under present methods the cylindrical sticks of grease often contain dirt picked up when they are laid on the floor or ground. This

newly developed device is designed to prevent foreign matter getting into the grease and eventually to the bearings. It therefore tends to improve the efficiency of rod lubrication and prevent cut and hot bearings.

With the device, the grease cups are said to be filled more quickly than by the usual methods. The grease-gun fitting is simply applied over the end of the nipple and a few turns of the handle will do the work, whereas the

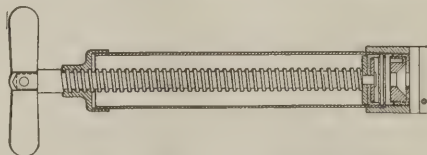


Fig. 3—Auxiliary Portable Gun

Whenever the lubricating system is applied to locomotives or other portable machinery, the engineman carries this gun with him while on the road.

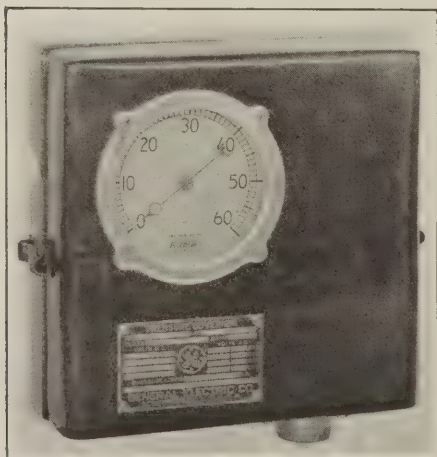
older method requires that the plug or cap be threaded into and out of the grease cup possible several times before sufficient grease can be forced in to fill the cup.

An important safety feature is that should a rod bearing become hot, grease can still be forced into it with the grease gun without the workman being in danger of being scalded with boiling grease. Men are often seriously burned when, in applying grease to a hot bearing, they attempt to thread the plug or cap back into the cup by hand.

Pressure Control Relay

A new pressure governor to be used in conjunction with magnetic starting panels in the control of motor-driven pumps and air compressors, has been developed by the General Electric Co.

The governor can be set for a maximum and minimum range of air or water pressure. An auxiliary relay may be provided which will open the circuit of a control panel when maximum pressure is reached and close it when the pressure drops to the lower limit. The electrical connections are arranged so that the governor merely closes its contacts and is never sub-



Relay Maintains Pressure in Pipes

High- and low-limit contacts by their action hold the air or liquid pressure within predetermined values.

jected to heavy currents and arcs such as develop when circuits are broken.

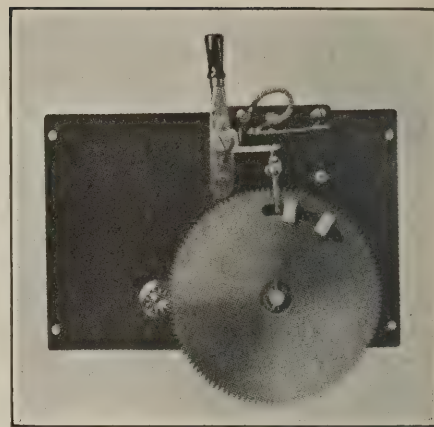
The contact tips are silver-plated to give low contact resistance and eliminate burning and sticking. The device is enclosed in a cast-iron box with a glass window through which the indicating dial is visible. The complete unit is designed for mounting on a wall. It is approximately 10 in. square and 4 in. deep.

Automatic Limit Switch

An improved device, known as the Ross limit switch, has been placed on the market by the Roberts & Schaefer Co., Chicago, Ill. This small device has been designed for use on electric hoists, using magnetic brakes. It is claimed that it is so connected that it will positively prevent the overwinding of any electrically driven hoist, in the event of failure of any or all of the other control apparatus. It is wired merely between the terminals on the electric control board, and the solenoid-operated brake. Should the drum of the hoist overtravel, the spring switch automatically functions, breaking the current and setting the brake.

Any electrically operated drum hoist can be quickly protected with one of these switches, it being necessary only to tap a $\frac{1}{8}$ -in. hole for the drive pin in the end of the drum shaft.

The switch is designed for an average travel of 128 ft., vertical lift, using a 36-in. drum, but may be applied to any hoist having a shorter lift. Provisions have been made to vary the



Automatic Switch Prevents Overwind

With little expense and labor this little device can be applied as an extra precaution against possible injury to hoisting equipment or men.

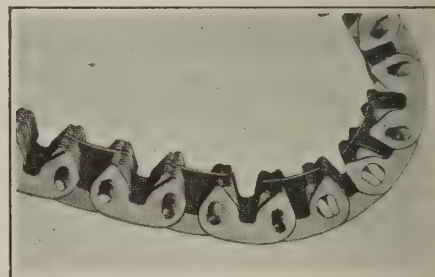
adjustment for any particular hoist. For larger hoists the same protective features can be obtained by changes.

Compensated Silent Chain

A simple silent chain possessing many new features has recently been placed on the market by the Ramsey Chain Co., Inc., 1031 Broadway, Albany, N. Y. The section of chain shown in the illustration has had one outside link removed, to show the ends of the pins at the joint.

This joint has a compensating effect when the chain is flexed around a sprocket of comparatively small diameter. It will be noted that the profile of all the pins is the same, producing a symmetrical joint and allowing the chain to run in either direction.

One pin of each pair is carried through the outside links in which it is a drive fit and is spun over after assembly. This method holds the pin in proper relation with the chain at all times. The individual links also are symmetrical, and the simple contour of the holes for the pins facilitates accurate construction of the links. As the relative motion of the pins is rolling, there is no tendency of the faces to slip and groove as they wear, a condition which is also helped by the small angle between the pin faces throughout their action. This chain is now being made in standard pitches from $\frac{3}{8}$ to 1 in. inclusive, and will no doubt be found serviceable for fan drives and coal preparation machinery.



Flexible Steel Chain

As this chain meshes with a sprocket of small diameter, there is a slight increase of the pitch. This compensates for the sudden acceleration impulse which ordinarily strains a chain.

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, *President*
E. J. Mehren, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. Dawson Hall
Engineering Editor

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The Greater Force

WHICH section of the country will complete the mechanization of the mines first—the union or the non-union? Will the fear of losing markets and the losses in operation so spur the union operators that they will put in conveyors and loading machines? or will the non-union operators out of their plethora of profits, present and accumulated, and out of their shortage of mine labor lead the way? One is disposed to believe that the union men whose needs are greatest but whose financial ability is least will lag behind especially as the union mine workers are not very favorable to a plan which reduces the force of men necessary for the operation of mines.

Rock Dusting Versus Mine Cleaning

IF coal dust is a source of danger in coal mines, why not meet the difficulty by collecting the coal dust rather than by adding rock dust, is a question one frequently hears. No one can seriously question the importance of suppressing coal dust by every possible means, but the main consideration is, how can we reduce the quantity of coal dust so as to reduce the need for using an unnecessarily large quantity of rock dust? For we cannot hope in any coal mine so completely to suppress coal dust that an explosion of any sort will not be extended by what coal dust is present, provided no rock dust is available to render it harmless.

The anxiety to reduce the quantity of coal dust should not be discouraged however. With great care it may be possible to use a maximum amount of rock dust and just have the dust of the mine continue for long periods of time to be of an incombustible character. The devices suggested for collecting coal dust will enable the mine to be prepared for stone dusting without danger. A forcible spray can be used for washing down ribs and timbers, or a vacuum cleaner can be devised for collecting the dust from these places. The dust swept down by the spray can be scraped and swept from the floor and shoveled into cars. The dust collected by vacuum cleaners can be allowed to settle in a container. When the rock dust is distributed it will fall on clean surfaces and consequently will be deposited almost without contamination.

A dry mine with the rock dust thoroughly desiccated may be safer than a wet one, for the rock dust will be ready to rise and extinguish the flame. A wet dust might be disposed to rise in smaller volume with less effect. In any mine the dust on the ribs and timbers will be most dangerous, if the dust of coal, and the most helpful in suppressing an explosion, if the dust of rock. It is likely to be drier and therefore readier to act. In a mine that is properly rock-dusted, it will be cleaner than the dust on the floor, and in one that is not thus treated it will be by reason of its freedom from incombustible material, its dryness, its fineness and its position, the most dangerous dust of any. The rib and

timber dust, small though it is in quantity, is most in need of treatment.

In the Cross Mountain Mine, in Briceville, Tenn., it was noted at the time of the explosion that the coal dust on the floor was of considerable depth, the cars having no end gates. The large quantity of dust, however, probably made little difference, for almost every mine not treated with rock dust or fairly drenched with water can sustain an explosion. Such a little dust is needed that no mine is safe however carefully cleaned, if it is not guarded by rock dust, for the drenching it gets is almost never sufficient for protection.

Missions Worth Supporting

THE movement now well under way in Kansas City for the creating of an active and virile "coal institute" is commendable. Such an organization, if it is backed by the right spirit among coal producers and retailers and if it is manned with men of the right caliber, can go a good way toward setting the public mind aright about coal. Organizations of that sort in most of the large cities of the country can benefit the entire coal industry. But to do this thing, they must sincerely and intelligently aim at real service to the coal consumer of the land as their one and only reason for existing. The benefit to the coal men will follow naturally and deservedly.

There is much service that such an institute can render to a community. Take Kansas City, for instance. Oil competition there is at its keenest. Coal has suffered heavily by that fact. Thousands of coal grates have been replaced by oil burners during the past four years within the district. In some instances, it must fairly be admitted, the change was for the better. It was logical and economical. But in scores of others, the change was bad economy and was made merely because a wave of oil burning was sweeping the community. A coal institute, active and possessed of public confidence could have prevented the shift. It could have so improved the use of coal by prospective oil consumers that coal would have held the market to which it was entitled.

It is a fact that the average household furnace wastes a full 60 per cent of the fuel value of the coal it consumes, partly by reason of bad equipment, partly because of improper maintenance and largely because of plain ignorance on the part of the householder. It is no wonder, therefore, that dissatisfaction with coal is often widespread. Coal consumption in larger heating plants is only a little more efficient and among power plants fuel wastes are tremendous as every well-informed combustion engineer knows. There are things to be done about this. No agency would be in a better position to do them than the community "coal institute." But that institute must be free to do its work in an unbiased, broad-visioned way with the people's interest—not the coal man's—first. Only by that

means can it win public confidence and only with public confidence can it accomplish anything. Its whole object should be merely to give coal a fair chance at the hands of the people. Having done so, it will have established a new and friendlier relation between coal and the public.

Dressed Up and Nowhere to Go

WHY all the insistence in favor of a Department of Mines? Organs are created for the purpose of performing definite functions, but no one has as yet found a function for a Department of Mines. Why reverse beneficent nature and make an organ for which no function has as yet been found? Certain it is that nature will not permit any such anomaly. The department, if formed, will find a function. It will not live in a vacuum. It will have to discover a reason for existence or die. The politician who heads it—and it will be a politician—will find something to do. Will that something be helpful or harmful to the industry? We fear it is most likely to be the latter.

The Department of Agriculture has been a helpful agency for the farmer. It has always been headed by a farmer—usually a real “dirt farmer” at that. The farmers see to that and they are powerful enough to get just what they seek. How long would the head of the department, the Secretary of Agriculture, last if he placed the interest of the public above the interest of the industry? Not a day. He is supposed to clamor and he does clamor for higher prices for the agricultural interests. On the whole the farming industry has a difficult time and needs help. It gets it, however, not because it has a Secretary of Agriculture, but because it controls that Secretary and because it can direct legislation. Farming has a dominant political influence. What is true of farmers and labor is not true of any other groups of individuals.

It is quite likely that a Department of Mines would be a corrective body. It probably would be regarded as the department of correction of the mining industry. It would be headed by someone who was not a mining man. The chairman of the committee on Mines and Mining is quite usually not a mine owner. He is looking after the supposed interests of the public, and he is disposed to believe that this can best be served by a further control of the mining industry. It is likely that this will be true of the Department of Mines if it be formed.

The frogs in the pond, says the classical story, cried for a king. They were tired of being ruled by a log which lay on the edge of the domain in which the frogs lived and croaked. The gods heard the plea of the frogs and sent them a fine outstanding fellow for their king—a long-legged, attractively appareled stork. They were rapt in admiration till presently the stork began to swallow up the denizens of the pond, one by one. Then they began to wish they had not importuned the gods and had been content with the log, which though unsightly and supine, did none of them any harm.

To what end shall we then pray Congress to send us a king? We are told his presence in the Cabinet will give the industry a standing comparable with its importance. Metal men may desire the public to recognize them, but the coal men long ago ceased to tell the public how important they were and how essential to public well-being, for they well know that the people have always a desire to regulate any essential industry and do it by cutting down excessive profits and by ignor-

ing the losses which the mining industry sustains.

The new head of the department would for a while be “all dressed up with no place to go,” but not for long; in a short while he would be regulating every detail of the industry. Mining has suffered already so much that it is to be hoped it will suffer no further interference, except as to increased safety, and that perhaps is best provided by state regulation.

Safe Gas Limits

AT last comes a protest against Professor Wheeler's remarks at Scranton. The correspondent seems almost to suggest that *Coal Age* should have protested against that authority's conclusions and perhaps should not have quoted them.

We are quite willing to say that men should not be allowed to work in a mine for the purpose of getting coal where the content of methane in the return is $4\frac{1}{2}$ per cent. Whether they would be justified in sealing in a fire where such a percentage is found in the return is entirely another matter. In such a case the opening of a door is not so much to be feared as in an operating mine. A sudden outburst of gas is not as likely to occur in such event as in a mine where men are advancing faces. A fall of roof might baffle ventilation. The fan might stop. These contingencies are more remote and in all kinds of fighting—whether against an army or a mine fire—there is some danger.

We thought Deputy Chief Inspector Walker put the matter well when he said it would be his painful duty to enforce the law and have his colleague arrested if he did not withdraw the men where such a percentage was found. Certainly it was well if the professor would seriously try to continue the extraction of coal for commercial use with such a percentage of methane present.

It is customary for the press to quote the sayings of responsible persons as news, even though it does not agree with them. For instance, Republican papers reproduce the speeches of Democratic presidents and other public men. They are not responsible for what is quoted. Nor are Democratic papers subject to criticism for publishing Republican pronouncements.

Some years back we quoted a statement from a reputable German technical journal. This had been quoted in an English Government organ without protest. We gave both publications full credit. That, however, did not save the credit of this journal. It was held that we should have safeguarded our readers by a word of reprobation. We might have done so, feeling the German and British papers were ill-informed on the matter, but thought that such censorship exceeded our duties and that perhaps the German authorities might, after all, be right. The last word has not been said on many subjects.

Some years ago it would have seemed ridiculous, for instance, to use carbon dioxide in the resuscitation of a suffocated man, but close reasoning and experiment have shown that a little of that inert gas stimulates the lungs and, administered with oxygen, greatly increases the rapidity with which the patient is resuscitated. Thus we are always ready to hope that there may be things—good things, of course—“undreamt of in our philosophy,” and if the person making the statement is a competent authority, most gladly do we slide the responsibility for the statement on his willing shoulders. So now we say Professor Wheeler said it, not we. Let Deputy Chief Inspector Walker incarcerate his genial colleague and leave us free and blameless!

Lowering Coal Down Hillsides with Minimum Breakage

Chutes Are Destructive to Coal and Inclined Planes Are Dangerous—Type of Conveyor to Be Chosen Depends Chiefly on Such Factors As Length and Inclination of the Hillside

BY M. L. O'NEALE
Fairmont, W. Va.



THROUGHOUT the Appalachian coal fields a large percentage of the mines have been opened in beds that outcrop on the hills high above the railroad tracks in the valleys. Many of these hillsides are steep, and the problem of lowering the coal from the mine to the tippie, with safety, slight breakage and at reasonable expense, furnishes an interesting study.

Probably the simplest and, from the standpoint of coal degradation, the most extravagant means of getting the coal down the hill is the chute. Where a chute is used, the coal is dumped into it near the level of the pit mouth and runs by gravity to the tippie. The chute must be steep enough to carry damp slack, as well as dry lump. This latter material accordingly accelerates rapidly and in a long chute attains a terrific speed. At the bottom, it is brought to a sudden stop and as a result the breakage is excessive.

Although theoretically a chute may be closed and kept full of coal, a gate being opened at the bottom to draw off the material only as fast as it is dumped in at the top, this is difficult to accomplish in practice. When, however, it is accomplished the coal moves *en masse* and little breakage occurs. The contents, however, are liable to plug, or arch, and may refuse to run unless the chute is made extremely steep. The cost of building a wooden chute in a proper manner also is appreciable. It is difficult to keep tight, and the maintenance cost is high. The sheet-iron plates lining it are subject to rapid wear and must be either excessively thick or must be renewed frequently.

INCLINED PLANE MUCH USED BUT UNSATISFACTORY

Another device frequently used in lowering coal is the gravity or self-acting inclined plane. Here the loaded cars are lowered either singly or in triple by means of a cable and a drum or a figure-eight plane machine. The loads in coming down pull the empties back up the hill, the system requiring no power other than the force of gravity.

This is a fairly simple arrangement, but it has many disadvantages. In the first place, derailments and wrecks are frequent. If the incline is steep, coal rolls from the tops of the cars and litters the tracks. To avoid this spillage, the cars should not be topped as high as is customary where the coal is transported only on light grades. This reduces the tonnage delivered to the tippie per mine car handled. Where under-

ground haulages are long, one of the chief problems of the mine management is to deliver empty cars to the loaders. If the miner is compelled to put 10 to 15 per cent less coal on each car, the daily output of the mine often will be reduced in almost a like proportion.

Because it is designed to round the sharp curves necessary underground, the ordinary mine car is long in comparison with its wheel base. This permits it to seesaw on the incline, so that it is easily derailed by obstructions or inequalities in the track. Consequently a plane of this kind should be well laid with heavy rails and should be kept clean and in good condition, all of which means expense.

More costly and dangerous than a simple derailment is a runaway of one or more cars down the incline.

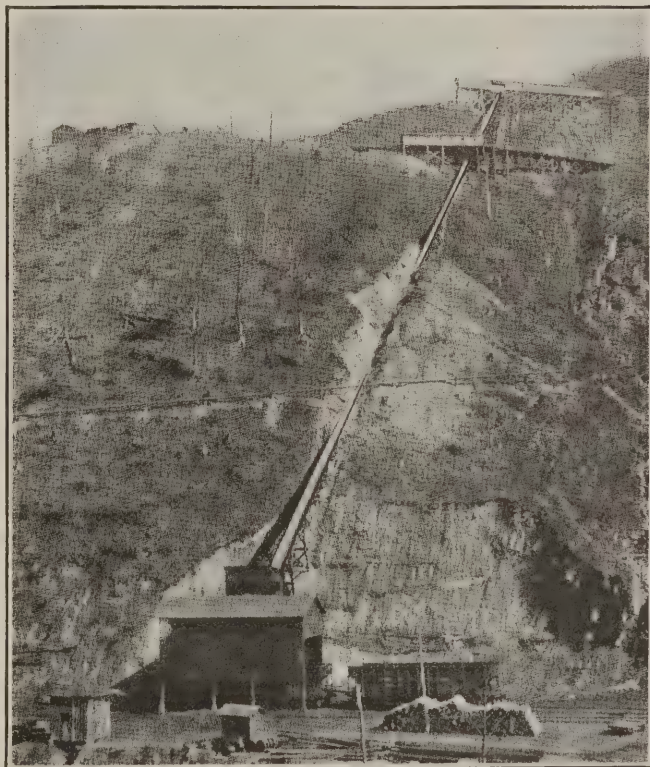


Fig. 1—An Inclosed Tubular Coal Chute

The chute receives coal from two levels. It is intended to be kept full of coal at all times the contents being drawn off at the bottom only as fast as it is dumped in at the top. This entails little breakage but the chute is liable to plug either from bridging or arching of lumps or from freezing in cold weather.



Fig. 2—Gravity Plane Just Completed

This plane is evidently intended for lowering mine cars as no provision has been made for discharging gunboats at its foot. Lowering the cars themselves entails less first cost but a greater liability to accident from both derailments and runaways.

This may result from broken couplings, defective attachment of the rope to the leading car, failure of the top men to properly couple the trip together, or attach the rope to it, or from other causes. Pushing cars over the knuckle without attaching the rope to them at all is not an infrequent occurrence. An accident of this kind may completely wreck the tippie, cause loss of life and tie up the entire mine operation for a long period. To lessen this danger, safety switches should be installed and their use, by the man responsible for their operation, should be rigidly enforced.

WITH INCLINE, TOO MANY MEN ARE NEEDED

Another objection to this method of handling coal is the fact that a large structure is necessary at the foot of the incline in order to accommodate the empty and loaded trips, as well as to permit of dumping operations. Furthermore—and this is important—a large labor force is requisite to handle the head and tippie ends of such an incline. A considerable saving in labor may be effected by installing a rotary dump at the foot of the plane, which will discharge an entire trip without disengaging it from the rope.

This, however, entails a large investment. With a rotary dump such as has just been suggested, either a storage bin is necessary, which would entail a certain amount of coal breakage and which must be set at such an elevation as to permit a gravity feed to the preparation screens, or the coal must be raised from

the lower portion of the bin to the screens by a conveyor. If coal is to be weighed, as is frequently the case, another problem is introduced. Furthermore, if the mine sends out cars of slate or other refuse, these should be cut out of the trip and their contents dumped from some point on the hill at the top of the incline.

To avoid the difficulties inherent to lowering coal down the hillside in mine cars, the monitor or gunboat plane has been introduced. This obviates some of the evils just mentioned, but introduces others peculiar to itself. To get a large tonnage, the monitor must be of large capacity. Monitors are, therefore, usually built to hold from 6 to 10 tons of coal, depending on the length of the incline and the output of the mine. About one minute should be allowed for loading each monitor and the speed of lowering is determined by the length of the incline, the quality and condition of track and equipment, and the relationship of the grades at the head and foot of the incline. A fair speed is about 10 miles per hour.

MONITORS STAY ON TRACK BETTER THAN CARS

Monitors should be heavily and substantially built. They are of longer wheel base than mine cars, and larger wheels are provided. Consequently they are less readily derailed. They are constructed to suit the inclination of the slope over which they operate and there is much less spillage along the track. Nevertheless, if the incline is steep at the loading point, as it frequently is, lumps very often roll off during the loading process to catapult and ricochet down the slope, endangering the lives of all who may happen to be near the track.

Because of the weight of a monitor and the coal it contains, the track must be substantially built and well maintained. On steep inclines, it must be anchored at intervals to prevent down-hill creep. The rope necessary for monitor operation is heavy and expensive. To prolong its life as well as to prevent the ties from being sawn in two by it, slope rollers should be placed at frequent intervals. These are subject to heavy duty on long inclines, particularly if the slope contains a hump or convex curve. They should therefore be substantially constructed and fitted with good bearings, which should be kept lubricated. Dirt, rock and coal periodically should be cleaned away from them, so as to allow them to revolve freely. If a roller ceases to turn, the rope soon cuts a flat place in it and it is ruined, requiring repair or renewal. The maintenance of track rollers is consequently an item of expense in plane operation, whether monitors or mine cars are used.

As previously stated, however, derailments are far less frequent with monitors than with mine cars. Furthermore, the rope is not disconnected from the monitor except for replacement or resocketing, or for the renewal of connection parts. As a result, if the rope and its connections are carefully inspected, there is small chance for a break-away. Should such an accident occur, however, it is liable to be far more serious than with mine cars, as the monitor is much more likely to hold the track and play havoc with everything at the foot of the plane. Both empty and loaded monitors pull simultaneously against the drum or head sheave, so that it must be made heavy and strong, and securely anchored to a massive foundation.

Loading of monitors is an intermittent operation,

FIG. 3

Belt Conveyor

Belts are excellent means of conveying coal on the level or down slight inclinations. They also may be carried easily over changes of grade. About 18 deg. is the maximum inclination on which a conveyor of this kind may be employed, as on steeper pitches the coal tends to roll on the belt. On grades exceeding about 6 per cent conveyor belts which transport material down hill tend to run away and means must be employed to hold them.



that is, 6 to 10 tons may be taken from the bins every two to three minutes. Accordingly, bins of at least this capacity are required at both the head and foot of the incline. This adds to plant investment and increases both fire hazard and coal degradation. With a monitor plane, coal is subjected to breakage three times—in dumping into the upper bin, discharging from the bin to the monitor and again discharging from the monitor into the lower bin. At the upper end of the incline, the bin is provided with gates for loading the monitors.

These may be automatically opened and closed by the monitors themselves, or they may be manipulated by the drum man, thus saving operating labor. At the lower end, the monitors discharge automatically. If coal is screened, it must be drawn from the lower bin and fed uniformly by a mechanical feeder, in order to secure effective sizing. In many instances, also, in order to obviate a high bin structure and its approach, the coal is elevated from the lower bin gate to the screen.

One other operating disadvantage of the monitor system, and this also applies to the mine-car gravity plane, is worthy of mention, namely, the high maintenance of brake linings on drums or plane machines serving long inclines where the duty is heavy. To reduce excessive wear, a stream of water is sometimes kept playing on the brake band and lining to prevent burning. The solution resorted to by one drum runner—putting oil on the brake band to stop the squeaking—is not to be recommended, as his experiment cost his company some thousands of dollars for cleaning up wreckage and repairing the damage done at the foot of the plane.

To obviate the many disadvantages of the various systems above discussed, the use of conveyors for lowering coal down hillsides is rapidly gaining favor. These devices are gradually displacing the older means employed. The conveyors generally used and those about to be discussed are of four types, namely, the belt, pan, scraper and rope-and-button conveyors.

Belt and pan conveyors differ markedly from the other two types in that the coal is actually carried by them. The force thus resisting material movement is that of rolling friction only, which ordinarily runs from 5 to 7 per cent of the weight carried. This resistance applies both to the moving parts of the con-

veyor and to the coal transported. On the other hand, the scraper and rope-and-button conveyors each drag the coal in a trough, so that the sliding friction of the coal on steel is introduced. This ordinarily ranges from 40 to 50 per cent of the weight.

In the scraper conveyor the steel flights are held clear of the trough, so that the moving parts of the mechanism are subjected to either rolling or sliding friction, which kind of resistance it is, depending on whether the conveyor travels on rollers or slides in steel guides. The friction of the conveyor alone is therefore from 6 to 10 per cent. With the rope-and-button conveyor, the moving parts are subjected to sliding friction—the friction of cast iron on steel—which is about 25 per cent of the weight. These basic differences in the forces resisting the movement of the different types of conveyors determine in a large measure the conditions to which each is best suited.

The belt conveyor is particularly adapted to moderate slopes, or to irregular profiles where a portion of the conveyor is horizontal or even upgrade. The friction resistance is low and the power consumption less than that necessary for the other types. On steep grades this factor has no advantage and, in fact, becomes a detriment because of the braking needed to control

**Fig. 4—Beaded Pan Conveyor**

Conveyors of this kind must be run slower than belt conveyors but by the use of side plates the coal may be piled so deep that their capacity will equal that of a belt. The many links, rollers and wheels employed require frequent lubrication.

the loaded conveyor, unless the installation is big enough to justify the provision of some electrical device to utilize the power generated.

Essentially, the belt conveyor is a high-speed machine as compared with the other types and, without discharging the coal too violently, may be satisfactorily operated at speeds up to 400 ft. per min. At such a speed, however, especially if coal is piled in the center of the belt, it is not adapted to the picking of refuse. This type of conveyor has a long life, is low in upkeep and maintenance, and highly satisfactory in operation. It is, however, costly to install. This is especially true if it handles only small outputs where the width of belt is governed not by the capacity desired, but by the size of the lumps to be carried. At present, the cost of a 36-in. belt conveyor per foot of distance between head and tail pulleys, including the troughing and return idlers but without the supporting structure, will run about \$14 to \$18, depending, of course, on the number of plies in the belt, the thickness of the protecting rubber cover, the brand of the belt, etc. A conveyor of this type and width, however, may be made to carry as much as 400 tons of coal per hour.

veyor would be only about 8 in. Per foot of length between centers of head and tail sprockets, a pan conveyor will generally cost 25 to 50 per cent more than a belt conveyor of the same capacity, provided the belt conveyor does not have to be made excessively wide in order to handle large lumps.

Ordinarily the pan conveyor is carried on rollers placed on a pitch of from 8 to 18 in. For extremely heavy duty, however, this pitch may be increased to 24 in. This construction entails a large number of wearing parts—pins and bushings—that must be lubricated. The rollers, however, move at slow speed and if provided with grease chambers require lubrication at intervals of about three or four weeks. The entire equipment is of rugged design and construction and with proper care its life compares favorably with that of the belt conveyor.

It might appear from the above that a pan conveyor is not as good an investment as a belt. Under certain conditions, however, it possesses some distinct advantages, particularly where the distance between centers is comparatively short. Again, it may be employed to carry coal down much steeper inclines than the belt.



FIG. 5
**Retarding
Conveyor**

This conveyor, like the chute shown in Fig. 1, receives coal at two points. As the coal is dragged along a trough by flights attached to the lower strand of chain this can be easily done without appreciable breakage. Scraper conveyors like this may be made to follow fairly abrupt changes of grade or direction of travel.

The pan (or apron) conveyor consists of overlapping plates or pans attached to steel links which are carried by rollers running on a track or a guideway. This type of conveyor requires a little more power than a belt, but this is no disadvantage in an installation where the grade is over 5 or 6 deg. The pan conveyor is a slow-moving machine and should not be run over 100 ft. per min., and preferably at about 80 ft. per min., the speed depending somewhat upon the pitch of the conveyor chain and the diameter of the sockets. By using high sides on a conveyor of this kind, the coal may be piled upon it and large capacity obtained with comparatively small width even at the slow speed necessary with this type of machine. Because of its slow speed, refuse may be picked from it as it conveys coal to the tippie, particularly if a screen or set of fingers installed at the feed end places the fine coal beneath the lump.

Taking as an illustration the 400 tons per hour mentioned under belt conveyors, a pan conveyor 48 in. wide and traveling 80 ft. per min., would carry this quantity of coal in a bed approximately 11 in. deep. At a speed of 100 ft. per min., the thickness of coal on the con-

veyor is not, as a rule, advisable to install a belt conveyor on an inclination of more than 18 deg., whereas a pan conveyor, particularly of the reverse beaded type, will satisfactorily transport coal down a 30-deg. incline. The pan conveyor also may be carried over sharp vertical curves. A common example of this characteristic of the pan conveyor is seen where it is brought down a steep incline and then broken sharply into a horizontal run to the discharge point on the tippie. Furthermore, as already stated, it may be used for picking refuse from the coal.

The scraper like the pan conveyor is carried on chains. In down-slope installations, however, the rollers are often omitted, either the links themselves or the lugs attached to them sliding along steel guides. Grease may be applied to these guides to reduce friction and wear. The omission of the rollers simplifies the lubrication problem, as the only turning of the pins in their bushings is performed while the chain is passing around the head and tail sprockets. This amounts to only a fraction of a revolution. Like the pan conveyor, this type may be carried over sharp curves.

Because of its greater frictional resistance, this type

of conveyor is better adapted to slopes of from 15 to 35 deg. It may, of course, be used on lesser inclinations, but requires more power which in turn means heavier driving machinery and bigger pins and links. On wide conveyors, or where the drag is heavy, the scraper flights must be strong and well stiffened with angles or heads to prevent bending in the center.

In a conveyor of this kind, the coal is generally carried on the lower strand. For this reason, it can be discharged into chutes without appreciable breakage. It may also be discharged at various points by merely opening or closing slides or valves in the bottom of the trough. In some cases, this is an important consideration as for example, in distributing coal throughout a bin with a minimum of breakage. Degradation of coal in transit is insignificant. As the trough plates wear extremely smooth there is only a small percentage of coal in contact with them and the abrasion is accordingly slight.

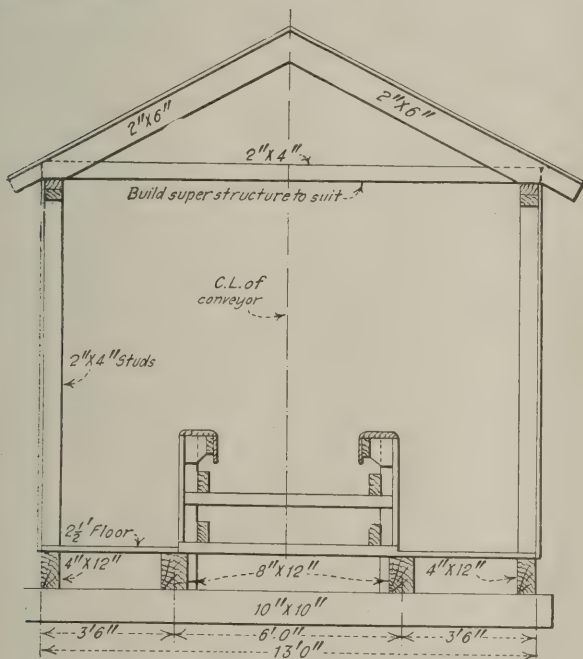


Fig. 6—Cross-Section of Pan-Conveyor Gallery

Only comparatively small timbers are necessary in a structure of this kind. As will be noted the largest ones shown in this drawing are 10x10 in. and 8x12 in. The side walkway is not infrequently carried along one side of the conveyor only.

The scraper conveyor travels slowly, generally at from 60 to 80 ft. per minute. It is not, however, adapted to the picking of refuse. Its cost usually ranges between the cost of a belt and that of a pan conveyor. It is difficult to compare the normal life of any of the various types of conveyors, except in a general way, as conditions and the care given the equipment vary materially. Under similar conditions, if the care given these machines is equal, the scraper conveyor should have about the same life as the pan conveyor, except that the trough plate may need renewal before the rest of the equipment, this, of course, depending upon the thickness of the plate used in the first place and the abrasive qualities of the coal handled. Although such conveyors have been installed on inclines 500 to 600 ft. long, they are not well suited to these lengths. This is because of the large number of joints that must be kept up, the size of the links and pins necessary to carry the load and the difficulty of keeping the two strands of chain of equal length.

The rope-and-button conveyor consists of cast-iron

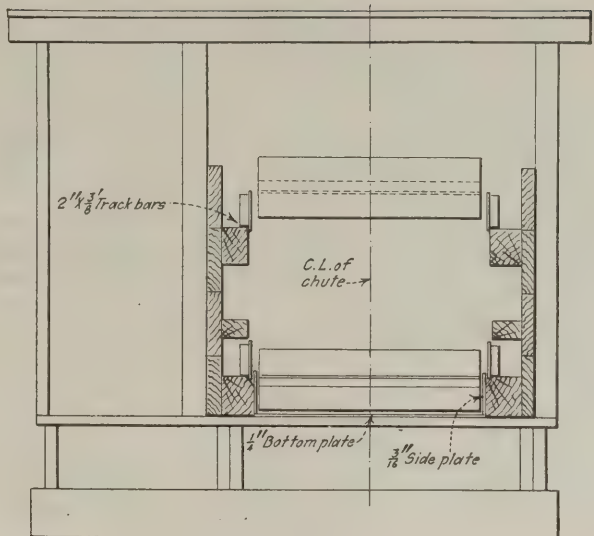


Fig. 7—Cross-Section of a Scraper Conveyor

The construction used in this gallery is quite similar to that shown in Fig. 6. As conveyors of this kind can be made to follow approximately the contour of the hillside timbers in the supporting bents are seldom larger than 6x6 in.

buttons or disks clamped to a steel wire rope, thus forming a single-strand, endless conveyor passing over a sheave at either end. The buttons move in a U-shaped, plate trough, the lower strand as a rule carrying the coal. Head and tail sheaves are provided with pockets spaced according to the pitch of the buttons on the rope. Into these, the buttons drop, the hubs being engaged by the edge of the pocket which serves as a sprocket. The diameter of the sheave is made to suit the size of rope used, which in turn depends upon the stresses encountered in the conveyor line. The sheave at the upper end of the line is made the drive sprocket because of the difficulty encountered in taking up slack in the line if the tail sheave with its take-up bearing were located at the upper end.

This type of conveyor is the simplest and cheapest of the four varieties here considered, provided the length is approximately 150 ft. or more. The higher cost of sheaves and driving machinery forces the price up on short installations. In first cost, the rope, buttons and troughing for both strands will average from \$5 to \$6 per foot of center-to-center distance between head and tail sheaves. To this must be added the cost of the sheaves themselves, together with their shafts,

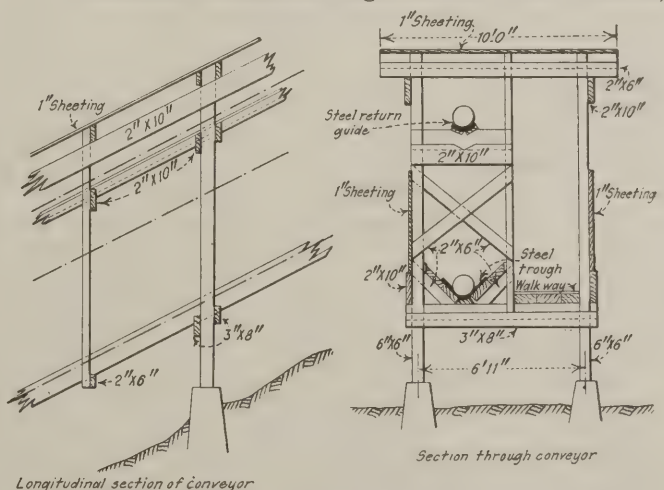


Fig. 8—Sections of a Rope-and-Button Conveyor

This well illustrates the simplicity of gallery construction. Unlike the other conveyors this type is not well adapted to follow sharp vertical curves. It can be carried however over gradual changes in grade.

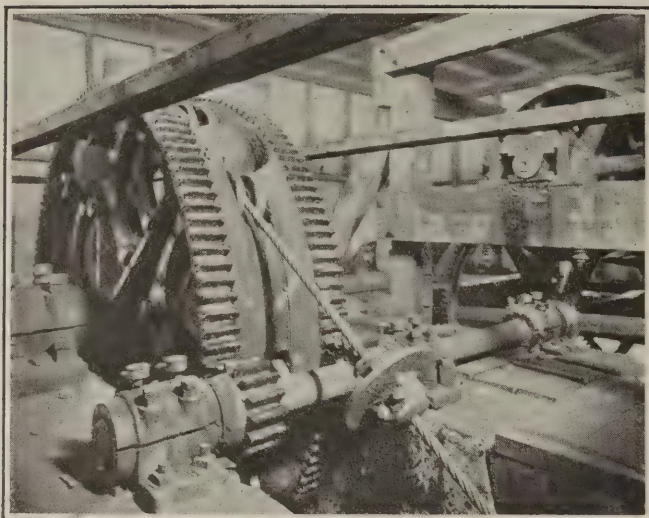


Fig. 9—Head Sprocket and Drive, Button Conveyor

Note the rollers on the sides of the button pockets in the driving sprocket. These engage and release the hubs of the buttons without shock or "grabbing." The drive of this type of conveyor is always placed at the upper end.

bearings and driving machinery. Maintenance and upkeep cost is low. The rope is subjected to only slight wear and its life is long.

An improved type of drive sheave places the load on the entering buttons with a minimum of shock, so that breakage of buttons or their slippage along the rope is minimized. Buttons are rarely broken and are cheap to replace should such an accident occur. When a button breaks, however, it does not interfere with the operation of the conveyor, as it is the rim portion that gives way and not the hub. The trough of this conveyor lasts for several years, its life, of course, depending upon the thickness of the steel plate, the tonnage handled per year and the abrasiveness of the material carried. The total tonnage transported over a given trough lining will also depend upon the average loading per hour, as the wear on the lining over any given period of time will be little more when moving 400 tons per hour than when operating at a 200-ton-per-hour capacity.

The labor necessary for operating a conveyor of this kind is a negligible quantity. No lubrication is required on the conveyor line, the head- and foot-sheave bearings and the driving machinery being the only points where lubricant is applied. By means of push-button control, the motor driving the conveyor may be started and stopped at the tippie or head-house as desired, and the feeder drive is ordinarily connected to, and operates in, conjunction with the conveyor drive.

Like the apron and scraper type, the rope-and-button conveyor runs at slow speed, generally about 80 to 100 ft. per minute. It is not particularly well suited for use in picking refuse from the coal, as the material is carried at considerable depth in the trough. At some installations, however, a part of the slate is removed by pickers stationed alongside the conveyor line.

Coal traveling in the lower trough may be discharged with minimum breakage and without spillage by the use of gates in the trough bottom. Discharge may be made at various points, just as with the scraper conveyor. As the coal lies fairly deep in the trough, only a small percentage of it is in contact with the plate. It is therefore transported practically without breakage.

On steel trough plates worn smooth by use, therefore, degradation arising from friction of the coal in contact with the plates is negligible.

The rope-and-button conveyor differs from the apron and scraper types in that it cannot be run over sharp vertical curves. A convex curve or hump adds to the wear and drag of the conveyor, and a concave curve must be so designed that all points in the trough are well above the catenary that the rope and buttons would assume under conditions of maximum stress.

A properly designed concave curve is in reality advantageous, as it tends to equalize the pressure of the buttons on the trough lining throughout the entire length of the conveyor and thereby equalize and reduce the friction and wear. A curve in the conveyor line, however, adds somewhat to the labor cost of erecting the gallery and to the engineering work in both field and office for the trough must be at the proper elevation throughout the bend.

The rope-and-button conveyor finds its greatest field of usefulness on inclinations ranging between 15 and 35 deg., particularly on long conveyors. On moderate slopes, the friction of coal and buttons in the trough increases the power consumption and the tension on the rope. There is, however, no fixed angle under which it may be said that this type of conveyor should not be employed, but the weight of coal handled per hour, the length of conveyor and other factors must be considered. Long installations of this kind have been made embodying vertical curves in which the lower portion of the conveyor even approaches the horizontal.

There is also no fixed maximum inclination beyond which it may be stated definitely that a rope-and-button conveyor is impracticable. On slopes exceeding 35 deg., however, coal lying in the trough above the buttons is liable to roll and flow upon itself. For this reason, it is well to run a steep conveyor at maximum speed.

The ideal condition for a rope-and-button conveyor is to have a slope of about 26 deg. At this inclination, the loaded conveyor is approximately at its point of equilibrium, that is, it is neither consuming nor generating power. This critical angle, however, cannot be fixed definitely, as it will vary with the loading of the

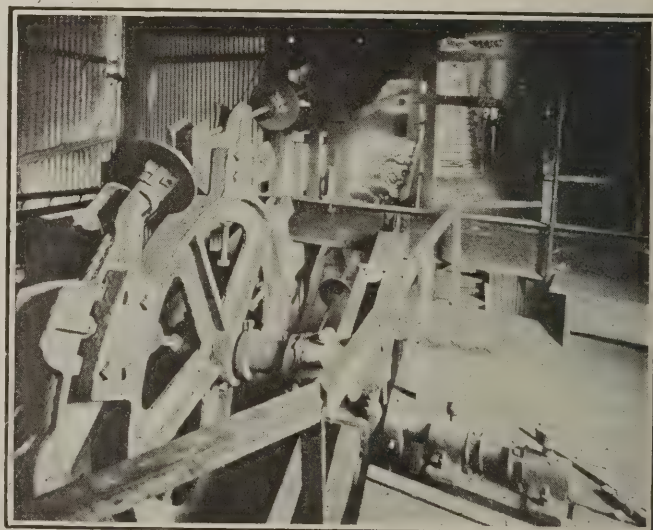


Fig. 10—Tail Sprocket at Conveyor Foot

The cable here traverses a sheave provided with pockets for the reception of the buttons. Takeups are always placed at the foot of the conveyor as otherwise they would be difficult to operate. The head shaft, drive machinery and tail shaft are the only places on a conveyor of this kind that require lubrication.

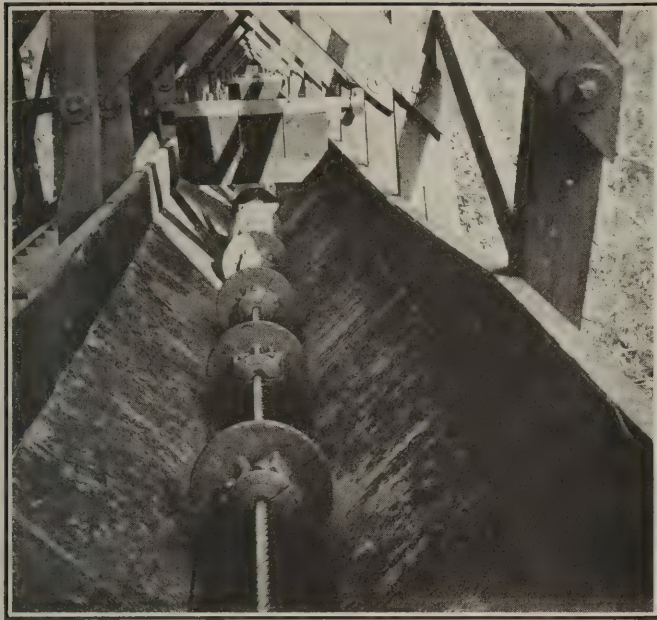


Fig. 11—Trough, Cable and Buttons

Coal may be piled well above the top of the buttons and yet be transported with ease. When a button breaks it is the rim, not the hub, that gives way. As a result this makes little difference in the operation of the conveyor and repairs may be made when opportunity offers.

conveyor, the physical characteristics of the coal and the condition of the trough lining. Again, a conveyor on a 26-deg. slope may develop power when moving coal at the rate of 400 tons per hour and consume power when operating at the rate of 100 tons per hour.

The capacity of a conveyor of this kind may be extremely large. In fact, on an ideal inclination, no limit can be set, for the coal acted on by the buttons will carry forward the material that is piled in the trough above them. On inclinations greater than 30 deg., the movement of the coal upon itself will cut down the depth to which the conveyor may be safely loaded. This also limits the capacity so that, as previously mentioned, a steep conveyor should be run at maximum speed so as to reduce the volume of coal carried per lineal foot of trough.

Where the inclination of the conveyor is such that

it becomes self acting when loaded, a brake must be provided to absorb the power generated and control the speed of the conveyor. The most satisfactory arrangement of this kind is a brake pulley carried on a counter-shaft mounted in floating bearings. This arrangement allows the pulley to run free of a stationary brake block when the drive is from the motor, but draws the pulley back against the block when the driving power comes from the conveyor. Worm gears also have been used in drives of these machines, and, of course, are arranged so that they lock themselves when the power fails. A solenoid brake may be provided to stop the conveyor in case of power failure, but such a device takes hold suddenly and throws a shock into the conveyor line that may prove damaging. The automatic brake first mentioned takes care of power failure without introducing this sudden shock.

Conveyor galleries are frequently built of wood as the fire hazard entailed by this construction is not as great as that at tippie or headhouse, and their life is fairly long. They may, of course, be constructed of steel, particularly if for topographic reasons long spans between supports are necessary. It also may be advisable to use steel bents and long spans if the hillside is subject to slip and points of solid anchorage are difficult to obtain.

A wooden gallery for the various types of conveyors above described, including a walkway on one side, will require approximately 60 to 75 board feet of lumber above the supporting bents or towers for each foot of conveyor length. Bents are usually so spaced that 16- or 18-ft. stringers may be used. As a result, the load upon any bent is not great and 6x6-in. legs are commonly used, except for high bents. Even if the conveyor is high above the ground, this size of lumber may be used if resort is made to tower construction.

Galleries are usually provided with a walkway along one side of the conveyor only. They may be left open-sided if the climate is not severe, though it is usual to inclose at least one side, ordinarily that next to the conveyor so as to reduce the quantity of rain and snow blowing in upon the belt, chains or cable. The rope-and-button conveyor requires less protection than any of the other types.

FIG. 12

A Long Conveyor

To such conditions as those here shown the rope-and-button conveyor is particularly adapted. The slope of the hillside is almost ideal for this type of installation as a concave curve somewhat flatter than the catenary that the cable and buttons would assume if hanging freely is best suited to reduce friction and equalize wear.



Selecting the Best Type of Motor for Driving a Mine Fan at Variable Speed

Fan Speed Often Decreased at Nights and on Holidays or During Development—Large First Cost Justified When Energy Charge Is High—Motor Should Operate at High Efficiency and Slow Speed

By B. W. CHADBOURNE
General Electric Co.

ELECTRICALLY operated mine fans are usually direct-connected, belt-, gear- or chain-driven. Many years ago most of the fans were belt- or chain-driven, but now fans are frequently directly connected to their motors. This change is due to the extended use of automatic starters, and also to the fact that there is a tendency for a belt to slip off the pulleys when the motor is being brought up to full speed.

At many mines it is necessary to operate fans at constant speed for twenty-four hours per day every day of the week. At other mines the volume of air required varies. A mine in the process of development requires only a small quantity of air but when it has reached an operating stage more ventilation is needed. A non-gaseous mine may require less air during nights and holidays than during working hours. Under these conditions a variable-speed drive is more economical than one that is fixed.

SQUIRREL-CAGE MOTOR IS CHEAP AND EFFICIENT

There are several types of electric motors suitable for driving fans operated at constant speed. Each has some advantages and some disadvantages. When the motor is directly connected to the fan a standard squirrel-cage motor is frequently desirable. It is cheap both as to first cost and operation; it is also simple and the upkeep is small.

The squirrel-cage motor does not operate so success-

fully with a belt drive, because it has a tendency to throw the belt during the acceleration period. For belt drives or for large direct-connected fan units, a wound-rotor induction motor is preferred because with it the acceleration can be made constant.

There are some installations where it is desirable to obtain power-factor correction. This naturally suggests the use of a synchronous motor. A standard-type synchronous motor will not develop sufficient pull-in torque unless the fan is greatly over-motored, therefore it will not bring the fan up to speed unless the airways are closed so as to reduce the load on the motor. This can be done, but it is not desirable to do so. When the power factor needs much correction, an oversize motor can be used, and in that case sufficient pull-in torque can be obtained. This, however, is uneconomical and consequently rarely done. A standard-type motor can be used with a magnetic clutch, but this arrangement is liable to put an excessive stress on the fan.

NEW MOTOR DEVELOPS MAXIMUM TORQUE

To overcome these difficulties the General Electric Co. has developed the super-synchronous motor, which has the stator mounted on bearings so that when the power is applied the stator revolves and soon reaches synchronous speed. The field circuit is then closed, and the motor has synchronous-speed characteristics, that is, it can develop its maximum running torque.

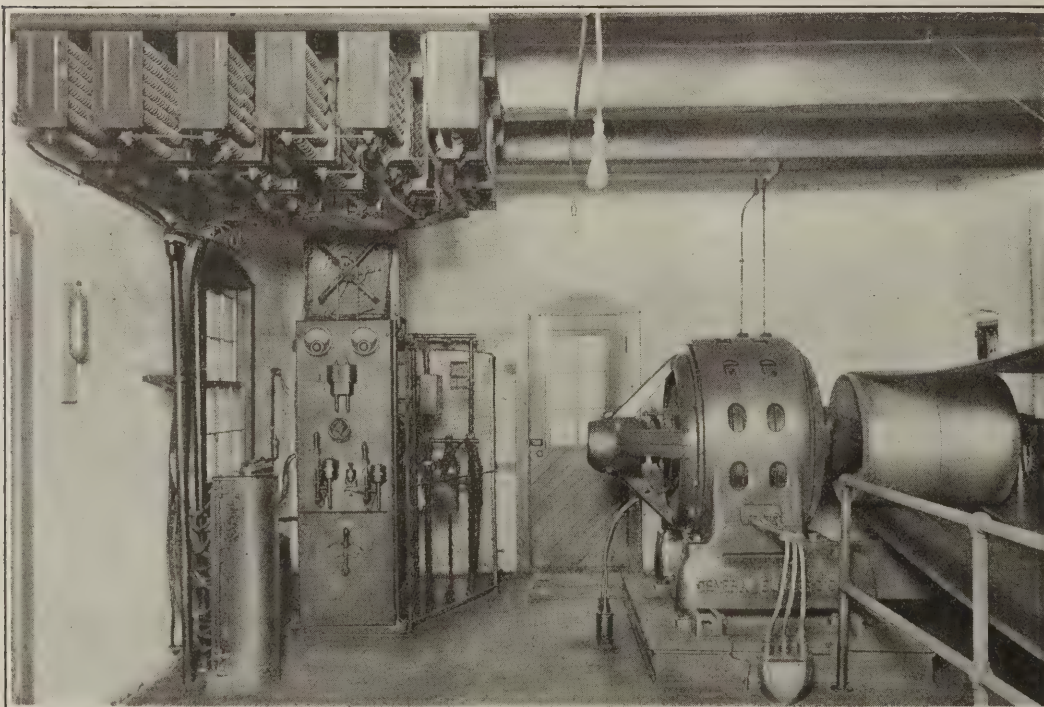


FIG. 1

Adjustable-Speed Mine Fan

This illustration shows a wound-rotor type induction motor driving a mine fan. Seven or eight different speeds are obtainable with this drive.

A brake is then applied to the stator and it is brought to rest, the rotor in the meantime begins to rotate and finally runs at synchronous speed. This motor can be used either belted or directly connected to its load. It is especially suitable for direct connection at slow speeds where an induction motor would have a very low power factor. This equipment is more expensive than the squirrel-cage, wound-rotor or standard-type synchronous motor but it has advantages over any of these drives.

When two or more speeds are required it is possible to use a two- or three-speed squirrel-cage induction motor, a wound-rotor induction motor with a regulating resistance in the secondary circuit, a commutator-type brush-shifting induction motor or a direct-current motor. Data are given in this article by which the cost and overall efficiency of these different kinds of drives can be compared.

As nearly all mines are supplied only with alternating current, it is necessary with a direct-current motor

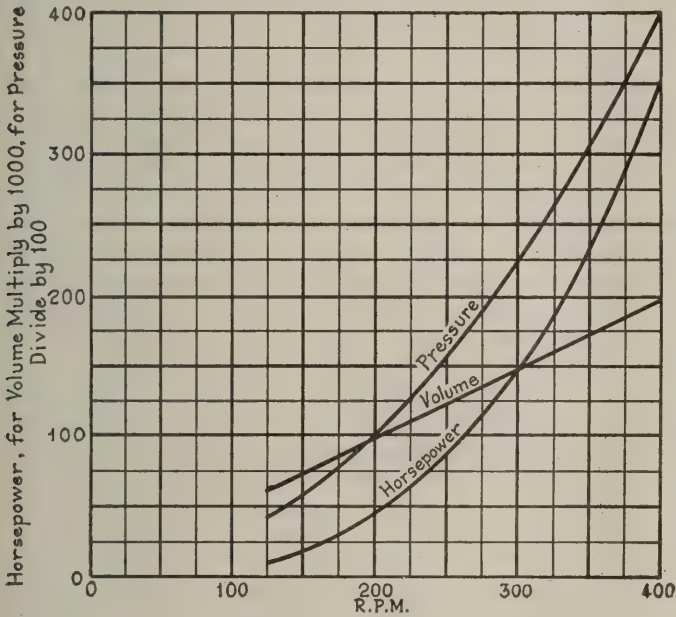


Fig. 2—Characteristic Curve, Typical Mine Fan

This fan is designed to deliver 200,000 cu.ft. of air per minute against a 4-in. water gage. When operated at this capacity the fan must be driven by a 350-hp. motor.

to have some device to convert alternating to direct current. A direct-current motor with speed control by armature or field resistance could be used, taking power through a rotary converter or alternating-current-direct-current motor-generator set. This would require extra machines and a substation. For the direct-current drive therefore we must consider the use of a separate motor-generator with generator-voltage control.

In order to make the various systems comparable, a particular case has been chosen upon which to base all the calculations, namely a fan which must deliver 200,000 cu.ft. of air per minute against a 4-in. water gage. Incidentally it may be said that the air thus circulated per minute weighs 8 tons or 12,000 tons per day. This work requires a 160-in. fan running at 400 r.p.m. taking 350 hp. For comparative purposes a number of slower operating speeds down to 130 r.p.m. have been chosen arbitrarily.

The results of tests made under the foregoing conditions have been plotted. Fig. 2 shows how the air volume air pressure and horsepower input vary with the fan

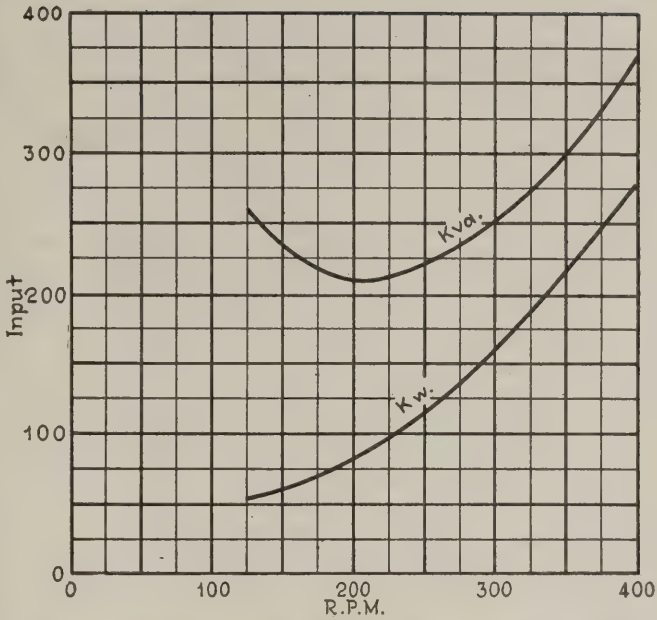


Fig. 3—Power Curve of Fan Driven by a Wound-Rotor Induction Motor

It will be noticed from the curves that at slow speeds the power factor of the motor is not good. This is particularly noticeable at speeds less than 200 r.p.m.

speed. In the calculations it has been assumed that the power required to drive a fan varies as the cube of the speed, all openings to the fan remaining fixed.

A wound-motor induction motor rated 350 hp. 400 r.p.m. directly connected to the fan, will meet the requirements. This type of motor complete with drum controller and resistor is simple and will be cheaper than any other drive. It gives seven or eight operating speeds from 130 r.p.m. to 400 r.p.m. and will cost about \$4,700. Fig. 1 shows this type of equipment but with the motor belted to the fan. The power input at various speeds is shown in Fig. 3. The costs given in this and the following paragraphs include boxing, freight for approximately 1,000 miles and installation charges.

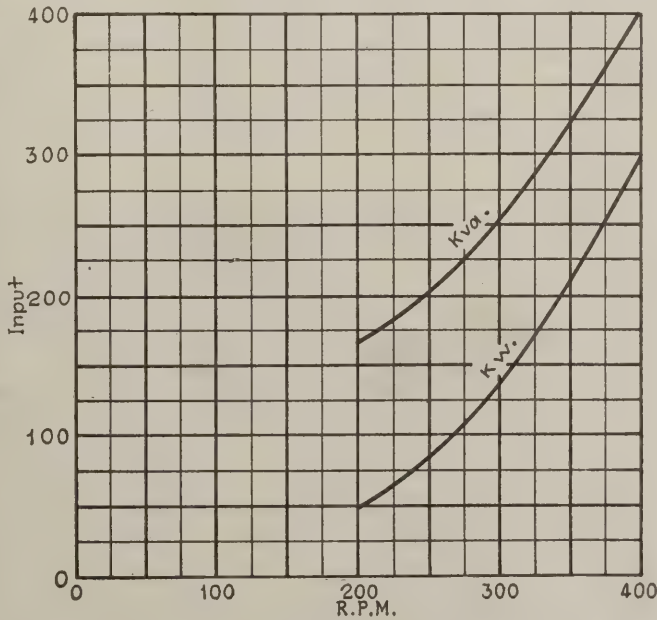


Fig. 4—Power Requirements of Three-Speed Induction Motor

The power input, of this type motor is greater at full speed but less at slow speed than for the wound-rotor induction motor. The control equipment is, however, simple.

Another drive which may be considered is a three-speed squirrel-cage motor, which may be rated 18/24/36 poles, 350/197/87.5 hp. and 400/300/200 r.p.m., thus giving three definite speeds at which the fan can be operated. The cost with its control would be \$7,800 or 66 per cent more than for the wound-rotor motor. The power input as compared with the wound-rotor motor installation is higher at full speed but lower at half speed with the inputs identical at about 300 r.p.m. The inputs at the three speeds are shown in Fig. 4.

A commutator type brush-shifting alternating-current motor with a normal rating of 350 hp. at 400 r.p.m. can be operated at any speed down to 130 r.p.m. by shifting the brushes and changing the stator connections from delta to wye. Practically an infinite number of operating speeds are thus made available. Any change in load, such as might be caused by an obstruction in the airway, will have a slight inverse effect on the speed. The complete equipment would cost \$9,400. The power input throughout the speed range is shown in Fig. 5. An installation where this motor was used is illustrated in Fig. 6.

FIRST COST IS HIGHER THAN OTHER SYSTEMS

If a system driven by a direct-current motor controlled by the voltage regulation of a direct-current generator were used this would require a 350-hp., 400-r.p.m. direct-current motor receiving its power from a synchronous motor-driven direct-current generator with exciter. The speed of the motor is controlled by adjusting the strength of the generator field. As it is necessary to buy three machines, the first cost, \$13,200, is higher than for any of the systems under consideration. The power input curve is shown in Fig. 7. At full speed it will be noted that the power input is less

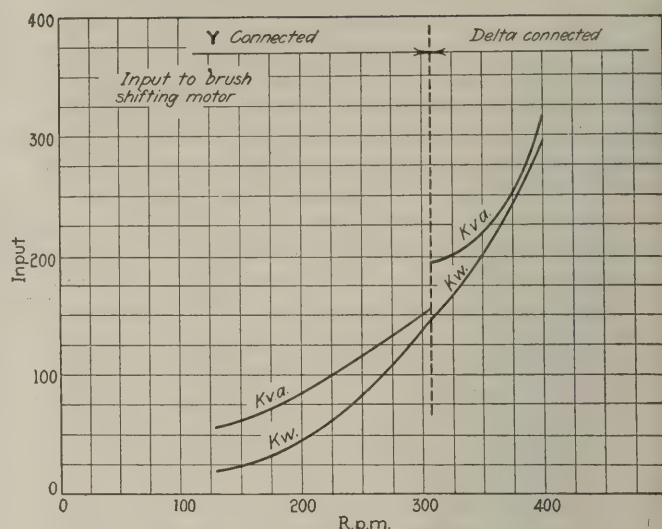


Fig. 5—New Motor Operates at Good Power Factors

The stator of the motor may be connected either wye or delta. By this arrangement it is possible to get a wide speed variation at good power factors. When running near maximum speed the stator winding is connected in delta.

than for either the wound-rotor or the three-speed squirrel-cage motor, but is slightly greater than for the brush-shifting motor. At low speeds its power input is less than that of any of the other types of drives outlined.

There are at least two other methods for driving mine fans at adjustable speed. These are the two-speed wound-rotor induction motor with rheostatic control between the two-fixed speeds and the wound-rotor induction motor with a Scherbius regulating set to control the speed. Both of these systems have a very high first cost and the gain in economy is not large enough to offset it. Therefore, we will not detail the cost or operating characteristics of these two systems.

Table I shows the input in kilowatts and kilovolt-amperes for each of the foregoing types of fan drive.

Table I—Input at Four Speeds With Various Drives

	Wound-Rotor	Three-Speed Squirrel-Cage	Brush-Shifting	D. C. with Gen. Voltage Control
400 r.p.m.				
Input kw.	282	294	296	326
Input kva.	367	398	312	...
300 r.p.m.				
Input kw.	160	132	140	148
Input kva.	255	254	150	...
200 r.p.m.				
Input kw.	83	46	45	60
Input kva.	210	163	89	...
130 r.p.m.				
Input kw.	53	...	20	35
Input kva.	260	...	60	...

MANY DRIVES USED FOR ADJUSTABLE-SPEED FANS

For mines requiring adjustable-speed fan drives, it is not possible to lay down any general statement as to which method of drive is best, for the reason that no two mines present exactly the same conditions.

We may, however, assume a case in which the fan operates at full speed nine hours per day for 300 days

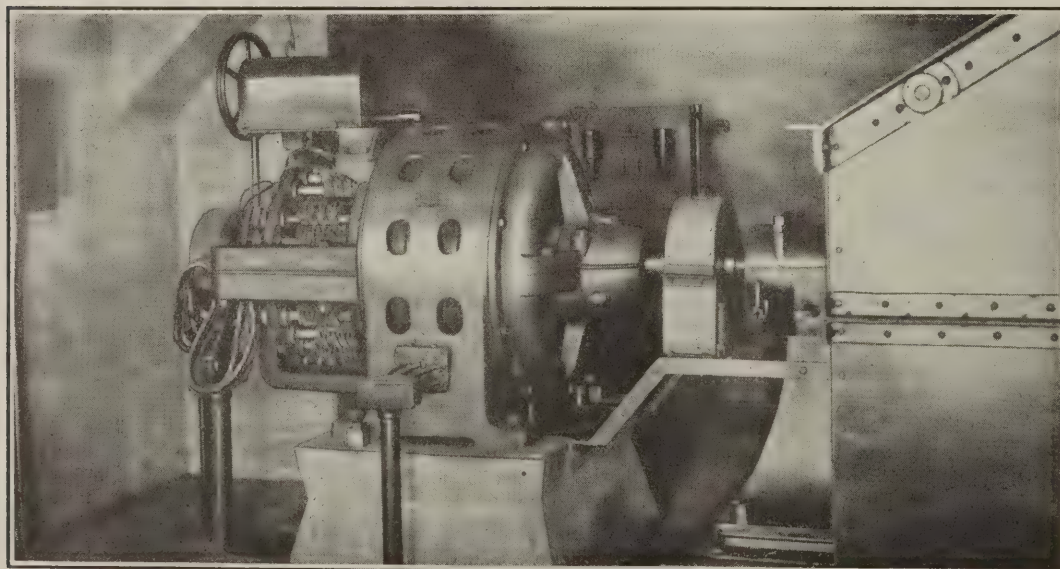


FIG. 6
Modern Fan Drive

This motor is supplied with automatic speed regulation. The brush-shifting mechanism may be controlled from a push-button or pressure regulator. The control circuit transfer switch is shown on the wall.

Table II—Cost of Operation Per Year With Different Drives

	Wound-Rotor	Three-Speed Squirrel-Cage	Brush-Shifting	D. C. Motor With Gen. Voltage Control
Fixed charge.....	\$710	\$1,170	\$1,410	\$2,000
Power charge, full speed.....	3,850	4,000	4,030	4,450
Power charge, one-half speed.....	2,640	1,460	1,430	1,910
Totals.....	\$7,200	\$6,630	\$6,870	\$8,360

in the year and at half speed the rest of the time. The fixed charge of 15 per cent includes interest, depreciation, etc. There is no penalty considered for the low power factor, and the power cost is taken as a half cent per kilowatt-hour.

Table II, shows that the first cost is not a large item when compared with cost of operation. It also shows that when the operator is not penalized for low power factor, the three-speed squirrel-cage motor is the most economical one to use. However, as this motor has only three operating speeds, it may be necessary to go to the next equipment in order of economy, that is, the brush-shifting motor. If, however, the operator is penalized for low power factor, then the brush-shifting motor or the direct-current equipment would be more economical.

The above data have been compiled not with the expectation that the problem as given would apply exactly to any mine, but to give the underlying principles of operation and with the belief that from the curves and data given, an operator may determine which type of equipment would best fit his particular

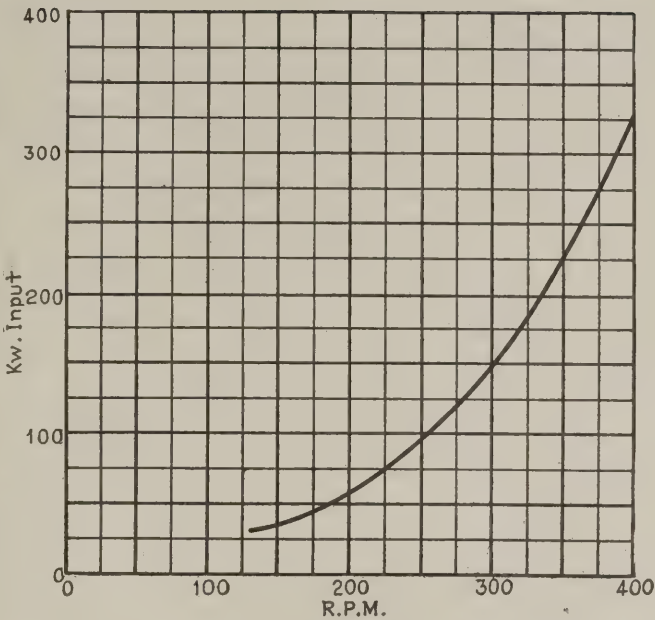


Fig. 7—Direct-Current Motor with Generator Voltage Control

This type of drive requires a special generator to supply variable voltage to the fan motor. It is an efficient drive even at slow speeds, but the first cost is usually prohibitive.

needs. These data also have been compiled because there is a growing demand for some better type of drive than the usual wound-rotor motor. In many instances this demand is best met by some type of brush-shifting alternating-current motor.

The Miner’s Torch

As Others See Us

A STATE agent for a large manufacturer of mining machinery had something like this to say on the subject of coal-mining men: “Recently we took on a new line of mine equipment, and, to put our records in shape so that we could give all our customers service and avoid mistakes, we wrote a letter to all the companies who had purchased equipment through the former agent asking that they furnish us with the shop number of the machines that they had in service and also give us the serial number which would allow us to tell the type of machine, as the model had been changed several times. We enclosed a stamped envelope for reply and so worded our letter that all that was required for reply was to insert a few figures and return it.

“We received replies from about one-fourth of the companies addressed. Less than half of the replies were complete and some were incorrect; we had a record of the highest number that had been issued by the manufacturer and thus had a rough check on the numbers sent in. If this information had been of service to us alone, one might have understood the indifference, but the advantage of preventing delays and errors in shipments would react solely to the benefit of the owners of the machines.”

A sales engineer for one of the largest manufacturers of electrical machinery recently told me during a con-

versation that he had come to the conclusion that coal-mining men were inclined to be bigots or fools because they rarely were interested in what their neighbors were doing, and in turn they would not allow their neighbors to find out what they were accomplishing if there was any way to prevent it. Most manufacturers when in the market for machinery welcomed information as to the kind of equipment specified by their competitors, and in order to get an order, a salesman usually had to show photographs of his equipment in operation in neighboring plants and have a list of satisfied customers to whom he could refer. But the coal men generally informed him that their problems differed entirely from those of their neighbors and that the experience of the other fellow could have little bearing on the matter.

A manufacturer of mine cars recently took me into his engineering office and asked me to glance over the drawings he had accumulated covering the mine cars he had built for various coal-mine customers over a period of fifteen years. In all that time he had never built cars for two different customers that were exactly alike; as a matter of fact many of them had individually several different styles of cars in use at a single operation. Dozens of times his salesmen had gone to managers who were preparing plans for new operations and offered to furnish them with prints of mine cars used in nearby operations and although sometimes requests had come in for the prints, he had yet to enter an order that would indicate that use had been made of the information furnished. Once he sent out a circular letter to a number of mine managers asking them to explain how they decided on the wheel base for their mine-car trucks and only 10 per cent replied to the letter.

South Wales Coal Region Is Principal Competitor Of American Mining Districts

Extent and Location of South Wales Coal Fields—Classification of the Different Grades of Coal and Their Uses—Difficulties Experienced in Mining and Marketing of Anthracite

BY HORACE WILLIAMS*

COVERING four counties of South Wales and extending into the County of Monmouth, which is administered legally as a part of England, lies a coal field regarding which the information available has been meager. The coal field has an extreme length of 90 miles and a width that varies from 21 miles in Glamorgan County to about 1½ miles in the County of Pembrokeshire where it extends from Abersychan to St. Bride's Bay and continues for an indefinite distance under the sea. Approximately, this field covers an area of nearly 1,000 sq.mi., including 145 sq.mi. beneath Swansea and Carmarthen Bays.

Almost throughout its extent the coal field is bedded on Millstone Grit, beneath which are Mountain Limestone, Old Red Sandstone and Silurian strata. In the extreme western portion, beyond Swansea Bay, however, the Millstone Grit disappears and the coal lies immediately on the lower Silurian formation. The coal field is practically divided into two elongated troughs by an anticline that extends from Pembrokeshire to a point just east of Pontypridd.

COAL RANGES FROM GAS COAL TO ANTHRACITE

Perhaps the most striking feature of the Welsh coal field is the variety of the kind and quality of the coal produced. The product ranges from bituminous to anthracite. The different classes of coal are described as gas coal, heavy bituminous steam coal, smokeless steam coal, bastard anthracite and anthracite. In the Gower area the principal seams around Llanelly and all the seams east of the line from Gowerton to Neath and Merthyr are more or less bituminous. North and west of that line, the same seams are carbonaceous; in the Aberdare and Rhondda districts, changing gradually to anthracite west of the Vale of Neath.

The coal measures may be assumed to have a total thickness of upwards of 7,000 ft., divided into three principal series, namely, "Upper Pennant," "Lower Pennant" and "White Ash." In the eastern portion of the field there are twenty-six seams having a total thickness of 99 ft., and in the western portion there are eighty-two seams presenting a total thickness of 182 ft. In each instance, however, the thickness of workable coal is much less than that just given. There are approximately 670 collieries, large and small, in South Wales, employing nearly 270,000 men. About four-fifths of the workers are engaged underground and the rest on the surface.

Much can be said regarding the superior quality of the Welsh coal. Experiments made for the purpose of testing the rate of deterioration of the Welsh coal under severe conditions of storage have proved that it does not lose its properties during extended periods. It

Table I—Estimated Tonnage, Percentage and Uses of Different Classes of Welsh Coal

Kind of Fuel	Estimated Tonnage	Per Cent	Uses
Bituminous	8,618,688,965	30.42	Domestic, manufacture gas, coke, etc.
Anthracite	6,310,292,214	22.27	Malting, hop drying, lime burning, gas power, steam raising and domestic use.
Steam (Western Division)	4,076,424,971	14.38	
Semi-bituminous or second-class steam	5,393,724,590	19.04	Stationary engines, bunkering steam vessels.
First-class steam..	3,936,657,410	13.89	Supplying Admiralty.
Total	28,335,788,150	100.00	-

is this quality that has earned for it a reputation of being the best coal in the world. A true anthracite from this field can be stored indefinitely and the briquetted fuel manufactured from the coal loses none of its properties over a long period of years.

An estimate of the contents of the coal field is given in Table I, showing the uses to which each grade or class of coal is best adapted.

The selection by the Admiralty of the coal from the deep mines of the Rhondda Valley for the consumption of the British Navy shows the high esteem in which this coal is held. It has been claimed that this coal enables ships at sea to travel at a higher speed than when supplied with any other coal. That fact, however, does not give the South Wales coal any real monopoly, and the competition between the Cardiff and the Newcastle coals has always been active. It was in the year 1881 that shipments from the Bristol Channel ports first exceeded those from the northeastern ports. In that year the coal exported from the South Wales



South Wales, the Leading Coal Field of the United Kingdom

The principal mining counties are Glamorgan, Monmouth, Carmarthen and Pembrokeshire. Monmouth is markedly Welsh (that is, British) in its population but English in its name and in the administration of its courts. In popular estimation it is a part of Wales.

*Great Western Rwy., Swansea, Glamorganshire, South Wales, England.

district exceeded that from the northern district by a half-million tons.

The development of the coal industry in South Wales and the expansion in its export trade is shown by a comparison of the total tonnage mined and the export shipment for the year 1874, as compared with similar data for the year 1915. In 1874, the mines in South Wales produced 16,000,000 tons of coal, as compared with 57,000,000 tons, in 1915. Again, the exports, in 1874, amounted to 4,000,000 tons, as compared with 30,000,000 tons, in 1915.

In the classification of the South Wales coals as "steam, bituminous and anthracite," given in Table I, it is estimated that the steam coal constitutes between 45 and 50 per cent of the workable seams; the bituminous coal, between 28 and 32 per cent; and the anthracite, between 20 and 24 per cent. The bulk of the steam coal is exported and by far the greater proportion of this is used for marine navigation. For that reason, the South Wales coal holds a leading place among the fuels supplied to ocean steamers at the various coaling ports.

The more bituminous coals, particularly those produced in the Monmouthshire district, are extensively used by railways in the operation of their locomotives. Again, those grades having the highest percentage of volatile matter, amounting in some cases to nearly 30 per cent, are mostly used in the production of gas and the manufacture of byproducts. The anthracite grades are consumed largely in malting, production of gas, cement manufacture and domestic heating. Some of these possess as much as 87 per cent of fixed carbon.

SIXTY COLLIERIES PRODUCE ALL ANTHRACITE

At the present time, the anthracite production is confined to slightly more than 60 collieries, located within a belt of 30 miles. Though a few of the larger collieries produce 700 tons of coal a day, the average output of these mines will range from 200 to 300 tons a day and a number of the smaller mines do not put out more than 50 or 100 tons per day. Until recently, most of the anthracite operations have been confined to drift or slope openings along the outcropping of the seam. All the collieries have grown from small beginnings to their present magnitude.

Today, there are few shafts of any considerable depth but the future expansion of anthracite mining will involve deep shafts and the investment of larger capital. From an annual output of 1,500,000 tons of anthracite thirty years ago, the production has steadily advanced, till in 1923 the production of Welsh anthracite reached 4,333,187 tons, except for a slight diminution during the years of the war.

Until about twenty years ago, the anthracite industry in South Wales was by no means successful and more money was lost than was made in the operation of the mines. In competition with Continental coal, in those early years, South Wales anthracite had to be sold at a low price, and the mines had great difficulty in keeping going. About that time, however, the introduction of what was known as the "Suction Gas-Power Plant" caused an increased demand for anthracite. These plants produced as much power from a ton of anthracite as was obtained by the consumption of ten tons of steam coal burned under a Lancashire boiler. This use of anthracite, in "Suction gas plants," marked the turning point in the history of the South Wales industry.

Yet, looking into the future, anthracite mining in South Wales presents many difficulties. The anthracite seams occur at the base of the coal measures and, being the oldest of the coal formations, are more broken and faulted than the steam coal and bituminous seams which were formed later. Moreover, the anthracite seams are numerous and vary in thickness from a little over a foot to 9 and 10 ft. At present, none of the seams having a thickness less than 30 in. are being worked.

In most of the operations, the roof overlying the coal is difficult to support, and much timber and labor are consumed in cleaning up the frequent roof falls. Faults and minor dislocations are of frequent occurrence, all of which makes the mining of anthracite more expensive than that of other coal. However, with improved mining methods and the introduction of coal-cutting machinery and mechanical conveyors, the thinner seams will be developed.

As is well known, in order to meet the requirements of the anthracite market, this coal when mined must be subjected to elaborate treatment. From the time the coal is loaded at the face and before being shipped, it must undergo a system of mechanical grading, sizing and cleaning by hand-picking and washing, which makes anthracite, in a sense, a manufactured product. By these processes, in South Wales, some thirteen different sizes are produced for various requirements. Swansea is the chief center for the production and marketing of this fuel. From 1894 to 1920 the production has increased from 1½ million to 4½ million tons, owing chiefly to foreign demand, which in 1920 consumed no less than 70 per cent of the output. There are few, if any, coal fields in the United Kingdom better equipped for shipment facilities than that of South Wales. The principal docks are those of Cardiff, Newport, Swansea, Port Talbot and Llanelli, all now under the control of the Great Western Railway Co.

Cement That Matures in 24 Hours

An extremely quick-setting cement is not desirable, but there are many instances where it would be advantageous to use a cement that after the initial set would in a few hours reach its maximum tensile strength. This is especially true in week-end work where operations have to cease unless the cement has hardened before the time for resumption. If the cement will mature in 24 hr. the delay in operation is nil or considerably shortened.

A new product known as Lumnite cement is being manufactured at Northampton, Pa., by the Atlas Aluminate Cement Co., 25 Broadway, New York City. It is said not only to possess the desirable qualities of portland cement but to acquire a strength in 24 hr. somewhat greater than the other kind of cement will attain in 28 days.

A large proportion of high-grade aluminum ore (bauxite) is used in the mixture, and the raw materials are then fused and ground to a considerably greater fineness than is necessary under standard specifications for portland cement. When lumnite is used the mix should be slightly wetter than with portland grades because of the more rapid hydration of the former. The initial setting by this means can be arranged to be no more rapid than with portland cement.

Lumnite cement is somewhat more expensive than portland, and it cannot be mixed with other cements without both losing their distinctive qualities.

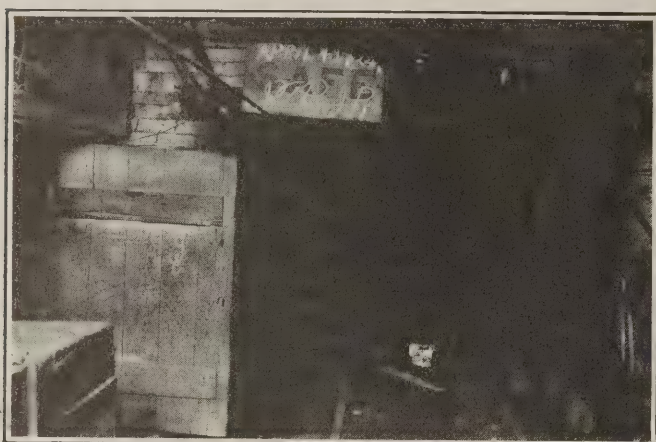
Benwood Explosion Shows Need for Stricter and More Uniform Mining Laws

Fire That Followed Blast Quickly Extinguished by Sealing Off—
All-Service Gas Masks Prove More Advantageous Than Oxygen
Apparatus in Rescue Work—Necessity for Rock Dusting Emphasized

BY ROBERT M. LAMBIE

Chief Inspector of Mines, West Virginia

THE necessity for a change in our state mining laws is forcefully brought to our attention by several recent serious explosions. The Castlegate explosion attracted most consideration because more men lost their lives in it than in others and chiefly



The Benwood Mine Was Believed Safe

Too much reliance cannot be placed on the condition of a mine as reported on a bulletin board by firebosses or any other official making an inspection. When the miners entered the Benwood pit mouth April 28 they felt assured of safety, for they saw on the bulletin board the date and the O.K. and initials of the two firebosses. Less than an hour later the explosion occurred.

because its occurrence awakened Utah to the need for drastic revision of and additions to its mining laws.

All attention is now focused on the situation created by the explosion at the Benwood mine, in West Virginia. The industry wants to know the facts—and rightly—relating to the most serious explosion that has taken place in many years in that state.

The explosion in the Benwood mine of the Wheeling Steel Corporation, near Wheeling, W. Va., occurred on Monday, April 28, at 7:08 a.m., taking the lives of 118 men. Not a man in the mine when the explosion took place was able to save himself. Until the examining commission makes its investigation and the inquest is held, no statement can be made fixing the agent of ignition which set off the explosive mediums. However, it is safe to say that a pocket of gas was ignited and the resulting local explosion propagated by coal dust swept all the inner workings and galleries of the mine. The explosion is believed to have originated in Section 9, North.

At irregular intervals this mine, which works the Pittsburgh No. 8 seam, liberates gas at the faces of advancing headings. Nevertheless, it always was con-

sidered safe, though classed as gaseous, and open lights were used by all men with the exception of the firebosses. Dry and dusty sections of the mine were sprinkled by a water car. Both permissible and black powders were used for shooting.

The Benwood mine was opened up about sixty years ago. Its former owners developed it on a two-entry system for a distance of 7,500 ft. from the pit mouth. The present owners developed all its new workings on the three-entry system. Cross entries perpendicular to the mains and butt entries at right angles to the cross entries develop panels in which rooms are driven in two directions on both sides of the butts, which usually is the practice where no pillars are recovered, as in this mine.

EXPLOSION SHOWS VENTILATION INADEQUATE

Up until Feb. 24, 1924, only one intake and one return were provided for ventilation. Realization that better ventilation was needed, when a local explosion last autumn of a pocket of gas in which a fireboss and two other men were killed, led to the sinking of a 9x13-ft. concrete shaft 315 ft. deep. This has an open stairway but no hoisting equipment and it serves as an intake for a part of Section 5, North.

Two firebosses were constantly employed in the Benwood mine, starting their inspections in time to accompany the miners to their working places. On the morning of the explosion the firebosses had made their runs and reported no gas in any section of the mine. A night crew had distributed supplies, including explosives, to all working places in each of the live sections. As was customary, the distribution of supplies was supervised by one of the firebosses.

At 6:30 a.m. two man trips entered the mine. One traveled to Section 5, North, and the other to the main East and 8, North sections. Both trips had reached their destinations before the explosion occurred. The men in Section 5, North, were found a short distance from the trip and apparently were headed for their respective working places, as also were the majority of the men in Section 8, North. Eight men were found in 5 East haulageway in a small trip of mine cars that evidently had been detached from the main man trip and was being hauled by a gathering locomotive.

The men in the main East section had left the man trip and were found some distance away from the trip landing. One of these men was Fireboss Rawlins, who had examined this section of the mine for gas a few hours before the explosion.

The force of the explosion extended to nearly every section of the mine with the exception of an area within a radius of about 1,000 ft. of the airshaft, which is remote from the probable seat of the explosion. Its

Note.—This report was written before the investigation commission of state mine inspectors made its report and before the coroner's inquest was held.

violence was checked at a point on the main entry about 500 ft. from the pit mouth because of the presence of wet spawlings of roof material on the bottom of the entries. Because the explosion spent itself before reaching the outside, no damage was done to the ventilating fan. If the airshaft had not been sunk, or had the violence of the explosion continued unabated to and up the airshaft, it is quite likely that attempts to enter the mine would have been futile, and in that event the Benwood mine with its victims would have been sealed.

All stoppings on the main entry and many on secondary entries were demolished and several overcasts were partly or totally destroyed. That brick stoppings are stronger than those of tile was conclusively proved in this explosion, for the former resisted concussion while the latter collapsed.

The explosion started heavy falls of roof in almost every section of the mine, which hampered exploration work. Practically all timbers were dislodged, releasing heavy loads of roof material on the entries. So weak and treacherous is the roof in this mine that timber sets placed on 2-ft. centers were required on every principal entry. A 6-in. bed of roof coal is left in mining, above which is an easily weathered soapstone 4 to 10 ft. thick.

HEAVY FALLS ARE MENACE TO RESCUERS

Many difficulties were encountered which obstructed the rescue and exploration work to recover the bodies of the victims. Heavy falls on the main entry extended from the point where the explosion spent itself, 500 ft. from the pit mouth, in by for thousands of feet, obstructing an entry into the inner workings of the mine through the drift opening. A rescue team, on advancing 4,500 ft. from the pit mouth by crawling over the falls was forced to give up the attempt. In the evening of the first day activities were transferred from the pit-mouth side of the mine to the Browns Run airshaft.

In order to maintain a larger volume of fresh air in the workings being explored, the system of ventilation was changed. The intake of the split ventilating that area nearest to the pit-mouth side of the mine was stopped after two of the temporary stoppings erected in the early exploration were removed. This intake then aided the regular return airway in conducting air to the exhaust fan.

The change increased the flow of fresh air down the airshaft from 17,000 to 27,800 cu.ft. per minute and served, wherever the ventilation was effective, to draw all gases away from the shaft. The volume of fresh air entering the shaft was increased hourly as temporary stoppings were erected to guide the ventilation. Incidentally, the water gage reading of 7 in. is a measure of the damage done by the explosion in destroying ventilation and obstructing airways by bringing down roof.

Browns Run airshaft is reached by traveling over a country mud road for about 3 miles from a hard state road. A heavy rain throughout the first day made the mud road impassable for trucks; therefore wagons, sleds and tractors were used in transporting supplies to the shaft. As no hoisting equipment had been installed in the shaft, supplies had to be lowered by a rope attached to an improvised cage platform, passing over a pulley block fastened to a hastily erected wooden headframe, and drawn by horses. Later a tractor was pressed into service for raising and lowering the cage.

Rescue men were compelled to use the stairs in entering and leaving the mine.

As an aftermath of the explosion, a fire broke out on a pillar between rooms No. 3 and 5 off 19 East heading. The roof in the vicinity of the fire fell heavily due to the high temperatures developed. The fire was discovered following an investigation subsequent to the night shift's complaints of headaches and the discovery of such manifestations of underground fires as "breathing" action.

Little time was required to extinguish the fire by sealing off the fire zone. An air lock was erected to allow the passage of men into the fire zone after the fire was believed to have been extinguished. After a search in this zone for bodies, it was sealed for the second time. The situation was precarious because of gas about 1,000 ft. from the fire, a fireboss patrol being required at all times to protect the men exploring the mine.



Scene at the Shaft on the Day of the Explosion

The shaft has an open stairway but no hoisting equipment and serves as an intake for a part of Section 5, North.

The cause of the fire is not known, though the theory is advanced that a heavy squeeze on a room pillar caused spontaneous combustion. If the fire started before the explosion it may have been responsible for the latter. There are no manifestations of violence in the fire zone; consequently the explosion did not originate in this area.

The Benwood explosion, like several others of less serious consequences, should emphasize the necessity for classifying all mines as gaseous that liberate any quantity of gas. To avoid similar disasters, those mines which rightly should be termed gaseous must use approved electric cap lamps and explosion-proof motors and also permissible explosives.

The advantage in practicability of the Burrell all-service gas mask over self-contained oxygen-breathing apparatus in rescue and exploration work following an explosion was conclusively proved at the Benwood mine. At least fifty masks were in use at all times and about 90 per cent of the work was done by men wearing them. However, the self-contained oxygen-breathing apparatus was used to explore places where it was thought the percentage of oxygen in the air was not sufficient to support life. The latter equipment also was worn by men who accompanied the gas-mask crews, to act in cases of emergency. In only rare instances was the heavy and cumbersome outfit really required. Men

wearing the gas mask penetrated as far as 125 ft. beyond points at which the carbon monoxide content of the air killed canaries.

How much greater are the freedom of movement and efficiency in the work of the wearers of gas masks was demonstrated to H. Foster Bain, Director of the U. S. Bureau of Mines, who spent a long time in this mine, wearing a gas mask himself and watching the rapid erection of stoppings, the recovery of bodies and other work by men equipped with the mask. In many cases, with cars jammed across the tracks and with timbers knocked crosswise and interlocked, it would have been exceedingly difficult to work with self-contained oxygen-breathing apparatus.

Mine rescue stations, in my judgment, are not complete unless equipped with at least ten gas masks.

Of the men who lost their lives in the Benwood explosion I am certain that the two men who were first found would have saved themselves had they carried a self-rescuer (diminutive gas mask). Evidence surrounding the finding of at least 35 bodies proved that these men were not killed by the violence of the explosion. As it was, many of these men tied handkerchiefs around their noses and mouths in an attempt to ward off death by the breathing of afterdamp. Had they also been equipped with self-rescuers, and not been prevented from reaching the outside by falls, they, too, would have been saved.

WILL URGE WEST VIRGINIA TO ADOPT ROCK DUSTING

There remains one more point about which I desire to speak, and that is the necessity for rock dusting to prevent the propagation of explosions. It is my intention to use every resource at my command to urge the operators of West Virginia to take this important step in the direction of safety.

The criticisms which appear in this report are not directed in particular toward any company, field, district or state. Accidents of small or large magnitude cannot be attributed directly to carelessness or neglect on the part of a mine or company manager. Before state mine departments can effectively place responsibility for accidents and fatalities they must build a structure of mine laws that provides no loopholes for evasion. The present laws must be brought up to date in order to meet with the requirements of our fast-growing industry and guard lives and property under conditions brought about by advanced methods of engineering and operation. To that end coal-producing states should combine in an effort to make uniformity of mine laws a major consideration.

It is high time that an interstate code of safe-practice regulations be formulated, to which individual states so far as possible should adhere, in a sweeping movement to revise and extend the scope of mine laws. There are many ramifications to the achievement of the purpose for which we should strive, but in sum and substance our biggest task is the attainment of uniformity in the mine laws of states in each competitive region. When this is accomplished, all operations in each of the several competitive regions will be placed on a plane of equality in regard to the monetary cost of obeying the mine laws in their respective states.

There is yet another phase of our prospective program which must not be overlooked. That is the education of the consumer of coal in the importance of safety in mining. He must be made to realize that the cost item resulting from the employment of safety precau-

tions must be absorbed in the price of a ton of coal; also that safety can be obtained only by the use of permissible equipment, which is more expensive than that which is not approved, and safety devices of various kinds. All these increase the cost of coal. If only the consumer paid for these items, as he should, and in periods of depression such as we are experiencing now, cost cutting were not applied to anything that guarantees safety!

Benwood Blast Due to Ignition Of Gas and Dust by Open Lamp

Inquest Proves That No Mine Working Pittsburgh No. 8 Seam Is Safe Without Closed Lamps and Rock Dusting

FOLLOWING the presentation of evidence lasting all day relative to practices before and conditions after the Benwood mine explosion, at the coroner's inquest held in Benwood, W. Va., on May 10, the jury returned the following verdict: "That one George W. Holliday, Jr., and others came to their death in an explosion on the 28th day of April, 1924, in a coal mine located in the City of Benwood and owned by the Wheeling Steel Corporation, said explosion being caused by the ignition of an accumulation of gases combined with coal dust, by an open miner's lamp."

Such were the facts brought out in the hearing as told by all witnesses who knew the conditions as they might have existed at the point of origin before the explosion and as they did exist after. Though a fire was discovered in the mine during the exploration work, the evidence proved that even if it had started before the explosion, it was not responsible for the ignition of the gas which caused the latter.

Practically all the testimony coming from state inspectors, company officials and other men who helped in restoration of ventilation and the recovery of bodies proves almost conclusively that the explosion originated in No. 4 room on 9 East off 9 North. In this room a fall of 8 ft. of roof occurred about 20 ft. from the face.

This fall probably occurred after the fireboss' examination on the morning of the explosion. When roof falls in the Pittsburgh No. 8 seam under heavy cover it is likely to liberate gas soon after. This is what



Muddy Roads Impassable to Trucks but Not Tractors

This is an example of the difficulties experienced in getting supplies to the Browns Run airshaft.

certainly must have happened. The miner who was supposed to work in this room most likely approached the fall and then either climbed over or around it, setting off the gas. His body was hurled from the face of the room to the entry.

No. 4 room is driven in about 100 ft. from the entry and is connected with rooms No. 3 and 5 by means of breakthroughs, in accordance with the mine law requiring that the latter be turned every 80 ft. Carbonization on the inby side of timbers and distinctive coking of ribs enabled the investigators to trace the path of the explosion from the fall near the face of No. 4 room out to the entry, and also through the breakthroughs to right and left to No. 3 and 5 rooms respectively and thence to the butt entry and through every part of the mine.

Interrogation of all witnesses who were familiar with the ventilating fan dispelled the rumor that the latter was shut down on Sunday. It had not been shut down for nearly two months prior to the explosion, and then only for about 20 minutes on a Sunday while brushes were being adjusted in the motor. Another rumor to the effect that one J. T. Boyle, who really laid track, was permitted to act as fireboss was as readily disproved.

MINE, THOUGH GASEOUS, NOT THOUGHT DANGEROUS

George W. Gehres, superintendent of the Benwood mine, admitted that gas is given off from time to time at faces in advancing headings and also accumulates in cavities formed by the fall of roof, but, he said, that this mine, though gaseous, was never considered dangerous. Barometric readings were taken daily and firebosses were conscientious in their work. Mr. Gehres believes the explosion occurred somewhere on the right side of the 9 North heading between 9 and 14 East because this section of the mine is the "hottest." He said that the mine is naturally dry; coal dust had to be loaded out regularly and the entries sprinkled frequently.

Jerome Pyle, fireboss, who examined places in the 5 North section in the morning of and prior to the explosion, admitted that his duties were not confined to firebossing alone; that in addition to his regular duties he supervised the distribution of supplies by a crew of two men on the night shift. He never left his own territory, however, and the supply men with open lights entered places to distribute supplies only after he had examined for gas and general safety.

The first of the two supply men on the night shift, Sam Buzinski, in reply to a question by Chief Lambie as to the occurrence of coal dust, said: "Yes, lots of dust; pretty dry on main line." He also remarked to the effect that the air was sluggish on 5 East entry on Sunday night. He reported this fact to the fireboss.

Paul Rijak, the second supply man on the night shift, admitted the presence of some dust on the entries. He substantiated his companion's remark that the air was slow on 5 East entry, due to a fall on 6 East.

Fred Christini testified that his duties were that of a patrolman, having to make his rounds on the off shift, going into all places but those abandoned, for the purpose of watching for fires, bad roof and timbers.



Browns Run Airshaft at Benwood Mine of the Wheeling Steel Corporation

This concrete airshaft, which is 315 ft. deep, was completed only recently. It was the only opening through which the rescuers could enter the workings after the recent explosion. A wooden stairway in this shaft, fortunately, was undamaged by the explosion, being in a downcast. It aided the rescue men in their work. Bodies were raised and supplies lowered on a box or cage attached to a hemp rope which passed over a pulley block and was drawn by a caterpillar tractor.

He also was instructed to keep section switches of the power lines open.

D. M. Ryan, an operator who directed the work of getting supplies into the mine and who many years ago went through an explosion, gave his opinion as to the origin and cause of the explosion. He said that an idiosyncrasy of the Pittsburgh No. 8 seam in the Panhandle region is the release of roof gas, which accumulates in a cavity formed by a fall of roof. This accumulation may occur soon or a long time after a fall.

Because the rails in the 9 East heading off 9 North are badly twisted and other indications of great violence are found on this entry, he feels reasonably sure that it was the origin of the explosion. In answer to a question by Mr. Lambie as to the possibility of a fall of roof between the time the fireboss inspected No. 4 room and the time a miner might have reached the face to start work, Mr. Ryan said that that probably is what occurred. The miner, seeing the fall and thinking it had been examined by the fireboss, probably started to skirt or go over the fall with an open light on his cap, igniting the gas which quickly accumulates.

Several other witnesses admitted that an accumulation of gas following a fall could form after a fireboss had made his examination and before the day shift came on duty. They admitted that roof gas liberated by falls was treacherous. Falls of roof in the Pittsburgh No. 8 seam under heavy cover generally release such gas. For that reason approved electric cap lamps are really needed though seldom used.

Andy Boyce, a motorman who missed work on the day of the explosion, said that 9 and 10 East headings, on which the explosion is said to have occurred, usually are wet at the face. W. D. Lee, state inspector, however, said that the mine is dusty soon after sprinkling. Victor E. Sullivan, another state inspector, said the Benwood mine is the driest mine he has ever entered.

James Gibson, mining engineer of the Wheeling Steel Corporation, answered a number of questions by Robert M. Lambie which brought out the fact that the Browns Run airshaft was not in full-capacity use at the time of the explosion. A rearrangement of the courses of the air would have required the building of many stoppings, etc. These were being rushed and probably would have been completed in three weeks from the day the explosion took place. Two men found near the air shaft were stone masons.



Mill Yard from Which Entrance Is Gained to Benwood Mine, the Scene of the Recent Mine Explosion

The drift mouth is located just within this fence, and the main entries pass under the street. Little damage was done to the surface buildings by the force of the explosion. The main entries were obstructed by heavy falls.

The fact was also brought out that the distance between the Main East headings and the head of 8 and 9 North headings off the former is about 1,800 ft. In that distance the rise is about 15 ft. in the direction of the faces of 8 and 9 North entries. That means that gas is more likely to accumulate in this section than in any other part of the mine. He voiced the opinion that coal dust played no small part in the explosion.

Superintendent Gehres, again called to the stand, said that six certificate bosses were employed in the Benwood mine. Drop-bottom cars of a type that do not close in a tight fit were used and resulted in much spillage of slack along the haulageways. Coal dust was shoveled out at regular intervals. As much as 50 cars of dust had been loaded out in one clean-up. Sprinkling was resorted to when and where necessary with no fixed method or schedule. Mr. Gehres believes that a local explosion which killed three men last autumn occurred in 10 East off 7 North, which point is about 400 ft. from the origin of the recent explosion.

R. W. McCausland, general superintendent of mines

of the Wheeling Steel Corporation, is satisfied that the explosion started in the room designated by previous witnesses. He said that he received weekly reports in which the fact was noted that coal dust was being loaded out of the mine. He said that prior to the explosion he had no knowledge of the methods and frequency of sprinkling. When Mr. Lambie asked Mr. McCausland what had ignited the gas causing the explosion, he answered: "Open lights."

A. E. Lafferty, of the state, who inspected the mine two months ago, stated that as far as he was able to ascertain the mine was in good condition then.

All the recommendations which his department made, though costly, were being followed by the company. "A safe condition can be changed in a week; in an hour," said he. He also called attention to the fact that between 5 and 7 o'clock on the morning of the explosion barometer readings showed a fall of about $\frac{1}{2}$ in. Such a decided fall usually causes a greater liberation of gas than otherwise would escape from faces, roof or clay veins in the Pittsburgh No. 8 seam.

The inquest proves that no mine working the Pittsburgh No. 8 seam (and for that matter any other seam) is safe, comparatively speaking, unless closed lamps and rock dust are used. Any mine working the Pittsburgh No. 8 seam that is under heavy cover, if open lamps are used in it, may be the scene of an explosion today, tomorrow or any time. It is safer to play with dynamite than to work such mines with open lights. Chief Lambie recommended approved closed lights and rock dusting in this mine, and hopes that the time is near when these two precautions will be taken in every mine in West Virginia.

Low-Temperature Carbonization of Coal

OF ALL ways of using coal the most wasteful of all is to burn it. We are learning that slowly. Just when we were making up our minds that coking with saving of byproducts was a better way and had learned how to do it satisfactorily, word came that it should not be coked, it should be only charred, giving more light oil, a better domestic fuel and with certain briquetting and high temperature carbonization even a better metallurgical fuel than straight coke. Unfortunately, though we have learned how much better it is to char coal and what we would get from it by charring instead of coking, it would be an untrue assumption to declare that we have learned how to do it economically.

An English book entitled "Low Temperature Carbonisation of Bituminous Coal," written by Andrew McCulloch and Neville Simpkin and published by H. F. and G. Witherby, of 326 High Holborn, London, W. C. 1, explains quite adequately what has been done hitherto. Despite the fact that it says nothing of the Piron system, which Henry Ford has made prominent, it is extremely complete and truly international.

It must be remembered that England has made notable progress early and late, in low-temperature carbonization, notably in the Coalite, Maclaurin, L. M. N.

(Laing, Marshall and Nielson), Pure Coal Briquette, Del Monte, Chiswick, Fuel Research, Freeman, Turner and Illingworth processes. All these are described in this volume with some that have been devised in Continental Europe.

The work of American chemists is scantily recognized, little reference being made to the division into resinic and humic sulphur which has engaged the investigatory powers of Powell and Parr. It is true their inquiries into the character of organic sulphurs is purely scientific. As yet they have led us nowhere but it cannot be safely overlooked for at any time they may open a way to a more perfect technique of coal treatment.

Some general remarks follow on the general problems of low-temperature carbonization and a lengthy reference is made to the many processes available. The final two chapters are on coal tar and low-temperature tar. An appendix details the specifications for British fuel oil, benzol motor-fuel oil, tar and pitch for roads and for grouting and the requirements of the German Tar Distillers' Federation for Diesel-engine oil. Another gives much information on coke structure and combustibility with many interesting illustrations of the former. A good bibliography concludes the book.



News Of the Industry



Farrington Urges Co-operation of Miners With Operators to Cut Output Cost

Sees Only Hope for Illinois Mines in Checking Inroad of
Non-Union Competition—Thinks Nationalization of Mines
Unlikely—Outlines Advantages of Giant Power Plan

Peoria, Ill., May 13.—Establishment of giant power plants in Illinois was suggested as a possible way of improving and stabilizing the coal industry, by Frank Farrington, president of the Illinois United Mines Workers, in opening the biennial convention of Illinois miners here today. He also bespoke co-operation with the operators to cheapen the cost of producing Illinois coal, in order to check the inroads of non-union competition and provide work for union miners.

Unemployment, which has already overtaken 30,000 Illinois miners, was shown by Mr. Farrington to dwarf all other problems almost to insignificance. He dismissed the threatened attack on his appointive powers by an appeal to the reasonableness of the members, declaring it was not a political asset but an obstacle to any scheme he might have to form a "machine."

Outstanding features of his report were his suggestions for solution of the problem of unemployment, though he also devoted some attention to the matter of out-of-work benefits. He urged that the convention declare in unequivocal language either for or against such payments and draft rules in accordance with its decision.

Cheap Production Paramount

"The bituminous-coal industry is highly competitive," said Farrington, "and under free competition, all other things being equal, that producer will secure the market who can produce the cheapest. From this it follows that any increase in the cost of production of coal in our district will result in increased competition from the unorganized field."

"As a matter of fact this competition has already reached a proportion which has become a serious menace to the life of our organization and the coal industry of Illinois as well. The widespread unemployment we have experienced of late in the Illinois field is due largely to the competition of Kentucky and West Virginia coal, which is underselling Illinois coal in the Chicago market. It also may be mentioned that had it not been for the shopmen's strike which seriously crippled the coal-carrying roads during our late suspension, the influx of non-union coal might easily have been fatal to our organization."

"The remedy for the competition of non-union coal would be, of course, the unionization of the unorganized fields. But while we all hope that some day these fields may be as strongly organized as our own district, we cannot blink at the unpleasant fact that all attempts in that direction have met with such tremendous obstacles as to make them more or less futile."

"In the face of such conditions it will become increasingly difficult to obtain the improvements in wages and working conditions to which our members are justly entitled. In other words, we find ourselves in the position where every increase in wages and lowering of hours of labor is followed by a reduction of production in the organized fields for the benefit of the unorganized fields. And if we follow this tendency to its logical sequence we may imagine a situation when our wages and conditions are so favorable as to put an end to the coal industry of Illinois."

"In view of the unsatisfactory status of the coal industry, three successive conventions of the U. M. W. A. have adopted resolutions contemplating the nationalization of coal mines. Without going into the merits or demerits of the plan suggested by our committee, let me state that the decentralized character of our government would make it exceedingly difficult to bring about the nationalization of mines, even if such a policy were found feasible and desirable."

"Fortunately we are so situated that the coal industry of Illinois may be organized on a new basis without waiting for the consent of two-thirds of the states of the Union."

"Such a reorganization would imply the creation of:

"(1) A semi-public corporation in which District No. 12, the operators, the consumers and the state would be represented, so as to safeguard the interests of all these factions."

"(2) The establishment of one or more giant power plants on the Ohio and Mississippi rivers for the manufacture of electricity."

"(3) An integrated network of major and minor power lines to make electricity available to every hamlet and farmhouse in the state."

"(4) The distillation of coal at or

Coal Miners May Pick Strawberries

The closing of the Consolidation Coal Co. mines at Seaboard, Va., throwing about 130 men out of work, has added considerably to the task of the Public Employment Service, recently inaugurated by the General Assembly to take care of such situations.

J. Hopkins Hall, State Labor Commissioner, calls attention to the fact that labor will soon be needed to harvest the strawberry crop and it has been suggested that idle miners be sent to the strawberry fields. Mr. Hall says that this would be "a happy solution" of the difficulty.

near the giant power stations, in order to save the byproducts of coal, which are now wasted.

"The benefits anticipated from the plan suggested are: (1) An increased demand for Illinois coal through (a) the substitution of electric light for kerosene light; (b) the substitution of electric power for gasoline power; (c) the substitution of electric stoves for wood, oil, gasoline and crude-oil burning stoves; (d) the more extensive use of electrical labor-saving devices in home and farm, such as washing machines, vacuum cleaners, corn shredders, etc.; (e) the illumination of concrete highways; (f) the substitution of artificial anthracite for fuel oil in heating plants."

Looks for Many Benefits

"Other benefits anticipated are:

"(2) A marked reduction in the price of light, heat and power at the expense of water in transportation, selling and delivery."

"(3) The stimulation of industry by a steady supply of light, heat and power at reasonable prices."

"(4) The abolition of the smoke nuisance."

"(5) Cheaper fertilizer for the reclamation of land."

"(6) Steady employment for our members."

"The plan as sketched herein must be merely regarded as a suggestion."

"Sooner or later the welfare of our country, as well as that of the coal industry, upon which the well-being of our members is dependent, will require a profound change in the mining, distribution and utilization of coal."

"And as there is no other body of our citizenship more vitally interested in the coal industry than we who bear its burden, I request that this conven-

Bituminous Coal Loaded Into Vessels at Lake Erie Ports During Season to End of April

(IN NET TONS)

		1924			1923			1922		
		Cargo	Fuel	Total	Cargo	Fuel	Total	Cargo	Fuel	Total
Toledo	Hocking Valley	449,041	12,390	461,431	112,013	3,622	115,635	202,729	5,824	208,553
	N. Y. C.-Ohio Central Lines	4,505	227	4,732	57,039	1,609	58,648			
Sandusky	Baltimore & Ohio	71,371	2,280	73,651	83,308	2,334	85,642	251,346	4,567	255,913
	Pennsylvania	35,123	909	36,032	84,589	2,271	86,860	176,364	4,883	181,247
Huron	Wheeling & Lake Erie	81,668	3,188	84,856	54,546	2,190	56,736	7,612	334	7,946
Lorain	Baltimore & Ohio	42,739	7,976	50,715	126,999	10,901	137,900	17,820	2,835	20,655
Cleveland	Pennsylvania	19,887	6,271	26,158	96,309	3,824	100,133	43,358	5,624	48,982
	Erie	14,315	555	14,870	74,251	4,602	78,853			
Fairport	Baltimore & Ohio	7,921	3,595	11,516	22,392	858	23,250			
Ashtabula	New York Central	30,397	4,063	34,460	208,511	7,192	215,703	31,083	2,792	33,875
	Pennsylvania	26,666	4,630	31,296	29,444	902	30,346	28,342	1,688	30,030
Conneaut	Bessemer & Lake Erie	101,272	8,475	109,747	137,381	3,730	141,111	22,152		22,152
Erie	Pennsylvania	4,343	5,654	9,997	18,292	3,440	21,732	21,835	3,365	25,200
Total		889,248	60,213	949,461	1,105,074	47,475	1,152,549	802,641	31,912	834,553
*1923 Storage Loading		182,060	4,940	187,000						

*Coal loaded into vessels in December, 1923, after close of navigation and forwarded from Lake Erie ports during 1924 season of navigation.
Compiled by Ore & Coal Exchange, Cleveland, Ohio; H. M. Griggs, manager.

tion empower the executive board of District No. 12, United Mine Workers, to employ the funds of the organization for the purpose of obtaining the necessary advice to ascertain the practicability and desirability of the plan suggested herein.

Nearly 100,000 Miners in Illinois

"According to the records of the Department of Mines and Minerals we have a total of 374 shipping mines in Illinois. During the fiscal year ended June 30, 1923, an average of 99,081 men were employed. The mines worked an average of 146 days, or less than half time, and produced a total of 73,410,837 tons. This means that Illinois mines have a potential producing capacity of 150,000,000 tons annually. During approximately this same period, West Virginia, with about the same number of men employed, mined 103,000,000 tons, or nearly 30,000,000 tons more than was mined in Illinois.

"The great bulk of the West Virginia tonnage was mined under non-union conditions at 1917 wage rates and much of it at rates lower than the 1917 rates. In fact in Mingo, Logan and McDowell counties, in southern West Virginia, where the bulk of the non-union tonnage was produced, the miners are paid 90c. for loading a four-ton mine car and the highest inside day wage rate is \$4 per day.

"In Alabama, Kentucky and Tennessee the situation is relatively the same as in West Virginia, excepting that in some parts of Kentucky the wages are higher than in West Virginia, but nowhere in Kentucky are wages as high as in Illinois, while in Alabama the wage rates are lower even than in West Virginia.

"Considering that Illinois coal must find a market in competition with coal mined in the states named the situation furnishes a problem for some very sober consideration on the part of the Illinois mine workers. Last winter we had less work than during any winter period within my recollection and this summer promises less work than ever before and hunger and want is now present in the homes of thousands of our members.

A careful tabulation of the situation reveals that on the first day of this month 150 Illinois mines were completely closed, and many of them had been closed for months, with no im-

mediate prospect of resuming operations and every indication is that as time advances more mines will suspend work. When these 150 mines were in operation they gave more or less employment to 30,000 of our members, and fully that number of men are now idle. Very few of the mines that are now operating are working more than half time and the great majority of them are not working that much.

"I hold no brief for the Illinois operators, but I do for the Illinois miners and my only desire is to help the miners, but in order to do that I must help the operators find a wider market for their coal. Without markets there can be no work. The consumer will get his coal where he can buy it the cheapest.

"The mining industry is fully 50 per cent overdeveloped, which means there is an abundant supply from which the consumer may choose, and the competition for markets is, therefore, desperately keen and consequently the operator who can sell his coal the cheapest will get the business that means work for the miners. Therefore, there is only one way whereby we can get more work for Illinois and that is to cheapen the cost of producing coal in competition with coal mines in non-union and sparsely organized districts where the cost of production is much less than in Illinois.

"I do not mean that I would have the Illinois miners accept a reduction in wages or give up any beneficial working condition. That would not help, for the reason that if wages were reduced the operators in competing fields would do likewise and the effect would be that all would be in relatively the same position only on a lower level, but there are means by which the cost of production may be reduced and without injury to the miners, but with profit to them in the way of more work.

"Respect your contracts, eliminate strikes in violation of contract, work when the operator has work to do, do careful workmanship, load clean coal, reduce the amount of slack by careful shooting, give an honest day's work, co-operate with the management in doing the things that are right, fight for what is coming to you, but do not antagonize, and be on the square. All these things will tend to reduce the cost of production and bring more work to Illinois and relieve some of the distress that is among us."

Reliance-Hatfield Coal Cos. Are Merged

The Reliance Coal & Coke Co. and the Hatfield Coal Co., including the E. J. Hickey Transportation Co., Plymouth Coal & Mining Co., Inc.; the West Virginia Washed Coal Co. and the Licking Valley Coal Digger Co., have been merged into one unit after having operated separately, some of them over a quarter of a century, and in conjunction with each other as part of the Fleischmann interests in Cincinnati, Kentucky and West Virginia, along the Kanawha and Ohio rivers.

The combined unit, which will be known as the Hatfield-Reliance Co., will own in fee simple 6,444 acres of coal deposits and will have under favorable long-time lease 5,513 acres additional, estimated to contain more than 65,000,000 tons of recoverable coal in West Virginia and eastern Kentucky. The company will operate four mines most modernly equipped, together with controlled mines and mining interests in the two states, and also holds control of stocks in many retail coal companies in Louisville, Carrollton and Maysville, Ky., and New Albany, Madison and Vevay, Ind., and in other river communities along the Ohio. The properties are appraised at \$3,151,952.94, but are carried on the books of the new company at \$2,532,368.66, around 80 per cent of appraisal. Julius Fleischmann will be president, J. T. Hatfield be vice-president, Irvin Davis secretary-treasurer, August Helm assistant secretary and F. J. Ed Bramlage assistant treasurer of the company.

Name Hard-Coal Advisers to Commerce Department

The anthracite operators have designated the following representatives of the anthracite industry to serve as members of the advisory committee to the Coal Division of the Department of Commerce: S. B. Thorne, president, Thorne-Neale & Co., 17 Battery Place, New York City; G. N. Wilson, president, Lehigh Valley Coal Sales Co., 90 West Street, New York; Howard W. Perrin, vice-president, Susquehanna Collieries Co., Commercial Trust Building, Philadelphia.

Retrenchment Policy Seen as Menace To Co-operative Effort by Coal Industry

Statistical Data More Necessary Than Ever During Period of Stress
—Funds Needed for National Association's Bureau of Economics
Program—Unusual Responsibilities Confront New Administration

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

One of the unfortunate effects of the retrenchment which is going on among the coal producers is the weakening of the industry's organizations. Local associations are weakening, and the National Coal Association is suffering seriously.

Despite the discouraging circumstances which surround the coal trade at the time the National association is holding its annual meeting, it is believed that one of the effects of this gathering will be toward the prevention of allowing retrenchment to go to the point where it will undermine the industry's statistical foundation and deprive it of its one means of doing the constructive things which can be accomplished only through co-operation.

Disintegration among the local associations might proceed so far as to break down the structures necessary to collective bargaining. This did happen in 1893, when the coal business was in a situation quite similar to that which apparently is impending at this time.

Association Work Needed Now

It is important to the industry and to the public that co-operation, as represented by the activities of the local associations and by the national association, should go forward. The way out of many of the present difficulties lies in joint effort. The association is the only device on the operators' side through which joint effort can be carried out. Instead of shutting down statistical work and curtailing other activities, the associations, during a time of stress, should be working harder than ever. They should be given the means to capitalize the prevailing feeling of dissatisfaction with present conditions to get something better. If coal producers are to act intelligently in their own welfare and in the public welfare they must function as a unit in meeting a variety of situations.

The National association should be given the funds necessary to put through the broad program of its Bureau of Coal Economics. In addition to the information which that bureau would collect and interpret, the National should be in a position to stage a comprehensive drive for membership. It should be more representative of the industry. As it is, it frequently is looked upon as a non-union association. If for any reason local associations cannot be induced to affiliate with it, every effort should be made to obtain the maximum possible number of individual members in that district.

The administration which will pilot the National association through the next year is faced by unusual responsibilities, but its prospect of success is unusually bright if it will adopt an

active and determined policy looking to the lining up of the industry for the common good. It is either that or simply the drawing out of the process of falling to pieces.

There are many who hope that the new administration will address itself to the task of putting in more concrete form the objectives of the industry. What should be done to meet its difficulties? How can better public relations be established? What is the policy of the industry in the matter of co-operative marketing? Do coal producers want the Sherman anti-trust law amended and in what particulars? How can contracts be improved?

These and a hundred other suggestions could be made to make up a definite program of the objectives for which coal producers are striving. In addition, it is hoped that something can be done to raise the morale among coal producers. They have the enthusiasm and the spirit necessary; all that is required is to direct it in association channels. They should be impressed with the need of showing the same loyalty to their organizations that the mine workers show to theirs. The coal digger is willing to stick to his union even if it means going hungry and undergoing all manner of sacrifices. More of that spirit is needed among the operators. The foregoing are some of the thoughts which are being expressed as the operators are assembling for their principal gathering of the year.

Official Washington has its eye on Cincinnati. This convention is looked upon as something of a turning point in the affairs of the producers of coal. It is regarded as certain to indicate whether they are going to present a solid front in this crisis or whether they will disband and try to meet their difficulties in a disorganized way.

Russian Coal Output Higher

Gross coal output during the first quarter of 1923-24 (October to December) by the Russian coal basins of Donetz, Moscow, Ural, Kuzbas and Cheremkhov was 211,214,000 poods (a pood is equal to 36.113 lb.), compared with 144,349,000 poods during the corresponding period of the previous year, a gain of 46.4 per cent. The net output was 174,673,000 poods, compared with 103,349,000 poods for a similar period in the preceding year, an increase of 69 per cent. The greater increase in net output is due to a reduction in allotments to the miners.

Production was higher in all fields, but the increase was especially marked in the Donetz Basin, where the gross output for the quarter was 62.9 per cent greater than for the corresponding period of the previous year.

Exports from the five basins during the above period were 133,842,000 poods, compared with 108,517,000 poods for the first quarter in the preceding year, a gain of 23.3 per cent.

On Oct. 1 last there were 602 coal-mine enterprises employing 168,293 workers under the management of the Supreme Council of National Economy. Of these, 35 enterprises employing 37,842 workers were united in trusts and syndicates.

Production in the Maritime Province (Eastern Siberia) at the end of the business year 1922-23 was 90 per cent higher than the prewar output. The principal mines, those of Suchan and Zygun, which are operated by the government, produced 22,000,000 poods of coal, while the privately operated mines produced 16,000,000 poods. The selling price of brown coal is identical with that prevailing before the war.



Coal Mine at British Empire Exhibition

Top works as seen from the entrance to the mine, at Wembley, Wales. A comprehensive collection of cutting machines and other mining equipment also forms a part of the display.

Coal Men Hear Talk of Taxes, Trade Groups And Government Control at Cleveland

Paul Armitage, Goldthwaite H. Dorr and James R. Garfield Try to Rouse Them to Dangers of Overtaxation, Weakness of Trade Associations and Waste of Resources

An attempt was made at Cleveland, Ohio, by the United States Chamber of Commerce, in annual session May 6-8, to make coal-mining men realize that they are in the same boat with other operators of natural resources and that there ought to be a pooling of effort in mutual defence. Paul Armitage talked about present overtaxation of mining, urging active campaigns against it; Goldthwaite H. Dorr, legal staff man last year for the Bituminous Coal Operators' Special Committee, argued for strong trade associations, and James R. Garfield one-time Secretary of the Interior, defended the government policy of control over natural resources.

A number of coal men were present at some of the Chamber sessions, registering a voice in the traffic group for a resolution urging Congress to postpone for a year Sec. 28 of the Transportation Act in the hope that coal exports abroad will not be interfered with by the act. If Sec. 28 goes into effect next month, as the act provides, it will require all coal destined for export to use American bottoms during all periods when the U. S. Shipping Board says there are plenty of American ships available. If such coal is consigned to foreign bottoms, it will move from mines to piers under the domestic freight rates, which are much higher than those on export coal.

National Coal Men Attend

Among the coal men present was this delegation to represent the National Coal Association: Louis Madeira, 3d, Madeira, Hill & Co., Philadelphia, Pa.; J. R. Crowe, president of the Crowe Coal Co. Kansas City, Mo.; Monro B. Lanier, Monro-Warrior Coal & Coke Co., Birmingham, Ala.; Michael Gallagher, Wheeling & Lake Erie Coal & Mining Co., Cleveland; S. H. Robbins, Progress Coal Co., Cleveland; H. R. Sullivan, Central Coal Mining Co., Cleveland, and Allan H. Willett, statistician for the National Coal Association, Washington, D. C.

A wallop at the Ford proposal for the purchase of Muscle Shoals was dealt right lustily by Mr. Garfield. The former Secretary of the Interior took time from his main discourse to declare that turning Muscle Shoals over to Ford would be deliberately depriving the people of the great South of vast power service to which they are entitled under the government policy as to the disposal of natural resources. He said the potential development is about 800,000 hp., but that Mr. Ford agrees to devote only 100,000 to the manufacture of fertilizer for the farmers while he keeps the rest for himself.

"That's why I'm against Ford," said Mr. Garfield. "The plan as accepted by the House at Washington permits him to selfishly keep most of the resources of the development for himself. The

government should control all such water powers and lease rights in them only upon such terms as will permit the people of the entire distribution area to be served. That is the principle behind government control of any natural resource."

He said that the people of this country had really waked up to the necessity for conservation only within the past quarter of a century. The anthracite men have always known pretty well what the anthracite resources of the land were because the deposit was so small and so definitely described; but nobody knew much about the extent and probable "lifetime" of bituminous coal. The awakening, however, has now produced a different feeling on the part of the people toward their coal, their oil, their timber and the other natural resources.

Early Efforts Misunderstood

The government's early efforts at conservation were much misunderstood. Owners of great stands of timber couldn't see at first why they should not do as they pleased with it, and power interests that had been farsighted enough to reach out and grab many good watersheds for future use felt the same way. But most such interests have come around to the government's position that all the people, not a favored few, should benefit by the resources, and future generations are as much entitled to the possible benefits as this generation.

That is the reason, he said, that men permitted to operate public coal lands now readily agree that they should use the deposit so as to safeguard the interests of all the people. When that isn't done voluntarily the government is obliged to step in and see that it is done compulsorily.

The mining industries of the country should begin organized efforts at once to educate the people, the legislatures and the courts of the land, said Mr. Armitage, well-known tax expert, so as to offset the tendency to overtaxation. He said such a tendency these days is strong enough to be a real menace, as evidenced by the Minnesota iron and Arizona copper cases, now well known, where mining is taxed and supertaxed and overlaid with layer after layer of special taxes so that it groans under the burden.

The mines, the oil and gas deposits and the timber of the land are basic resources. It is unthinkable what would happen to industry if the output of these industries were cut off. Every man, woman and child would be affected at once. Yet, he said, legislatures gayly toss outrageously heavy tax burdens upon such industries with no thought of the way they are striking at the rest of their country's whole industrial structure.

For one thing, he said, law makers

and law interpreters should be taught that depletion and loss incident to production is an allowance that ought to be permitted for capital cost and should be deducted before taxation. A Supreme Court decision a few years ago denied the reasonableness of this, he said, but the decision was based on nothing short of plain ignorance. Today the tide is turning and he thinks if the point were to be raised again before the Supreme Court, the previous decision would be reversed. There remains a great deal of educational work to be done, however.

He contended that the opening of new mining deposits to replace worked-out areas ought to be regarded as discoveries and should not be penalized by taxation. Up to 1918 they were treated as excess profits, but today a more reasonable attitude is taken. He pleaded for smaller taxes or no taxes at all upon mining reserves. A study showed that a 3-per cent tax on a certain metal reserve deposit, if continued for 30 years, would bleed the owners of the entire value of the deposit. However, most states try to tax reserve coal and ore.

Mr. Armitage complained bitterly about government extravagance and wastefulness, saying he doubted whether the present administration could possibly reduce taxes at the rate expenditures are running. He thinks his proposed tax-reducing organization in the mining industries could profitably devote a good deal of time trying to reduce government waste, extending itself even to the point of carrying out government enterprises so as to get the work done at reasonable cost.

Attacks Anthracite Tax

He cited a long list of special taxes, like the Pennsylvania 1½ per cent anthracite tax, which have been levied within the last few years, mentioning the effort Congressman Kellar of Minnesota is now making at Washington to get a straight 1 per cent tax laid upon the entire coal and metal deposits of the country so as to raise \$650,000,000 a year for Congress to spend.

The "natural heritage of the people" argument, upon which such taxes of coal and ore are defended, he attacked as fallacious reasoning. Men open the mining deposits of the country by great expenditure and risk of capital and the application of much labor and inventiveness. Without these expenditures the deposits would be worthless. Therefore the "natural heritage" argument for the taxation of these deposits is illogical.

It is easy to tax mines because they are always within reach and cannot get away. Also absentee ownership of many of them makes them especially tempting targets. This is so true, he said, that today the public is plundering these resources by taxation. This and the public ownership propaganda ought, he thinks, to wake up the whole mining industry to its danger so that it will defend itself more effectively.

At the close of the Chamber session by the division of natural resources production, a resolution was adopted protesting against the compulsory reporting to the government of any sort of statistics on ordinary business operations.

Hoover Says Trade Associationism Is Saving Coal Industry from Itself

Tells U. S. Chamber of Commerce That This Idea Is What Gave Steady Running Time in 1923 and the Three-Year Agreement

—No Call Now for U. S. Control of Coal

The trade-association idea has already done a great deal for bituminous coal and can do a great deal more, Herbert Hoover, Secretary of Commerce, told the U. S. Chamber of Commerce at its Cleveland convention May 7. It was that very idea, practiced jointly by coal and railway associations and the Department of Commerce, that caused wide buying of coal last summer, thus preventing the troublesome annual drop in production in the hot months. It was the same idea at work, he said, which produced the three-year contract at Jacksonville, thus giving the industry some promise of stability for that period.

He said the development of proper trade-association work convinces him there lies within such associations "a great moving impulse toward betterment." He implied that this is exactly the sort of thing that will answer the one-time loud demand for government control of business. He does not believe that "today there is any sentiment for government regulation of the bituminous-coal industry."

Commerce Department Co-operates

"I propose now to mention a case most vitally important, rendered possible only through associational activity in which the Department of Commerce has been in active co-operation," said Mr. Hoover. "That is in the bituminous-coal industry. There have been developed in this industry, as many of you are aware, 30 per cent too many mines operating intermittently during nearly every week of the year with a large seasonal dip in summer. Thus they required 30 per cent more labor and 30 per cent more capital than was necessary to produce the nation's coal.

"One effect of this situation was that some proportion of the employees obtained too few days' work to yield them a reasonable standard of living, even at the apparently high daily wage. This minority of employees were naturally a constant source of agitation and disturbance. The result of all this was a higher cost of producing coal and consequently a higher national coal bill; speculation and uncertainty to the operators; hardship, difficulty and instability to a considerable portion of the workers.

"The fundamental cause was a vicious cycle of seasonal fluctuation in demand, annual shortages in coal cars, and periodic strikes which grew out of the instability of labor relationships. These periods of shortened or suspended production always resulted in famine prices for coal and great stimulation to the opening of new mines.

"At least four government commissions have examined this question. Probably forty bills have been introduced into Congress proposing govern-

mental regulation in an attempt to correct the abuses and wastes and public danger that lay in the situation.

"The associational agencies in the field were those of the operators, of labor, of the railway executives and of the various associations of industries as consumers. The first problem was to obtain a general knowledge of the causes, to which I feel the Department of Commerce contributed substantially. Remedy was undertaken in many directions. The railway association induced the construction of a more ample supply of coal cars and greater expedition and interchange in handling between different railways. The Department of Commerce, in co-operation with the Chambers of Commerce, manufacturers' associations, railway and public utilities associations, effected the placement of more coal in storage during the summer season. The result was that last year for the first time in many years we had no interruption in the distribution of coal due to car shortages. One element of the vicious cycle in this situation is eliminated, provided we can continue this same co-operation in future.

"The second part of the solution was the general agreement by both operators and labor that stability could not be restored in the industry unless there was a long period of continuous operation in which the absence of coal famines and profiteering would eliminate the speculative and high-cost producer and reduce the units in the industry and thus its intermittency. The labor agreement between these associations made last February for a term of three years has assured this improvement.

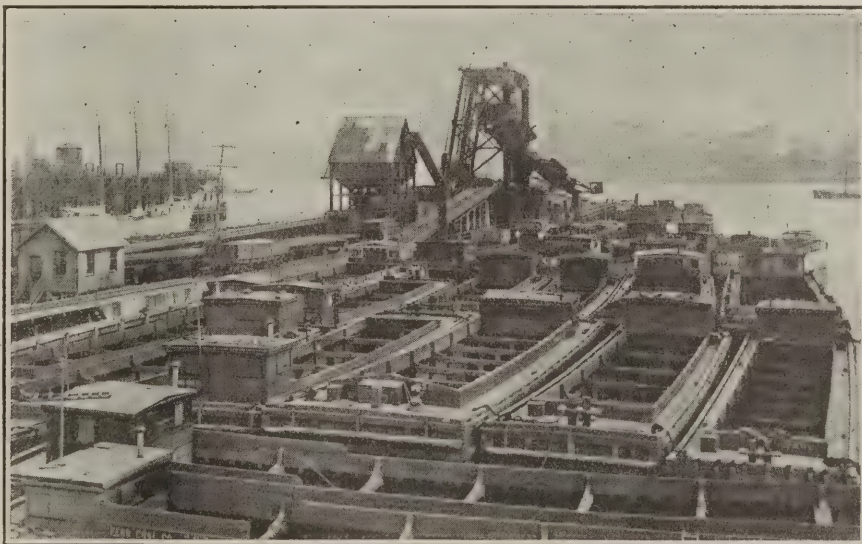
"Here we have an example of the

most profound national importance in at least the beginning of stabilization of an industry involved in a most vicious cycle of waste and trouble. The national savings can be measured in hundreds of millions and the human hardships greatly lessened. There will be some preliminary hardship in so great a self-imposed surgical operation, but I am confident it will heal to the mutual interest of the operators, the public, and the workers. Today I do not believe there is any sentiment for government regulation of the bituminous-coal industry.

"Three years of study and intimate contact with associations of economic groups, whether in production, distribution, labor or finance, convince me that there lies within them a great moving impulse toward betterment. If these organizations accept as their primary purpose the lifting of standards, if they will co-operate for voluntary enforcement of high standards, we shall have proceeded far along the road of elimination of government from business. American business is never secure unless it has public confidence behind it. Otherwise it will always be a prey to demagoguery and filled with discouragement.

"The test of our whole economic and social system is its capacity to cure its own abuses. New abuses and new relationships to the public interest will occur as long as we continue to progress. If we are to be wholly dependent upon government to cure these abuses we shall by this very method have created an enlarged and deadening abuse through the extension of bureaucracy and the clumsy and incapable handling of delicate economic forces.

"The government can best contribute toward the day-to-day progress of business life through stimulation of and co-operation with voluntary forces in our national life, for we thus preserve the foundations upon which we have progressed so far—the initiative of our people. With vision and devotion these voluntary forces can accomplish more for America than any spread of the hand of government."



Courtesy U. S. Distributing Corp.

Barge Convoy Ready to Help Fuel New York

This fleet of barges, belonging to the U. S. Distributing Corporation, awaits a trainload of coal at one of the New Jersey rail terminals at Edgewater, N. J., opposite New York City.

Buy Coal Now, Says Hoover Letter to Trade Bodies

Herbert Hoover, Secretary of Commerce, addressed a letter May 10 to secretaries of trade associations asking their support in urging manufacturers to begin buying and storing coal now in order to avert car shortage and transportation congestion next autumn. The letter in part is as follows:

"The fall car shortage always has the effect of increasing the price of coal and of seriously disturbing the whole economic machine. Security lies in repeating the storage performance of last year, by the manufacturers of the country taking reserves of coal during the months of May, June and July, thus foregoing the necessity of coal shipments during the peak period in competition with the household movement. Outside of strike years, these months are universally the period of lowest bituminous-coal prices.

"We also have a national problem in the long view of securing cheaper coal by maintaining more regularity in production of our mines through planing out seasonal fluctuations.

"I therefore ask that your association actively interest itself in bringing these matters to the attention of the large coal consumers from the point of view of their personal interest as well as a contribution to the mutual good of American business."

Shipping Board Opens Bids At New York

Seventeen coal firms submitted bids to the U. S. Shipping Board at New York on Monday, May 12, for furnishing and delivering not more than 18,000 gross tons monthly of navy standard coal for use on vessels of the board operated from New York Harbor. The deliveries are to extend over a period of one year. The bids follow:

J. H. Weaver & Co., \$6.05 f.a.s.; Quemahoning Coal Co., \$5.25 f.a.s.; Willard, Sutherland & Co., \$6.60 t.i.b., \$5.95 f.a.s.; Independent Coal Corporation, \$6.33 t.i.b., \$5.60 f.a.s.; Eastern Fuel Co., \$6.21 t.i.b. over top bunkers, \$6.41 t.i.b. through side bunkers, \$5.81 f.a.s.; Seiler Coal Co., \$6.66 t.i.b., \$5.61 f.a.s.; Horgan Fuel Corporation, \$5.23 f.a.s.; Steamship Fuel Corporation, \$6.31 t.i.b., \$5.51 f.a.s.; Imperial Coal Corporation, \$5.90 f.a.s.; Cosgrove & Co., \$6.82 t.i.b. over all bunkers, \$7.02 t.i.b. through side bunkers, \$6.02 f.a.s.; Coleman & Co., \$5.51 f.a.s.; Dexter & Carpenter, Inc., \$5.74 f.a.s.; H. B. W. Haff, \$5.93 alongside, 10,000 tons monthly; W. A. Marshall & Co., \$6.65 t.i.b. over all bunkers, \$6.85 t.i.b. through side bunkers, \$5.99 f.a.s.; Commercial Coal Co., \$6.12 f.a.s.; Pennsylvania Coal & Coke Corporation, \$5.68 f.a.s.; Johnstown Coal & Coke Co., \$5.17 f.a.s.; E. Russell Norton, \$7.05 t.i.b., \$6.99 t.i.b. freight ships.

Timely Topics on Tapis at Wholesalers Convention

When the American Wholesale Coal Association holds its annual convention at White Sulphur Springs, W. Va., June 3 and 4, between 400 and 500 wholesalers from all parts of the country will be in attendance. The committee in charge of arrangements has so arranged the program that the business sessions will convene at 9:30 a.m. and adjourn at 1 p.m., leaving ample time for recreation.

The business sessions of the convention will be of great interest and importance to all those connected with the coal industry. Realizing that the conditions facing the coal trade today are different from any with which they have ever before had to contend, the discussions will be along lines calculated to solve some of these difficulties and to build a constructive platform for the future.

Among the speakers will be F. R. Wadleigh, of the Tuttle Corporation, New York, and former Federal Fuel Distributor, who will present for consideration a plan looking to close co-ordination between the various branches of the industry. E. M. Platt, president of the Platt & Brahm Coal Co., Chicago, will discuss "Costs and Credits." "Oil Competition" will be handled by Borden Covell, president of the Northern Coal Co., Boston, Mass. "Transportation and Its Relation to the Coal Trades" will be the subject of a paper by G. N. Snider, for many years coal traffic manager of the New York Central Lines and more recently general manager of Dickson & Eddy, New York. "The Wholesaler of the Future" will be the subject of an address by Owen Meredith Fox, associate editor of *Black Diamond*, Chicago.

Other features will be announced as the program is completed. These subjects alone insure wide interest and discussion of the problems before the convention. Everyone connected with the coal industry in any way and particularly wholesalers, irrespective of membership in the association, are urged to be present and to assist in solving the problems confronting the industry.

Lockout Cuts Ruhr Coal Output

A lockout May 6 of mine workers who rejected employers' proposals for a longer workday was quickly followed by a general strike in the Rhenish Westphalian mines, in the Ruhr Valley. The workers demand a seven-hour day, contending that their wages, which vary from 5.60 to 6.10 marks per day, are insufficient to maintain their strength for longer working hours. All the unions, both Conservative and Socialist, are in agreement in the demand, though only the Communists favor a strike. Coal reserves in the Ruhr are so limited that other industries will be affected soon and thousands of other workers thrown out of work.

The operators assert that they can meet the demands of the industrial agreement with the French only if production is cheap.

Champion Coal Loader Has Charley Horse

William Allen Bumpers, claimant of the coal-loading championship of West Virginia and Kentucky, is temporarily out of the running, due to a muscular ailment that makes it necessary for him to use crutches, but he expects to be back in the running again in a few weeks. During the last several months he said that he had been "going on high," turning out 60 tons of coal a day. His pay checks for January totaled \$499.42 and in February, the shorter month, he made \$399.56.

During the war his pay averaged \$26 a day for 18 months, when he turned out 40 tons a day. With the lowering of wages, following the war, he had to speed up a trifle, hence his more recent record of 60 tons a day. He is a non-union miner.

"At Hazard they paid me around \$700 a month for a time," said Bumpers, "but I'm usually found in West Virginia, where I have worked, on and off, for 26 years. Business is slow now and we aren't loading so much coal, but we are a lot better off than some of the closed-shop fields, where the union has the bigger wage scale, but less work."

Bumpers is a negro, weighs 177 lb. and is 45 years old, but looks much younger, although he is the father of six children and has worked hard all his life.

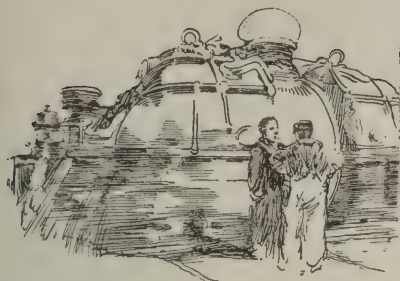
Government Fuel Yard Seeks Coal Bids

The Government Fuel Yard, Washington, D. C., will receive proposals up to 10 a.m., Wednesday, May 28, for the coal requirements of the district and federal governments for the fiscal year July 1, 1924, to June 30, 1925. The estimated requirements are 14,990 tons, more or less, of anthracite and 239,600 tons, more or less, of bituminous coal. Specifications may be had by addressing the Chief Engineer, Government Fuel Yard, Room 1139, Interior Department, Washington, D. C.

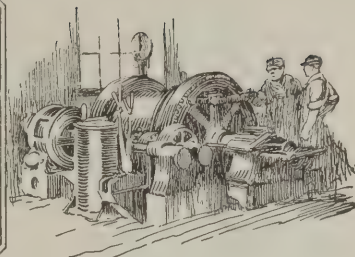
Coal Consumption and Power Output by Utilities Drops

Electric public-utility plants of the United States consumed 3,250,947 net tons of coal during March, according to a report just issued by the U. S. Geological Survey. This compares with 3,330,107 tons consumed in February and 3,664,258 tons in January. Fuel oil consumed by utility plants in March totaled 1,538,178 barrels, compared with 1,544,927 barrels in February and 1,618,591 barrels in January.

The average daily production of electricity by public-utility power plants in March was 160,700,000 kw.-hr., about 3½ per cent less than the average for the month of February. This decline probably was due in part to seasonal effect.



Practical Pointers For Electrical And Mechanical Men



How to Select Grinding and Polishing Wheels and Use Them Without Risk

What Kinds of Wheels Should Be Used and for What Purposes—How to Mount Them so that They Will Not Break—How to Order Wheels of Suitable Size

By GUSTAV RADEBAUGH
University of Illinois,
Urbana, Ill.

A MINE repair shop is not complete unless it has a good grinding stand and the necessary equipment to do all the grinding and polishing of the soft and tempered steel tools which must be used in general repair work. When a good serviceable grinding stand has been purchased for the mine shop and properly installed, the purchaser only too often is disappointed in the work it does. The reason for the workman's inability to obtain good work is directly traceable to material of which the grinding wheels are made.

To get good results from the machine only the best types and grades of wheels should be used. It must be appreciated that the grinding wheel is the business end of the machine. Often-times cheap wheels are supplied with the stand, and the operator has discouraging difficulties. The supplies used in the mine repair shop should be as good as those found in the best commercial shops.

To be able to meet all grinding demands, two types of grinding wheels should be supplied—one for tempered steel and the other for soft metals. The emery wheel so long used for grinding has been superseded by commercial abrasives known to the trade as carborundum, aloxite, alundum, and corundum. Manufacturers have published extremely useful information about

these abrasives. If you know what they are and for what type of grinding they are best suited you will be better able to select the right wheels for the grinding stand. Carborundum is a manufactured abrasive. It is not found in nature. It is a chemical combination of carbon and silicon. Carborundum is the trade name of carbide of silicon, a substance discovered by Edward G. Acheson in 1891. It is much harder than any other known abrasive. This gives it great durability. It is made up of small, sharp crystals just brittle enough to break slightly in use.

The sharp edges of the crystals cut clean and fast, and the brittleness of the material causes it constantly to present to the work fresh cutting edges, thus preventing the glazing of the wheels. The characteristic property of brittleness makes it highly efficient for grinding and polishing such metals as cast iron, chilled iron, brass, and bronze, also marble, granite, pearl, and in general, all materials of low tensile strength.

The abrasive material for grinding steel successfully must be not only hard and sharp but tough. These characteristics are found in aloxite, a new aluminous abrasive. Aloxite is the purest form of aluminum oxide. It is the product of the electric furnace, differing materially from other aluminous abrasives in several of its characteristics, the principal one of which is its temper, which makes it the ideal steel-cutting material.

In its crude form aloxite is taken from the electric furnace in an immense compact pig weighing several tons. This pig, by means of special, powerful machinery, is crushed or reduced to grain form. The aloxite grain then undergoes a thorough refining until every possible atom of impure matter is removed.

There are three processes of manufacture. The vitrified process consists of bonding the grain with certain clays, and vitrifying or baking at a high temperature. This changes the clays to a substance similar to porcelain. The vitrified wheels are most generally used

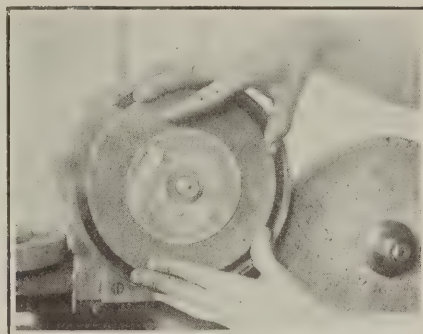


Fig. 2—Fitting the Wheel on the Spindle

An improperly fitted wheel is always dangerous. Broken guards and accidents frequently result from tight or loose wheels. It is usually disastrous to force a wheel on a spindle that is too large for it.

because, by this process, a wider range of grades can be obtained, because the wheels can thus be made more open and porous, thereby assuring a cool cutting wheel and because they are durable and stand up to the work. However, owing to its rigidity, vitrified material is not used where a thin wheel subject to side strains is required.

In the silicate process silicate of soda is used as the bonding agent. Wheels made by this process cut less harshly than the vitrified wheels and are used extensively for knife grinding and for sharpening saws and woodworking tools in mine shops, furniture, sash, door and blind factories and planing mills. Silicate wheels can be supplied with a wire web if desired.

Thin wheels usually are made by the elastic process, which consists of bonding the grain with a more or less elastic material, such as shellac or rubber. These wheels are extremely tough, fast cutting, and can be run without danger of breaking at high speeds and under moderately heavy side strains.

Most jobbers dealing in grinding wheels know the type of work for which the different wheels are used and have co-operation from the manufacturer in obtaining the best wheel for the job. It is more satisfactory in most cases, therefore, to leave the selection of the wheel to the dealer. The conditions under which grinding wheels are used vary to such an extent that no absolute rule can be given for selecting the right grain and grade. There are no wheels so constructed that all materials can be ground equally well with a single wheel. In mine repair-shop practice, however, it is not necessary to have more than two kinds of wheels.

One of the large manufacturers of wheels recommends for all the types of

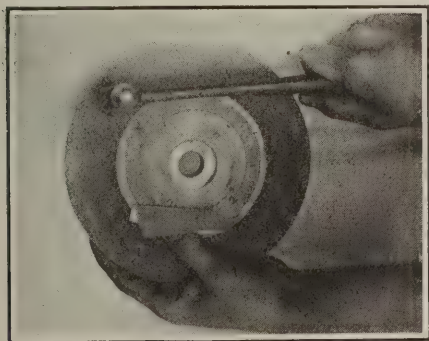


Fig. 1—Testing a New Wheel

As soon as a new wheel is received at the shop it should be tested for flaws. This can be easily done by sounding it with a light steel hammer.



Fig. 3—Put Washers on Both Sides
A compressible washer made of leather, cardboard or heavy paper distributes the pressure of the flanges. Unless some such arrangement is used the wheel easily may be broken.

grinding jobs that will be done in the repair shop two wheels: One 14 in. in diameter, 2 in. thick, 1½ in. arbor, grit 24, grade H vitrified bond, of carborundum material; the other an aloxite wheel of the same dimensions, made of the same size of grit and bound with the same bond. The aloxite wheel is used for grinding all kinds of steel and the carborundum for castings, etc.

When a new wheel is received it is good practice to test it. (See Fig. 1.) Wheels in transit sometimes are broken or cracked, yet so slightly that the defect is not noticeable to the eye. A simple test is to strike the wheel a light tap with a hammer. If the stone rings it is safe for use. Before shipment all makers of good wheels test them at a speed approximately 50 per cent greater than that at which they are to be operated. On each wheel a tag will be found glued to the center. The kind of wheel (carborundum, aloxite, aluminum or corundum), the grain and grade, size, number, outside diameter, bore, surface, speed at which the wheel should be run, and the speed at which the wheel was tested are among the data found on this tag. This record should be filed away for reference. Having this information, if a wheel is not satisfactory, inquiry regarding it can be made. This tag is equally valuable as a reference when ordering a duplicate.

Do not force the wheel on the spindle of the machine. The diameter of the hole in the wheel should be at least 0.005 in. larger than the diameter of the spindle. It is essential that the wheel should not be cramped on its arbor. If it goes on the spindle free (Fig. 2) you may be assured that it will fit properly against the inside of the flange. Too much cannot be said about the importance of the wheel being mounted properly.

Flanges at least one-half the diameter of the wheel should be used. Compressible washers of leather, rubber packing or blotting paper, slightly larger than the flanges should be placed between the wheel and the flange (Fig. 3). If no washers are supplied with the wheel it is an easy matter to make up several of the heavy paper taken from cardboard packing boxes. A washer protects the wheel because it takes up any imperfection in either wheel or flange and thus the pressure on the wheel is distributed evenly when the flanges are tightened.

Table I—Diameter and Thickness of Wheel for Any Given Diameter of Spindle

Minimum Sizes of Machine Spindles in Inches for Various Diameters and Thicknesses of Grinding Wheels							
Thickness of Wheels in Inches	½	¾	1	1¼	1½	2	2½
Diameter of Wheel, In.	Diameter of Spindle in Inches						
4	½	¾	1	1¼	1½	2	2½
6	¾	1	1¼	1½	2	2½	
8	1	1¼	1½	2	2½		
10	1¼	1½	2	2½			
12	1½	2	2½				
14	2	2½					
16	2½						

When the wheel is placed on the spindle the nuts are too often turned too tight. The flanges should be tightened only enough to hold the wheel firmly, without unnecessary strain (Fig. 4). With the left hand the operator holds the bolt securely and with the right hand brings the nut up snugly against the washer. One jobber, to emphasize the danger of unnecessary tightening of the spindle nuts, makes the following statement: "On a 1½-in. floor grinding machine equipped with 8-in. standard relieved flanges a man with a 2-ft. wrench can easily exert



Fig. 4—Tighten the Nut Enough to Hold Wheel Safely

Excessive pressure should not be applied to the side of a grinder. Strains set up by clamping the flanges too tightly often result in breakage. An accident often happens from the cracking of a wheel before the defect has become apparent.

a crushing pressure of 3 600 lb. It is obvious that the wheel will be damaged if any such pressure is placed on it." The spindle of the grinding stand regulates the size of the wheels that can be used safely. Table I gives the diameter and the width of the wheels than can be used on a spindle of any given size. When ordering wheels this table should be used.

To Get Maximum Life Use Lamp of Right Voltage

The economy of burning lamps at their proper rated voltage cannot be too strongly emphasized because of the reduced life and efficiency contingent upon even a slight difference between the voltage at the socket and the rated voltage of the lamp. Lamps used on over-voltage circuits are brighter, but give their excessive light at a sacrifice in life. When lamps are operated at under-voltage, the life is, of course, increased, but the efficiency is greatly decreased.

The life of the average Mazda lamp is one thousand hours, when operated at rated voltage. Fig. 1 shows how the life of the lamp decreases when it is operated at a voltage higher than that for which it was designed. For example, consider the effect of using a 110-volt lamp where the actual voltage at the socket is 115. This seems like a small difference, doesn't it? Yet the curve shown on Fig. 1, which has been determined from a large number of tests, shows that the actual life of the lamp will be only 140 hours, or 14 per cent of its rated life. In this case, an increase of 4.5 per cent over the rated

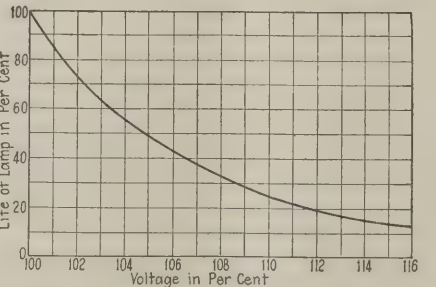


Fig. 1—Relation of Lamp Life to Voltage of the Circuit
Even a very slight increase of line voltage greatly reduces the life of an incandescent lamp. A 5 per cent over-voltage cuts the life of the lamp in half.

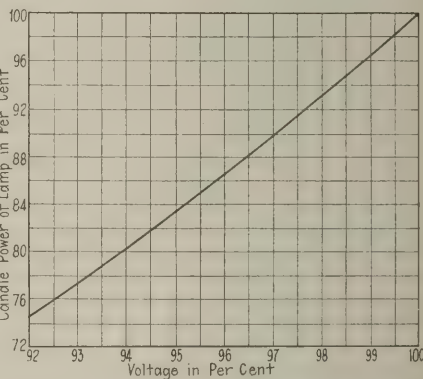


Fig. 2—Candle-Power Greatly Reduced on Low-Voltage Circuits

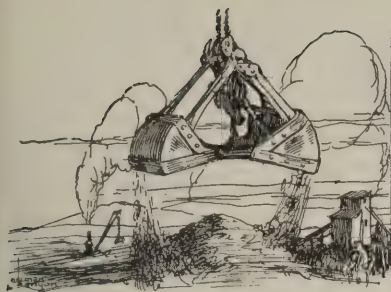
By operating a lamp on a circuit having a voltage lower than the rating of the lamp the life is increased but the efficiency and candle-power are reduced.

voltage causes a decrease of 86 per cent in lamp life. If a lamp rated at 110 volts is placed on a 220-volt circuit, it will burn out instantly.

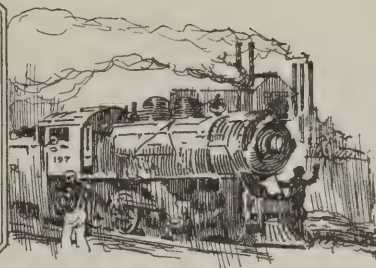
Fig. 2 shows the effect of operating lamps at a voltage lower than the rated value. If, for instance, a 110-volt lamp is used on a 100 volt-circuit, the light output would be only 74 per cent of its rated value. In this case, the candle-power is decreased 26 per cent by a 10-per cent under-voltage.

The obvious remedy, of course, is to use lamps having a voltage rating equal to the average voltage at the sockets. The voltages of lighting circuits have been standardized into two ranges, namely, 110, 115 and 120 volts, and 220, 230, 240 and 250 volts, the first range, particularly the 115 volts, being that generally used. Special lamps of voltage ratings other than those listed above are obtainable, but they should not be used because it is difficult to obtain them and because they are more expensive.

FRANK PAESKE.



Production And the Market



Bituminous-Coal Markets Show Little Change; Sentiment More Cheerful

The long looked-for and much hoped-for improvement in the bituminous coal market has not yet materialized. The general situation is as unsatisfactory as at any time during the last few months; demand is weak and fitful, production holds at rock bottom, a large number of mines are still idle and the running time at those working is sadly curtailed. As a consequence prices have a hard time holding their own at even the discouraging levels of recent weeks. None the less there are indications of an improvement in sentiment, based to some extent upon the gradual disappearance of distress coal. The signing of contracts is far from brisk, but movement to the lakes is picking up, shipments by the Hocking Valley R.R. to Toledo being three times as large as at this time a year ago.

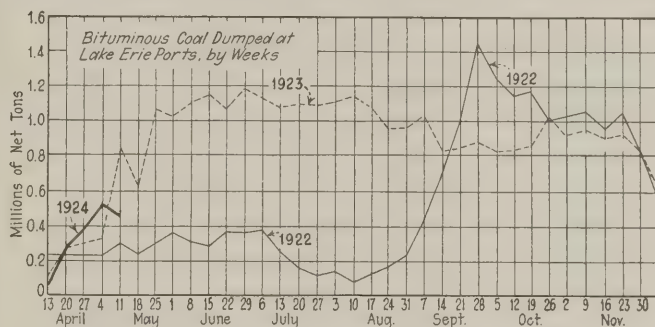
Hoover Urges Early Buying

In order to spread out the movement of coal and thus ward off possible car shortage and traffic congestion next autumn Herbert Hoover, Secretary of Commerce, has addressed a letter to secretaries of national and state trade associations urging manufacturers to purchase and store coal during May, June and July, when bituminous-coal prices are low and the railroads in better condition to handle the traffic.

That one-time radical, Frank Farrington, miners' union president in Illinois, recognizing the economic crisis that confronts the union in that state proposes a giant power plan to increase coal consumption, pointing out at the same time the necessity of co-operation by the miners with the operators to cut down production costs in order to lessen the inroads of competition by non-union fields.

Coal Age Index of spot prices of bituminous coal on May 12 was unchanged from the preceding week, standing at 169, the corresponding price being \$2.05.

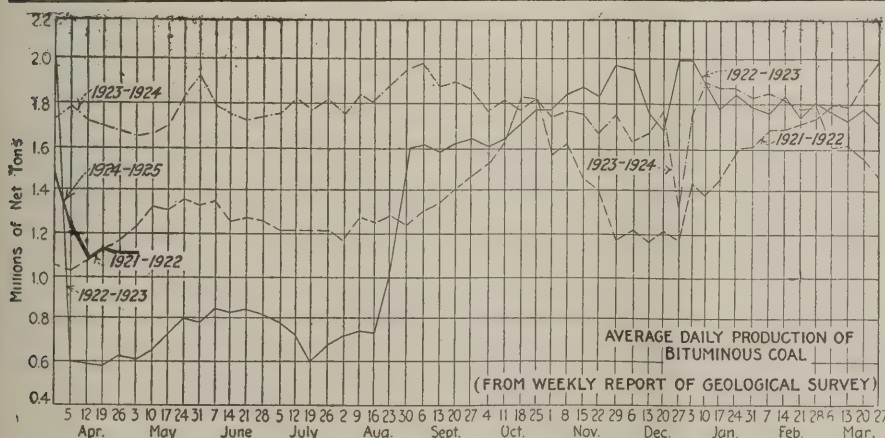
Dumpings at Hampton Roads for all accounts during the week ended May 8 totaled 293,849 net tons, as compared with dumpings of 326,962 net tons during the preceding week. Cargo coal dumped at Lake Erie ports during the week ended May 10, according to the Ore & Coal Exchange, amounted to 450,570 net tons, and of fuel coal 32,726 tons. This compares with



500,740 tons of cargo coal and 20,708 tons of fuel coal dumped during the previous week.

Production of bituminous coal revived to the extent of 108,000 during the week ended May 3, when, according to the Geological Survey, the output was 6,832,000 net tons. This compares with 6,726,000 tons produced during the preceding week. Anthracite output also took an upward turn, 1,616,000 net tons having been produced, compared with 1,205,000 tons during the week ended April 26.

Curtailed production of anthracite due to local labor disturbances has stiffened the hard-coal market. Independent domestic sizes are now quoted at close to company circular and in some instances shippers have had to refuse orders for immediate delivery. The strong demand for pea coal has led many to believe



Estimates of Production

(In Net Tons)

BITUMINOUS

	May 3	May 10†
April 19	10,221,000	6,918,000
April 26 (a)	10,103,000	6,724,000
May 3 (b)	10,061,000	6,832,000
Daily average	1,677,000	1,139,000
Cal. yr. to date (c)	187,097,000	169,161,000
Daily av. to date	1,771,000	1,603,000

ANTHRACITE

April 19	2,065,000	1,623,000
April 26	2,116,000	1,205,000
May 3	2,021,000	1,616,000
Cal. year to date	35,615,000	31,249,000

COKE

April 26 (a)	424,000	224,000
May 3 (b)	407,000	205,000
Cal. yr. to date (c)	6,773,000	4,888,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

that the country was short of domestic sizes, but the movement is explained largely by the fact that a number of consumers take some of this size in order to get more of the larger sizes. Stove continues to be in strongest demand, egg being next and chestnut third.

Midwest Feels No Pick-Up

Nothing happened during the past week to strengthen the coal market in the Midwest. Storage stocks are by no means exhausted yet, either in the hands of railroads or industrials, so that demand for all grades continues light. Enough coal is coming out of western Kentucky to reduce the effect that might have been created had the strike in that region stopped all work. The resumption of work in Kansas, Oklahoma, Arkansas and Missouri, with a slight freight-rate advantage from those mines to some of the Missouri Valley markets, has started a flow of fresh coal from that territory. All in all, the Midwest remains unencouraged by any element that might put strength into the trading. A little contracting is going on all the time, but the volume of it is small.

Production in Indiana and Illinois continues at rock bottom. Neither state shows any improvement from the

average 20 to 30 per cent of recent weeks. In the southern Illinois field little is moving except steam sizes, for which there is some demand. The Mt. Olive field is practically at a standstill. The Standard field is moving out some 2-in. lump, but there is no domestic market. Mines supplying railroad coal are about the only ones working. A good many unmarried miners have left these fields for parts unknown. Unrest is noticeable among those with families who cannot move so easily.

Business is practically stopped at St. Louis. There is no domestic tonnage moving and wagonload steam is just barely in evidence. The public seems a little inclined to put off buying this year, although prices are down to rock bottom. Country business is at a standstill, excepting a little trade in chestnut anthracite. Country steam shows a little activity here and there and the demand for screenings in outside markets continues good.

Kentucky Trade Is Slow

The Kentucky market is very dull, although the Big Four, Southern and Louisville & Nashville railroads have been taking a fair amount of coal. It is reported that the Wisconsin Steel Co., operating at Benham, Ky., has been moving some industrial fuel to its mills and also to the

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	May 14 1923	Apr. 28 1924	May 5 1924	May 12 1924†
Smokeless lump	Columbus	\$6.25	\$3.40	\$3.40	\$3.30@	\$3.50
Smokeless mine run	Columbus	4.10	2.25	2.25	2.20@	2.35
Smokeless screenings	Columbus	3.75	1.85	1.85	1.75@	2.00
Smokeless lump	Chicago	6.10	3.10	3.10	3.00@	3.25
Smokeless mine run	Chicago	3.85	2.10	2.00		2.00
Smokeless lump	Cincinnati	6.00	3.50	3.35	3.50	
Smokeless mine run	Cincinnati	4.25	2.10	2.05	1.75@	2.00
Smokeless screenings	Cincinnati	4.10	1.85	1.75	1.50@	2.00
*Smokeless mine run	Boston	6.85	4.45	4.40	4.35@	4.50
Clearfield mine run	Boston	2.75	2.05	2.00	1.60@	2.35
Cambria mine run	Boston	3.60	2.50	2.55	2.00@	2.75
Somerset mine run	Boston	3.10	2.25	2.30	1.75@	2.50
Pool 1 (Navy Standard)	New York	3.75	2.85	2.85	2.75@	3.00
Pool 1 (Navy Standard)	Philadelphia	4.00	3.00	3.00	2.75@	3.25
Pool 1 (Navy Standard)	Baltimore					
Pool 9 (Super. Low Vol.)	New York	2.90	2.20	2.20	2.00@	2.40
Pool 9 (Super. Low Vol.)	Philadelphia	3.00	2.20	2.20	2.00@	2.45
Pool 9 (Super. Low Vol.)	Baltimore	2.75	1.80	1.80	1.75@	1.90
Pool 10 (H.Gr. Low Vol.)	New York	2.50	1.85	1.90	1.70@	2.15
Pool 10 (H.Gr. Low Vol.)	Philadelphia	2.40	1.85	1.85	1.70@	2.00
Pool 10 (H.Gr. Low Vol.)	Baltimore	2.25	1.65	1.65	1.60@	1.70
Pool 11 (Low Vol.)	New York	2.20	1.50	1.55	1.50@	1.75
Pool 11 (Low Vol.)	Philadelphia	2.00	1.50	1.50	1.30@	1.70
Pool 11 (Low Vol.)	Baltimore	2.00	1.50	1.55	1.50@	1.60
High-Volatile, Eastern		Market Quoted	May 14 1923	Apr. 28 1924	May 5 1924	May 12 1924†
Pool 54-64 (Gas and St.)	New York	1.85	1.50	1.50	1.40@	1.65
Pool 54-64 (Gas and St.)	Philadelphia	1.85	1.55	1.55	1.45@	1.70
Pool 54-64 (Gas and St.)	Baltimore	1.80	1.60	1.45	1.40@	1.50
Pittsburgh sc'd gas	Pittsburgh	2.85	2.40	2.40	2.30@	2.50
Pittsburgh gas mine run	Pittsburgh		2.10	2.10	2.00@	2.25
Pittsburgh mine run (St.)	Pittsburgh	2.00	1.85	1.85	1.75@	2.00
Pittsburgh slack (Gas)	Pittsburgh	1.75	1.40	1.35	1.30@	1.40
Kanawha lump	Columbus	3.25				
Kanawha mine run	Columbus	2.20				
Kanawha screenings	Columbus	1.75				
W. Va. lump	Cincinnati	3.75	2.35	2.00	2.10@	2.25
W. Va. gas mine run	Cincinnati	2.20	1.40	1.35	1.35@	1.50
W. Va. steam mine run	Cincinnati	2.20	1.40	1.35	1.35@	1.50
W. Va. screenings	Cincinnati	2.00	1.05	.90	1.00@	1.10
Hocking lump	Columbus	2.80	2.45	2.45	2.25@	2.65
Hocking mine run	Columbus	1.95	1.60	1.60	1.50@	1.75
Hocking screenings	Columbus	1.60	1.30	1.30	1.25@	1.45
Pitts. No. 8 lump	Cleveland	2.90	2.35	2.40	2.10@	2.75
Pitts. No. 8 mine run	Cleveland	2.15	1.80	1.85	1.85@	1.95
Pitts. No. 8 screenings	Cleveland	1.60	1.50	1.55	1.45@	1.55
Midwest		Market Quoted	May 14 1923	Apr. 28 1924	May 5 1924	May 12 1924†
Franklin, Ill. lump	Chicago	\$3.80	\$2.75	\$2.75	\$2.50@	\$3.00
Franklin, Ill. mine run	Chicago	3.10	2.35	2.35	2.25@	2.50
Franklin, Ill. screenings	Chicago	1.75	2.15	2.15	2.10@	2.25
Central, Ill. lump	Chicago	2.30	2.60	2.60	2.50@	2.75
Central, Ill. mine run	Chicago	2.10	2.10	2.10	2.00@	2.25
Central, Ill. screenings	Chicago	1.85	1.90	1.90	1.80@	2.00
Ind. 4th Vein lump	Chicago	3.35	2.85	2.85	2.75@	3.00
Ind. 4th Vein mine run	Chicago	2.85	2.35	2.35	2.25@	2.50
Ind. 4th Vein screenings	Chicago	1.85	1.95	1.95	1.90@	2.00
Ind. 5th Vein lump	Chicago	2.85	2.35	2.35	2.25@	2.50
Ind. 5th Vein mine run	Chicago	2.10	2.10	2.10	2.00@	2.25
Ind. 5th Vein screenings	Chicago	1.65	1.80	1.80	1.75@	1.85
Mt. Olive lump	St. Louis		2.85	2.85	2.75@	3.00
Mt. Olive mine run	St. Louis		2.50	2.50	2.50	
Mt. Olive screenings	St. Louis		2.00	2.00	2.00	
Standard lump	St. Louis	2.60	2.15	2.15	2.00@	2.35
Standard mine run	St. Louis	1.80	1.95	1.95	1.90@	2.00
Standard screenings	St. Louis	1.50	1.80	1.80	1.75@	1.90
West Ky. lump	Louisville	2.60	2.35	2.35	2.25@	2.50
West Ky. mine run	Louisville	1.90	1.60	1.60	1.50@	1.85
West Ky. screenings	Louisville	1.60	1.65	1.65	1.50@	1.75
West Ky. lump	Chicago	2.60	2.25	2.25	2.00@	2.50
West Ky. mine run	Chicago	1.80	1.60	1.60	1.50@	1.75
South and Southwest		Market Quoted	May 14 1923	Apr. 28 1924	May 5 1924	May 12 1924†
Big Seam lump	Birmingham	2.70	2.60	2.80	2.70@	2.90
Big Seam mine run	Birmingham	2.05	2.00	2.00	1.75@	2.25
Big Seam (washed)	Birmingham	2.35	2.20	2.20	2.00@	2.40
S. E. Ky. lump	Chicago	3.75	2.25	2.25	2.00@	2.50
S. E. Ky. mine run	Chicago	2.85	1.60	1.60	1.25@	2.00
S. E. Ky. lump	Louisville	4.00	2.10	2.10	2.00@	2.35
S. E. Ky. mine run	Louisville	2.50	1.50	1.50	1.25@	1.75
S. E. Ky. screenings	Louisville	1.90	1.10	1.05	1.00@	1.25
S. E. Ky. lump	Cincinnati	3.35	2.25	2.05	2.25@	2.50
S. E. Ky. mine run	Cincinnati	2.00	1.35	1.35	1.25@	1.50
S. E. Ky. screenings	Cincinnati	1.80	1.10	.85	1.00@	1.15
Kansas lump	Kansas City	3.85	4.50	4.50	4.50	
Kansas mine run	Kansas City	3.25	3.25	3.25	3.50	
Kansas screenings	Kansas City	2.60	2.50	2.50	2.50	

* Gross tons. f.o.b. vessel. Hampton Roads.

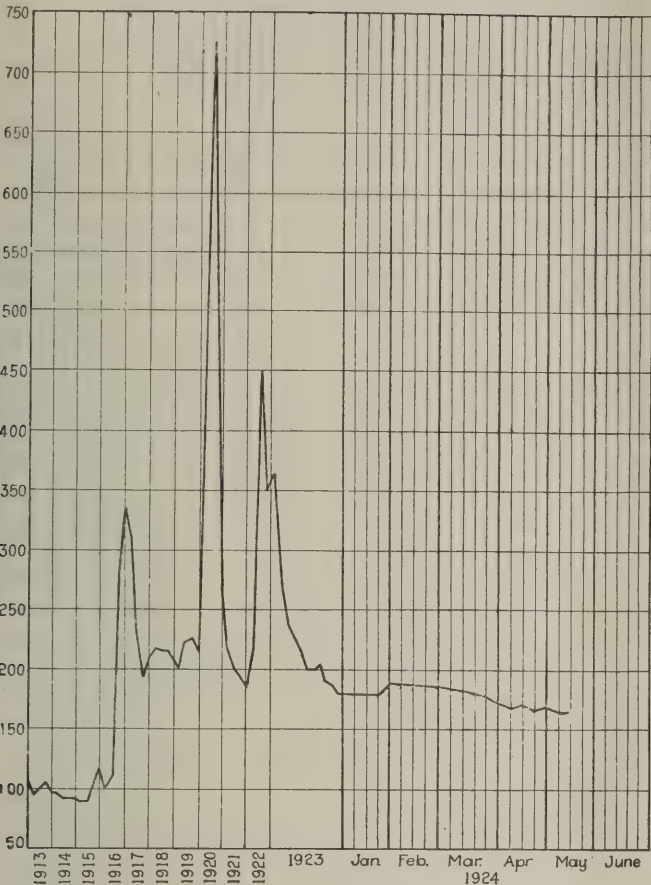
† Advances over previous week shown in heavy type, declines in *italics*.

‡ On strike.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	May 14, 1923	May 5, 1924	May 12, 1924†
				Independent	Company	Independent
Broken	New York	\$2.34		\$7.75@	\$8.35	\$8.00@
Broken	Philadelphia	2.39		7.90@	8.10	8.60@
Egg	New York	2.34		8.00@	8.35	8.35@
Egg	Philadelphia	2.39		9.25@	9.50	8.35@
Egg	Chicago*	5.06		12.00@	12.50	8.75@
Stove	New York	2.34		8.50@	11.00	8.35@
Stove	Philadelphia	2.39		9.25@	9.50	8.75@
Stove	Chicago*	5.06		12.00@	12.50	8.35@
Chestnut	New York	2.34		8.00@	8.35	8.35@
Chestnut	Philadelphia	2.39		9.25@	9.50	8.75@
Chestnut	Chicago†	5.06		12.00@	12.50	8.75@
Range	New York	2.34		8.30		8.60
Pea	New York	2.22		6.30@	7.25	5.50@
Pea	Philadelphia	2.14		6.15@	7.25	5.75@
Pea	Chicago*	4.79		7.00@	8.00	5.36@
Buckwheat No. 1	New York	2.22		2.25@	3.50	2.35@
Buckwheat No. 1	Philadelphia	2.14		3.00@	3.50	2.50@
Rice	New York	2.22		1.50@	2.50	1.90@
Rice	Philadelphia	2.14		2.00@	2.50	2.00@
Barley	New York	2.22		1.00@	1.50	1.50@
Barley	Philadelphia	2.14		1.15@	1.50	1.50@
Birdseye	New York	2.22		1.60	1.40@	1.60

* Net tons. f.o.b. mines. † Advances over previous week shown in heavy type, declines in *italics*.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924	1923
Index	May 12	May 5
Weighted average price	169	169
	\$2.05	\$2.05
	171	226
	\$2.07	\$2.73

This diagram shows the relative, not the actual prices, on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Lakes for movement north, but there doesn't appear to be much contract business developing on lake shipments, and the big utilities and industrials are buying lightly. Retail business has slumped off. Eastern Kentucky operators, as a result of favorable wage scales, are enabled to obtain some business on a price basis that otherwise would be denied them on account of freight hauls. Although more than half of the western Kentucky field is down on account of the District No. 23 strike, the remaining mines are not busy. However, orders for prepared are light, which is resulting in screenings being scarce and comparatively high. Prices of prepared coal are holding rather firmly.

Little Doing In Northwest

Business is extremely slow throughout the Northwest except in a little hard coal to meet immediate demand during a slight cold spell. Price reductions on many soft coals at the Head-of-the-Lakes did not stimulate trading much. Variations in anthracite prices are noticeable. While at Duluth a 10c. advance was made May 1 and further advances were promised for the rest of the summer, at Milwaukee slight decreases were put into effect to stimulate early buying. Shipments from the Duluth docks last month were good. In all 15,683 cars went out as against 13,619 in the preceding month and 7,555 in April of last year. Nearly all of this coal went to the railroad companies' yards as little selling was done. The larger number of cars (9,043) went from the Duluth side of the harbor, which is unusual. This was done to save tax assessment for coal on docks as of May 1.

To date 41 cargoes of new coal have been unloaded at the Duluth-Superior docks for a total of 318,090 tons. Ten of the cargoes, aggregating 79,230 tons, were anthracite. Eight more cargoes are ready to enter the harbor, but the ice cap has closed down and many boats are held out in the lake. All coal of the defunct Superior Coal & Dock Co. has been sold. This removes much cheap coal from the market. At Milwaukee the May reduction in soft coal has had the effect of stimulating business to some extent. Milwaukee receipts of coal by lake thus far this season aggregate 68,576 tons of anthracite and 113,599 tons of soft coal. Lake freight rates have been reduced 50c. per ton. The coal movement promises to be slow during the summer.

West Is Largely Inactive

Few mines of the Southwest have resumed work as a result of the recent wage agreement in Kansas City between operators and miners. Some "no bills" accumulated on Kansas tracks even during the month's suspension, the product of independent mines, the operators of which signed with the miners before the association did. Only a heavy storage demand could result in operation to any extent in the Southwest this summer. The market in Colorado shows very little change. Sales are at a standstill. Mines worked on an average of twenty hours last week and a number of them report "no bills." The operators' weekly reports show more than 30 per cent of the time lost attributed to "no market." The railroads also report a considerable decrease in the shipments of commodities from the coal producing districts. Utah operators are moving very little coal. Although working time is but two days a week, "no-bill" cars are increasing. Mining and cement companies are buying a little coal, but outside of these industries the demand is at a very low point. The domestic demand is for intermediate sizes. Nothing has been said regarding storage rates this year. It is unlikely that the operators will make a reduction.

Solid Undertone at Cincinnati

Business in Cincinnati had a more solid footing during the past week. Gradual elimination of the producers south of the river who threw coal on the market whether it was needed or not, the passing of a bulk of the tonnage that was coming on consignment and a minimum of "distress" fuel are the outstanding causes. Increase in Lake business and buying by large consumers whose stockpiles are at a level where they must replenish also have been helpful. The retail trade has settled down to an even tenor for the month apparently, for there has been no change in quotations. Low bids on county business is the only disturbing factor, but this is not taken to mean any great change in prices. An increased tonnage from the Kanawha River with more coming over the elevators at Huntington is the feature of the river trade. Specialized coals are quoted as follows: Block, \$3@3.50; egg, \$2.50@3. The Columbus market notes a better feeling in steam trade. A large part of the railroad contracting has been done and Hocking Valley operators got their share of the tonnage; quite a number of smaller agreements also have been placed. Steam requirements are not as heavy as formerly and some of the larger consumers are still using reserves. Some school coal also is moving and public utilities are coming into the market again. On the whole there is a better tone to the trade although there has been no especial strengthening in quotations. Producers have reduced output to a point where there is little distress coal on the market. Retail trade is quiet. Lake trade is slow. Cleveland operators and jobbers report an extremely quiet market and even consumers who have no stocks on hand are buying from week to week in small quantities rather than a thirty-day supply. Furthermore, there seems to be a slight slowing down in industrial activity, and consequently consumption is much below normal. However, the New York Central reports an upturn in the volume of loads moving through its Cleveland terminals, as compared with the daily average a week or so ago. The increase has been gradual and consistently upward during the past ten days. With a slightly increased production of lump coal for Lake, the quantity of slack in the market has become more abundant, and spot prices on slack and nut and

slack have receded about 10c. per ton. There is practically no change in spot prices on other grades.

Line demand at Pittsburgh continues extremely poor. The market is spotty from day to day, but a week's average shows no material change in volume. Railroad demand is still the chief support of the market. Prices are unchanged.

Practically all the non-union mines in Somerst, Cambria and Westmoreland counties, in the central Pennsylvania district, have gone back to the 1917 scale and operators are thus able to compete with southern conditions and, as a result, mines are operating on practically full time, with the exception of the Berwind-White Coal Co., at Windber, which is still paying the higher rates and is working two to three days per week. A further evidence of the effect of the new scale is shown in the loadings for the week ending May 3, which totaled 10,439 cars, as against 9,954 for the previous week.

The trade at Buffalo continues quiet. Slack is in better supply and the prospect of an advance in price seems to have disappeared.

Price Recession Feared in New England

In New England there is no material change either in prices or in the attitude of buyers. The industrial situation is in no wise improved, and the more pessimistic in the trade are apprehensive lest quotations again recede. In fact, prices for spot loading f.o.b. vessel at Hampton Roads are 10c. less than a week ago. While numbers of operations are working but one to two days weekly there are still moderate accumulations at the Virginia terminals, and the agencies find themselves pressed to relieve cars. In no direction is there hope of a much better market during May.

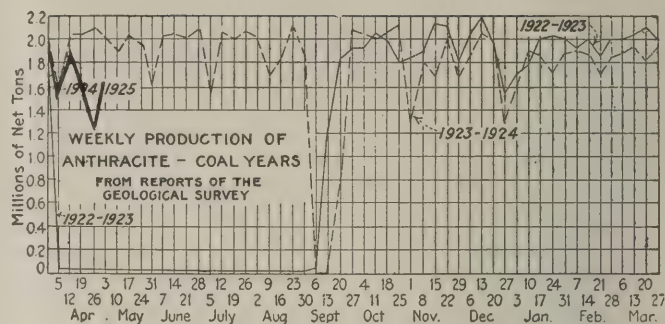
Prices per gross ton on cars Boston also have eased somewhat within a few days; \$5.35 is quoted, as compared with \$5.50 a week ago, although a few factors are trying to get as high as \$5.75. The market is governed, however, by those larger distributors who are obliged to make room for weekly arrivals.

All-rail from central Pennsylvania there is only scattering demand at minimum prices. Except within a narrow zone east and west of the Connecticut River and well away from tidewater there is no market whatever for grades other than a few specialties.

Better Tone in Seaboard Markets

Consumers at New York are making some interesting inquiries which are expected to develop into real business. As a whole, the market is in better shape. This is not apparent, however, by comparing the price list with previous weeks, but in the general attitude of the trade. There appears to be more optimism abroad and those coal men who a few weeks talked dull trade until August are advancing their revival date a few weeks at least. Less coal is coming to the New York tidewater and more strength is apparent, causing less tendency to cut prices in order to sell coal. The daily average of cars on tracks at the piers last week was less than during the previous six days.

Philadelphia finds coal still difficult to move, and more mines than ever are reported as being closed down or working short time. Big consumers are sticking to stockpiles for coal, and the fact that apparently more coal is being consumed than is being mined is really the one favorable aspect to the market. The recent slight flurry in tide movement seems to have quieted down about as quickly as it arose, as the past week has seen no clearances of



coal at all. Bunkering remains on the same plane as maintained during the past ten weeks or more.

Although production has been greatly curtailed in some sections of West Virginia apparently it is still in excess of current demand and possibly of consumption. Within the last few weeks, if anything, there has been a slight increase in the tonnage mined and loaded as observed in increased shipments to the Atlantic piers. The fact that there are so many mines in idleness in northern West Virginia has created a small increase in business for such mines as are running and has resulted in a scarcity of screenings, but so far there has been no advance in prices worth mentioning, either as to high or low volatile.

There was an almost complete cessation of activities last week in the Baltimore market. Few dealers are now chancing heavy shipments to tide for the spot market, as there has been difficulty in getting rid of this coal without heavy demurrage charges. The export movement, which for some time has been the one encouraging feature, has taken a drop for the first week of the present month.

Demand at Birmingham is extremely light, consumers showing little interest in solicitations and buying only for immediate needs. The Frisco Railroad has closed its contract for fuel for the next twelve months, this contract having been pending for several weeks. Business in export and bunker channels is negligible at present, a limited tonnage moving to Cuban and South American points.

Brisk Tone in Anthracite Trade

Weather conditions have helped consumption to such an extent that many New York retail dealers have not been able to fill their orders as rapidly as they would have liked. All domestic sizes are in strong demand. Stove coal leads the list and straight lots of that size bring the maximum quotation, but when taken with chestnut or egg may be had for 15c. to 25c. less. Chestnut is the hardest of the three coals to move. Pea is in good demand also. The steam coals are easily moved, with rice and barley the strongest.

An improved tone marks the trade at Philadelphia this week. Cool weather has helped in a measure to keep up a fair demand for current consumption. Dealers report consumer ordering slow and not much stimulated by increased mine prices. The retail price situation remains unchanged. Steam sizes have in no wise improved.

Baltimore retailers report a fair amount of orders, but that supplies on hand are adequate to meet the situation. The public apparently is taking advantage of the fact that prices probably will not be raised by retailers until July 1, and are endeavoring to get coal in cellars in many cases.

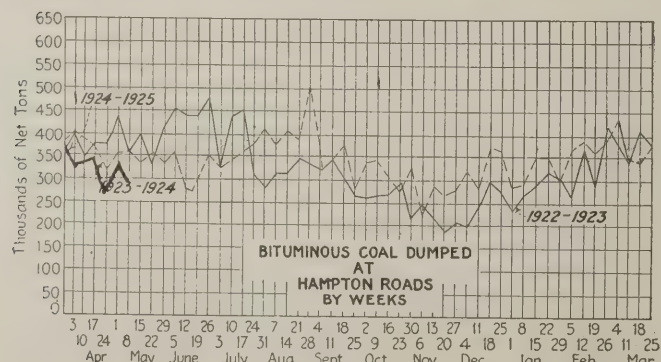
Coke Output Continues Steady Decline

Spot furnace coke remains quotable at \$3.60@3.75. Foundry coke is in poor demand and really standard foundry coke remains quotable at \$4.75 to \$5.25. Output of beehive coke during the week ended May 3 was 205,000 net tons, according to the Geological Survey, compared with a production of 224,000 tons during the previous week.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended April 26	878,892	117,572
Previous week	876,923	124,752
Same week in 1923	963,694	180,127

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
April 30, 1924	329,489	193,061		
Previous week	321,832	189,600		
Same date in 1923	13,556	2,849	35,282	17,634



Foreign Market

And Export News

British Coal Market Disorganized;

Production Slumps Further

The Welsh steam-coal market is suffering from disorganization and instability. The Easter holidays have in most cases been unofficially prolonged by the miners on account of the brilliant weather, and in consequence output has fallen and foreign buyers have made heavy purchases of American and German coal. These are some of the factors that account for the instability in South Wales. In addition merchants holding contract supplies are offering them at lower rates than the collieries. In these circumstances values have a marked tendency toward weakness.

Pit stoppages are numerous owing to the accumulations of stocks and the stormy weather interfering with exports. The recent decline in prices has attracted more business and buyers are refusing further concessions. The strike of trimmers at Leith threatens to spread to other ports.

The Newcastle market is suffering from a spring lassitude, and, all round, much the same conditions prevail as in South Wales.

Production by British collieries during the week ended April 26, a cable to *Coal Age* states, was 4,049,000 tons, according to the official reports. This compares with 4,994,000 tons in the week ended April 19 and 5,843,000 tons during the week ended April 12.

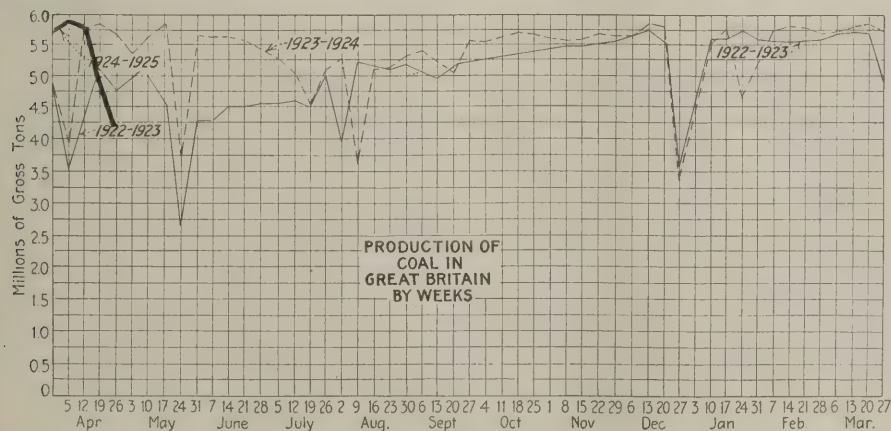
French Coal Market Steady

In All Lines

The French coal market is firm and steady in all lines, but disposals are extremely rare in the North and Pas-de-Calais, despite a continual increase in production. Imports of British coal are still large, but prices are more accessible with the decline of Sterling.

Owing to the new taxes imposed on the collieries, some of them intend to raise the prices of industrial fuel 15 to 30 centimes per ton.

Demand for household coal has slackened in anticipation of summer rates.



The Belgians having definitely established summer rebates at 8 fr. per ton for May and June, 4 fr. in July and 2 fr. in August, the Paris coal traders have issued their summer schedule.

Supplies of coke to the O.R.C.A. during April averaged 19,500 tons daily, which is slightly under the usual record, due to the slackening of activity occasioned by the Easter holidays. The price of coke for April will be 150.75 fr., all charges included.

The prices of reparation coal have just been lowered 10 per cent in Belgium, and similar action is expected soon in France.

Trade Steady at Hampton Roads;

Prices and Tone Firm

Business at Hampton Roads is holding its own, with no apparent increase in activity in the market. Prices hold firm, with scarcity of Pool No. 2 as perhaps one of the striking features of the market.

Coastwise and bunker trade is fair, but foreign movement shows an inclination to drop off. Old orders are being completed and no new contracts for overseas shipments are to be noted in the market.

The tone of the market is firm, and the outlook shows little prospect of any immediate increase in trade.

Exports of U. S. Coal in March

By Countries

(In Gross Tons)

Exported to:	March, 1923	March, 1924
France.....	3,495	34,084
Italy.....	54,971	43,702
Netherlands.....	53,452	
Other Europe.....	80,306	
Canada.....	920,629	822,175
Mexico.....	5,568	7,643
Br. West Indies.....	17,493	12,335
Cuba.....	51,173	28,960
Other West Indies.....	7,924	32,925
Argentina.....	8,140	53,650
Brazil.....	6,579	43,113
Chile.....		7,067
Egypt.....	2,498	2,980
French Africa.....		
Other countries.....	7,742	23,118
Coke.....	97,521	112,048

U. S. Coal and Coke Imports

During March

	1923	1924
Anthracite.....	33,252	13,727
Bituminous.....	319,941	53,972
Imported from:		
United Kingdom.....	137,688	7,485
Canada.....	168,936	40,926
Japan.....		5,560
Australia.....	13,311	
Other countries.....	6	1
Coke.....	8,829	7,361

Export Clearances Week Ended

May 10, 1924

FROM BALTIMORE		Tons
For Argentina:		
Br. Str. North Anglia.....	5,144	
For Italy:		
Ital. Str. Valdieri.....	6,782	
Am. Str. Lampasas.....	1,992	
FROM HAMPTON ROADS		
For Africa:		
Fr. Str. Mont Agel for Algiers.....	968	
For Argentina:		
Br. Str. Clydemede for Buenos Aires.....	6,001	
For Brazil:		
Br. Str. Denis for Para.....	505	
Braz. Str. Mandu for Rio de Janeiro.....	5,558	
Br. Str. Saint Patrick for Rio de Janeiro.....	5,741	
Br. Str. Hubert for Para.....	601	
Br. Str. Naxtergate for Rio de Janeiro.....	6,618	
For Canada:		
Br. Schr. Maid of France for St. John.....	597	
Ital. Str. Valverde for Montreal.....	6,088	
For France:		
Fr. Str. P. L. M. 20 for Marseilles.....	8,042	
Fr. Str. P. L. M. 21 for Marseilles.....	8,211	
For Italy:		
Ital. Str. Madison for Civita Vecchia.....	4,661	
Ital. Str. Monte Nero for Porto Ferrajo.....	6,945	
For Porto Rico:		
Swed. Str. Conallaria for Tanamo.....	305	
For West Indies:		
Br. Str. Maindy Court for Puerto Plata.....	5,634	
Nor. Str. Fram for Fort de France.....	3,908	

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	May 1	May 8
Cars on hand.....	985	1,124
Tons on hand.....	61,183	71,241
Tons dumped for week.....	145,413	93,638
Tonnage waiting.....	16,000	17,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,151	1,091
Tons on hand.....	78,850	76,800
Tons dumped for week.....	77,116	94,824
Tonnage waiting.....	10,773	8,300
C. & O. Piers, Newport News:		
Cars on hand.....	1,070	960
Tons on hand.....	53,070	45,693
Tons dumped for week.....	68,598	73,903
Tonnage waiting.....	625	16,450

Pier and Bunker Prices, Gross Tons

PIERS		May 3	May 10†
Pool 9, New York.....	\$4.70@ \$5.00	\$4.75@ \$5.00	
Pool 10, New York.....	4.40@ 4.75	4.60@ 4.85	
Pool 11, New York.....	4.25@ 4.50	4.40@ 4.50	
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05	
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80	
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55	
Pool 1, Hamp. Roads.....	4.35@ 4.50	4.40	
Pool 2, Hamp. Roads.....	4.15@ 4.25	4.25	
Pools 5-6-7 Hamp. Rds.....	4.00@ 4.15	4.00	
BUNKERS		May 3	May 10†
Pool 9, New York.....	5.00@ 5.30	5.05@ 5.30	
Pool 10, New York.....	4.70@ 5.05	4.90@ 5.15	
Pool 11, New York.....	4.55@ 4.80	4.70@ 4.80	
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40	
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00	
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80	
Pool 1, Hamp. Roads.....	4.35@ 4.50	4.50	
Pool 2, Hamp. Roads.....	4.15@ 4.25	4.25	
Pools 5-6-7 Hamp. Rds.....	4.00@ 4.15	4.15	

Current Quotations British Coal f.o.b.

Port, Gross Tons

Quotations by Cable to Coal Age		May 3	May 10†
Cardiff:			
Admiralty, large.....	27s.6d. @ 28s.	27s.6d. @ 28s.6d.	
Steam smalls.....	18s. @ 19s.	18s. @ 18s.6d.	
Newcastle:			
Best steams.....	27s.	28s.	
Best gas.....	24s.6d.	25s.	
Best bunkers.....	23s.6d. @ 24s.	23s.	

† Advances over previous week shown in heavy type; declines in *italics*.



News Items From Field and Trade



ALABAMA

The Big Sand Iron & Steel Co., Birmingham, has changed its name to Big Sandy Coal & Iron Co., and is said to be planning improvements to its properties in Tuscaloosa County, near Coaling.

Advices from Cullman, in Cullman County, state that much undeveloped mineral lands are being bought up in that section by L. B. Musgrove, of Jasper, organizer of the Deepwater Coal Co., recently formed, and that Henry Patillo, of Cullman, also is buying up lands in Cullman and adjoining counties, which it is believed carry valuable coal deposits.

The Crow Coal Co., which was recently incorporated, has been organized with Charles B. Crow, president and W. W. Bankhead, secretary and treasurer. It has 80 acres under development, with a daily output of about 250 tons, at Jasper.

The Stith Coal Co., Brown Marx Building, Birmingham, of which A. B. Aldridge is secretary, has bought the Drifton mines in Walker County, including about 15,000 acres of land, drift mines, about forty houses, store and other appurtenances.

The Bankhead Coal Co., Bankhead, of which W. D. Leake is general manager, has let the contract for a steel tipple of 3,000 tons per day capacity.

COLORADO

Substantial progress has been made in driving the Moffatt tunnel. Already Hitchcock & Tinkler, Inc., the contractors, have completed 2,200 ft. of the water tunnel at the east end of the bore and 2,500 ft. on the west end. The main railroad tunnel has been completed 320 ft. in from the east, and the narrow heading which precedes it is now 1,700 ft. long. Although the contract calls for completion of this railroad bore under James peak by July, 1927, the contractors now announce that they will have the job done in 1926. The tunnel is expected to give considerable impetus to the development of the great Routt County coal region, now handicapped by doubtful transportation.

An effort to reduce miners' wages in Colorado caused a strike of the 100 men at the Broadhead mine of the Temple Fuel Co. at Aguilar early in May. The company had announced a reduction of 15 per cent in wages with a statement from President F. R. Wood saying that, because of the 50 per cent

drop in the price of coal, the mine had been running at a loss for the preceding 60 days. The union men, presided over by Mike Livoda, vice-president for the Colorado district, voted to suspend operations until the old wage scale is restored. The strike is legal, according to the State Industrial Commission, to whom miners appealed several days ago. The company has made no attempt to operate the mine during the dispute. Mr. Wood also is president of the Colorado & New Mexico Coal Operators' Association.

Colorado coal mines yielded 10,336,735 tons in 1923, an increase of 333,125 tons over the output for 1922, according to the annual report of James Dalrymple, State Coal Mine Inspector. During 1923 the average number of men employed in the mines was 13,277, with an average of 169.9 days worked per mine.

The National Fuel Co. is being sued by Albert S. Nelson, a farmer in Colorado, for \$103,000 on the ground that its coal operations have so disturbed the surface of land under which they leased coal rights, that farming is impossible. Nelson charges that some of the holes sunk "in all sections" of his ranch are "40 and 45 ft. in diameter."

ILLINOIS

Work has been resumed by the Rex Coal Co. at its mine at Warner, near Coal Valley. A new airshaft has been sunk and two shifts of men are now being employed.

A total of 150 miners employed by the Madison County Coal Co. have petitioned for a receiver for that company to be appointed by the Circuit Court of Madison County at Edwardsville, Ill. The miners in the petition state that the company was unable to meet a \$13,000 payroll. Thomas R. Harris of St. Louis is president of the company. Slow collections are said to have caused the company embarrassment.

John Foster, who for several months had been superintendent of Mine No. 1 of the Chicago, Wilmington & Franklin Coal Co., at Benton, has been transferred to Herrin, where he has been appointed superintendent of Mine A of that company.

H. M. Prigge & Co. has been incorporated at St. Louis with a capital of \$20,000 and will mine and manufacture coal, coke, fuel, pig iron, fireclay, sand, and silicates. The incorporators are Henry M. Prigge, Martha J. Prigge and William Meinholtz.

Marshall M. Ennis was elected trustee of the Drakesboro Coal Co., Inc., at Drakesboro, Muhlenberg County, by the creditors at a meeting held on May 1, before John L. Stout, referee in bankruptcy. Ennis has been serving as receiver since the company went bankrupt. The stock consists of a coal mine and store.

H. J. Elliott, for 24 years well known throughout the Middle West as a representative of the Pittsburgh Coal Co. and for seven years the Chicago manager of that company, has resigned and is now spending the summer in his home country in and near Minneapolis, Minn., fishing and resting. His business plans for the future have not yet matured. J. D. Sauerberg, who has been with Mr. Elliott every year of the 24 in the Chicago office, is the present manager.

INDIANA

Representatives of the U. S. Bureau of Mines and of the Indiana mine inspection bureau recently conferred with John Hessler, president of District No. 11, United Mine Workers, to consider preliminary details of the State first-aid meeting to be held June 28 at Princeton.

The Dering Coal Co. has announced that Dering mine No. 6, at Clinton, which has been closed for some time, will be reopened immediately. This is one of the largest mines in the Clinton field.

Two new Indiana mining companies have been organized. The St. Clair Coal Co. has been incorporated at Bicknell by Charles Goodman, Thomas Thomas, Henry Brown, Patrick Penman, Alexander Campbell, Charles Holt, Lewis Steffy, John Thomas and Howard Taylor, all of Indianapolis. The Emcke Coal Co. has been incorporated at Terre Haute with a capital stock of \$100,000 to mine coal in that section of the state. The incorporators are W. L. Mace, John H., and A. J. Beasley, all of Terre Haute.

The Brooks-Hoffman Coal Co. has been incorporated at Vincennes, for the purpose of doing a general mining business. The incorporators are Lewis Brooks, Nolan McClure, William E. Ruble and Thomas J. Brooks, all of Vincennes, and Harry H. Hoffman of Petersburg, Ind.

The Patoka Coal Co., which operates a stripping mine at Rogers, six miles east of Petersburg, closed recently, awaiting a revival in the coal markets—if any. The company has been operating all winter and this is the first

suspension in a year. Other mines in Pike county are operating only from one to three days a week.

W. H. Leland, Chicago, president of the Leland Coal Co., closed a deal May 6 at Evansville with Jabez Wooley, president of the Warwick Coal Co., for the Polk Patch stripping operations, near Boonville, in southern Indiana, at a reported price of \$500,000. The Leland company now owns nine operations in Indiana, Illinois and Kentucky.

KANSAS

The Central Coal & Coke Co., of Kansas City and Pittsburgh, has purchased nearly 30,000 acres of land south of Coffeyville, all but 2,000 acres of which is in Oklahoma. The Santa Fe R. R. is to build a spur to the new field, development of which is under way.

KENTUCKY

The Dempster Coal Mining Co. of St. Charles, of which Geo. R. Dempster is president, is reported to have acquired the plant of the bankrupt Harris Collieries Co., at Island, and is planning the removal of the equipment to Earlington.

It is reported from Pinesville that several union miners and their families are moving from the property of the Liberty Coal & Coke Co., on Straight Creek, following expiration of the thirty days' eviction notices posted by the company in early April. On April 30 Judge Cochran, of the federal court, Eastern Kentucky division, in a hearing at Richmond, indicated that federal authorities would eject the miners if they did not move, and the court granted a preliminary injunction against United Mine Workers of District 19, the Straight Creek local union, and forty-two miners, who it was related were living in company houses.

Official denial has been made by the Ford mining interests that the Pond Creek mines of the company have been shut down as a protest against the presence of union organizers in the field. The company has been paying its men a little above the union scale but has operated open shop and has been having some difficulty with the union as a result.

Two men were killed and a third was excavated alive following a cave-in of a small area in a low level of the Black Diamond mine of the Pacific Coast Coal Co., April 28.

NEW YORK

John T. Roberts, for several years general sales agent of the Widnoon Coal Mining Co., has organized the Widnoon Coal Co., to be operated in the general bituminous trade, as the mine has been closed for some time, waiting for better business. The new company will be incorporated later on, business proceeding outwardly as before.

George A. Hughes, secretary of the Lake Erie Coal Co., has sold his interest in it and organized the Lake Erie Fuel Corporation, with office at 812 Prudential Building, Buffalo. The

incorporators are himself, S. A. Crone and H. B. W. Haff, of New York. W. L. Rowland, of the older company, son of the president, has been appointed Northern sales agent of that company, which is an auxiliary of the Richland Coal Co., of Wheeling, W. Va.

It is announced that the Buffalo office of the J. P. Burton Coal Co., of Cleveland, will be closed on June 1, owing to poor business and it is understood that other branches will be discontinued for the same reason. A. R. Stubbs has been head of the Buffalo office.



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Walter D. Rogers

Resigned May 1 as executive secretary of the National Retail Coal Merchants Association, which position he had held for six months. He was with the U. S. Coal Commission, for which he made an investigation in Boston and also made special cost studies in New York and Washington, D. C. He also was one of the authors of the commission's report covering the retail trade.

OHIO

Operators in the southern Ohio field are trying to get miners in that district to hold another referendum on a joint conference to change working conditions in the district. Several weeks ago it was voted down by the miners' organization with but one-third of the members voting. Operators believe that if another vote is taken it might be carried. It is planned to lessen the cost of dead work in order to reduce the cost of production in the district and thus enable the operators to compete with the West Virginia fields.

Coal Production in Ohio totaled 40,726,615 tons in 1923, according to a report to Herman Witter, Director of Industrial Relations. This compares with 27,526,555 tons mined in 1922, a gain of nearly 50 per cent. The 1923 output has been exceeded only three times since statistics have been kept, the peak year being 1920, when 45,227,077 tons was produced.

The Yorkville Mining Co., Yorkville, is having a switch laid from the Wheeling & Lake Erie R.R. to receive shipments from its mine. The Yorkville company has supplied large industrial consumers by truck and boat since its mine was opened a few years ago.

Considerable surprise was shown by the Cincinnati trade when the figures were announced for the county bids opened May 6. On West Virginia mine run the low was \$3.79, and for smokeless \$5.70. This is inclusive of freight and haulage and with a penalty clause attached.

Upon application of the West Virginia Rail Co., of Huntington, with a claim of \$24,039, ancillary receivers in Ohio for Jewett, Bigelow & Brooks were appointed in the U. S. Court at Cincinnati by Judge Smith Hickenlooper. E. L. Douglass, vice-president of the company in charge of operations, and John L. Richey of the Cincinnati Credit Men's Association, qualified under bonds of \$25,000. They had been appointed receivers for the company by Judge A. M. J. Cochran in a hearing before the U. S. District Court of eastern Kentucky. The only objection to the ancillary receivership was put in by Louis H. Stone and his wife, who claimed to be indorsers of notes up to \$700,000. The receivers sought to have stockholders enjoined from interfering with them. E. H. Jewett, president H. M. Jewett (also president of the Paige Motor Co.) and Walter Brooks, treasurer, were in Cincinnati recently but refused to say what conclusions they had arrived at as to the future conduct of the company.

Frank L. Stein and William S. Harman, receivers of the Maynard Coal Co., called a meeting of creditors May 10 to discuss the advisability of accepting an offer of \$650,000 and accrued unpaid taxes amounting to \$8,500 for the properties of the Superior Coal & Dock Co. at Duluth. Creditors were not inclined to accept, but wanted more time for consideration. The receivers will put the question up to Judge J. E. Sater, of the federal court, for final action.

PENNSYLVANIA

James A. Gleason, member of the executive board in District No. 1, United Mine Workers, will be grand marshal of the miners' parade to be held in Scranton at 1 o'clock on the afternoon of May 30, in connection with the unveiling of the John Mitchell monument on the Court House Square. Miss Kathryn Mitchell, daughter of the late union chief, will unveil the statue.

A settlement of the strike which tied up the 8,000 mine workers of the Panther Creek Valley collieries of the Lehigh Coal & Navigation Co. since April 14 was effected last week by Thomas Kennedy, president of District No. 7, United Mine Workers, and James A. Gorman, secretary of the Conciliation Board.

The Philadelphia & Reading Coal & Iron Co. has instituted a reforestation campaign. A large force of men is engaged in planting 25,000 Japanese red pine and 25,000 Scotch pine trees in the vicinity of Mount Carmel and Kulpmont. About 25,000 Japanese red pine also are being planted in the outskirts of Shamokin. The work is in charge of William Smith, district forester of the company.

The Sloan breaker, one of the oldest of the Glen Alden Coal Co.'s coal-preparing plants, will be dismantled within a few weeks. Maurice Sullivan, mining contractor, well known in the upper anthracite field, will tear down the operation and with it the Hampton Tower and several other buildings in the western part of Scranton.

The Glen Alden Coal Co., of Scranton, has completed the purchase of 5.08 acres of coal land in the fifth ward of Scranton from Eleanor E. Hoxie. The consideration was not made known.

With the visit of W. H. Grady and W. E. Decker, representing the Kemmerer interests, of New York, controllers of the Mount Jessup Coal Co., reports were current in Scranton of the reorganization of the coal company and resumption of operations. About a month ago all collieries of the company in Jessup ceased operations, throwing 2,000 men out of work.

The Philadelphia & Reading Coal & Iron Co. has flushed 1,500,000 sq.yd. of old mine workings underneath Mount Carmel borough and is continuing the work.

Officials of District No. 1, United Mine Workers, are investigating reports to the effect that the miners' certificate law is being violated in the district. They believe a large number of immigrants have obtained certificates through false statements and if they find evidence to confirm their belief they will institute proceedings, they say.

The Philadelphia & Reading Coal & Iron Co. has erected a separate wash house with shower baths, booths and dressing rooms at Donaldson, midway between the old West End and Middle Creek operations, at a cost of between \$20,000 and \$25,000.

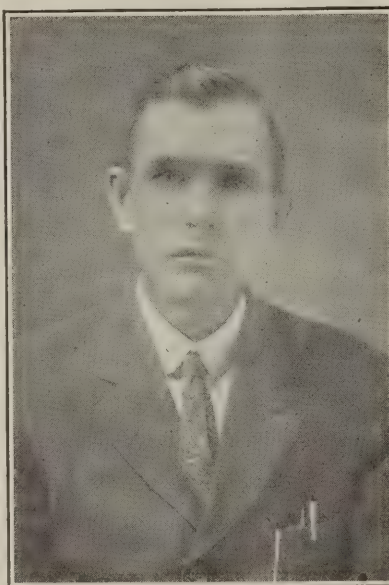
The Dodson Coal Co., operating at Beaver Brook and Locust Mountain, has moved steam shovels and other equipment at Locust Mountain to Raven Run, where a new stripping operation is to be started. The Dodson company has one of the biggest strippings in the world at Locust Mountain.

Appeals from the state anthracite tax, taken to the U. S. Supreme Court by coal companies, will not be heard until next autumn, as the court will be unable to reach them before the summer recess. Several million dollars of taxes are involved.

There is an increase in the number of evening mining classes conducted in Pennsylvania this year and the number of pupils is greatly increased over last year, according to the State Department of Public Instruction. "Mining courses in evening schools were organized this year in thirty-two school districts of the state," said Dr. J. George Becht, State Superintendent of Public Instruction, "and more than 1,500 men were enrolled in the different courses. The growth is remarkable in view of the fact that only six school districts in the state conducted courses in mining last year. This increase is due to the co-operative efforts of the State Department of Mines, State College and the Department of Public Instruction."

UTAH

The Utah Oil Refining Co. of Salt Lake City has definitely decided to use coal for fuel purposes and its plants will be changed accordingly. This will provide a new outlet for 600,000 tons of coal a year. It is stated that through a new refining process it is now possible to dispose of the oil that was used for fuel at a rate that would make it unprofitable to continue to use it for fuel.



F. F. Green

Recently promoted to the superintendency of the Valier Coal Co. mine at Valier, Ill. He formerly was chief engineer.

The U. S. Land Office at Salt Lake City offers for lease a tract of public coal land containing 1,818 acres in the Castlegate district of the Book Cliffs coal field about 3 miles northeast of Castlegate on the Denver & Rio Grande Western R.R. Lease for this tract will be at a government royalty of 10c. a ton for coal mined, a minimum investment in mining operations of \$50,000 during the first three years of the lease, a minimum production of 60,000 tons a year beginning with the fourth year of the lease. Leasing of this land is made in accordance with the general leasing law.

WEST VIRGINIA

The tippie at the plant of the Morgantown Gas Coal Co. at Murray, formerly known as Mine No. 93 of the Consolidation Coal Co., collapsed late in April, under the weight of several loaded cars and a string of empties. The accident happened when a Monongahela Ry. engine was backing empties into the siding, with loaded cars in front.

The Fairmont-Chicago Coal Co. has completed work on its new tippie at Barackville and the first coal was dumped over the structure late in April. Approximating 1,200 tons of coal a day are being loaded over the new tippie but it is proposed to gradually increase the amount to 2,000 tons a day. The new tippie is equipped with shaker

screen, picking table and loading boom equipment. W. E. Watson, of Fairmont, is president of the company.

The Island Creek Coal Co. has let contracts to the Hatfield Construction Co. for the construction of hard roads in Logan which will entail an expenditure of \$310,000. Roads to be paved include the Whitman's Creek, Trace Fork and Copperas transportation routes. All of the contracts, which call for the surfacing of about nine miles of roads with concrete, are expected to be completed by Sept. 1. The Island Creek company has already expended more than \$100,000 in grading the projects now to be paved.

The Rachael Gas Coal Co. has disposed of its Rachael mine and coal holdings at Downs, W. Va., near Fairmont, to the Bertha Consumers Coal Co., of Pittsburgh, Pa. The consideration, as shown by the deed filed, was \$536,000. The Rachael plant is one of the new ones in Marion County and is a large mine with modern equipment.

John C. Lowry, Jr., has been appointed general superintendent of the New River Collieries Co. Mr. Lowry is a graduate of Pennsylvania State College and had his start with the company.

Industrial Notes

A new coal company, launched at the outset of May was the Marmon Coal Co., with headquarters at Buckhannon, in the Upshur County field. This concern is capitalized at \$75,000. Chiefly interested in the new concern are A. M. Miner, Irvin Christner, George Christner, A. L. Quimet, Jr., and Amie Quinett, all of Buckhannon.

The McClanahan Pocahontas Coal Co. has just been organized to operate in smokeless territory, headquarters of the company to be at Cotter. The new corporation is capitalized at \$100,000. Among those identified with this company are K. S. McClanahan, of Amigo; William McClanahan and D. E. Claypool, of Cotter; W. A. Harrah and W. K. Harrah, of Backus.

The Wingo Manufacturing Co. has been incorporated at St. Louis, Mo. with a capital of \$300,000 and will manufacture and sell mine doors, automatic gates and switches. The incorporators are William W. Wingo, Joseph K. Cosinski, Helen Cosinski, Minnie Wingo and George W. Royce. Minnie Wingo and George W. Royce, Paul J. Pirmann, Fulton, Mo.

Craig Miller, president of the Man Coal Co., of Man, W. Va., accompanied by his chief engineer, Mr. Barrett, were in Cincinnati recently looking over plans and new equipment for developments at their mines.

The Lehigh Coal & Navigation Co. is about to commence the construction of a steel tippie in the Panther Creek Valley region, near Lansford, Pa. The cost, including machinery, will be about \$1,500,000.

Contracts have been let for building a washery for the Harleigh Coal Co., at Harleigh, near Hazleton, Pa. The plant has been designed by H. M. Chance & Co., and will be equipped with one Chance sand flotation separator 15 ft. in diameter. The steel structure will be bolted—not riveted—so that it can be moved when the culm banks to be worked are finished. Much of the material and machine equipment has already been fabricated.

The Candlemas Coal Co., of Silver Brook, near Hazleton, Pa., has begun the construction of a new anthracite breaker, which will be equipped with electrically operated machinery for an output of about 3,000 tons daily.

The Wilson Welder & Metals Co., Inc., will move its plant and general offices May 1 from 132 King Street, New York City, to the Wilson Building, Hoboken Factory Terminal, Hoboken, N. J. Increasing demand for welding machines and welding wire necessitated larger quarters.

Traffic News

Assigned-Car Order Date Now Set Back to Aug. 1

The Interstate Commerce Commission has again postponed the effective date of the assigned-car order, pending the consideration of evidence heard on rehearing, which resulted from protests against the Commission's original findings. Under the new order the rule becomes effective Aug. 1. The order was entered originally on June 13, 1923, and was to have become effective Sept. 1 last year. It was then postponed until Oct. 1, then until Nov. 1 and later until Dec. 1, 1923. The next effective date was Jan. 1, 1924. It was then postponed until Feb. 1, then April 1, and on March 3 the commission ordered that it should become effective June 1.

Railroads Must Provide Proper Facilities for Shippers

The U. S. Supreme Court on May 5 reaffirmed the principle that a state regulatory body has the right to require railroads to establish reasonable facilities for shippers and for the public. The case was an appeal of the Norfolk & Western Ry. against the Public Service Commission of West Virginia, which had directed the carrier to establish a crossing for vehicular traffic across its tracks at McCarr Siding, Mingo County, W. Va., near Blackberry City, the siding being primarily for the use of the Allburn Coal Co. A merchant of Blackberry City applied for the crossing order on the ground that he could not get a vehicle across the company's tracks to get freight consigned to him which was dumped at the siding. The state court's ruling upholding the order was affirmed.

Shipper Not Liable for Freight Except by Contract

A shipper is not responsible for freight charges unless there is an expressed or implied contract to this effect, the U. S. Supreme Court held May 5 in affirming the decision of the lower courts in the appeal of the Louisville & Nashville R.R. against the Central Iron & Coal Co., of Alabama. In 1917 the Central company sold ten carloads of coke to Tutwiler & Brooks. Before delivery, the latter sold the coke to the Great Western Smelter Corporation of Mayer, Ariz. Delivery to the railroad was made by the Central company consigned to Mayer, "on order of Tutwiler & Brooks." The smelter corporation paid \$5,082 freight charges, on demand when the coke arrived. It was discovered by the railroad three years later that the tariff rate was \$8,545 and an effort was made to collect the undercharge from the Central company, which resisted and denied responsibility. The Supreme Court held that shipment by the Central company "on order" relieved it of responsibility and that collection should be from Tutwiler & Brooks or the smelter corporation, neither of which had been sued.

Appeals Set Ahead

The Interstate Commerce Commission has advanced the dates for hearing appeals from the New England rate division decision. The case of the Central Railroad of New Jersey has been set for May 22; that of the Delaware & Hudson for May 26, and that of the Southern and Western carriers for May 28. The Jersey Central has asked for relief from contributing to the extra division awarded the New England lines. The Delaware & Hudson has asked, in addition to this, that the northern lines of its system be made beneficiaries of the decision, as are the New Haven, the Boston & Maine, the Maine Central, the Central Vermont and the Rutland.

Southwest Rates Are Reduced

The coal-mining industry of eastern Oklahoma and western Arkansas should be benefited by a decrease in freight rates provided for by an order of the Interstate Commerce Commission just announced at Washington. Reductions were not as great as were requested by the complainants, the Southwestern Interstate Coal Operators' Association. The rate now charged on shipments of lump coal from the Arkansas-Oklahoma group to Kansas City is \$3.28 per ton. The complainants sought a rate of \$2.49 and were granted one of \$2.65. Other rates from the various shipping points and to various destinations are in this proportion.

Coming Meetings

Retail Coal Dealers Association of Texas. Nineteenth annual convention, May 20 and 21, Vernon, Texas. Secretary, C. R. Goldman, Dallas, Texas.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

West Virginia Coal Mining Institute. Annual meeting June 3 and 4, Elkins, W. Va. Secretary, R. E. Sherwood, Box 1026, Charleston, W. Va.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

New Equipment

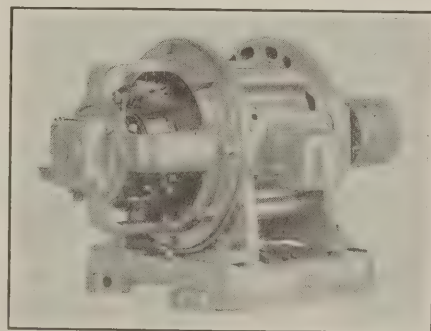
Newly Developed Single- and Three-Phase Motors

Two induction motors of a new type have recently been placed on the market by the General Electric Co. One of these is the single-phase constant-speed motor designed for operation on 40-, 50- or 60-cycle circuits and suitable for interchange on 110- or 220-volt alternating-current power lines. This motor is made in sizes varying from $\frac{1}{2}$ to 10 hp. Although designed on the squirrel-cage induction-motor principle, it entirely eliminates short-circuiting switches heretofore considered essential. Although the operating characteristics of this motor are similar to those of the usual induction motor, it has a high starting torque with low current demand. Both the maximum and accelerating torques are approximately 200 per cent of full-load torque without any low points during acceleration. The no-load and full-load speeds are both close to synchronous speed, thus the regulation is exceptionally good for this type of motor.

The stator winding consists of simple concentric polar windings arranged for double-voltage connections. The rotor consists of a cast squirrel cage winding and a repulsion wire winding of the multiple type with equalized commutator connections to insure uniform distribution of armature currents.

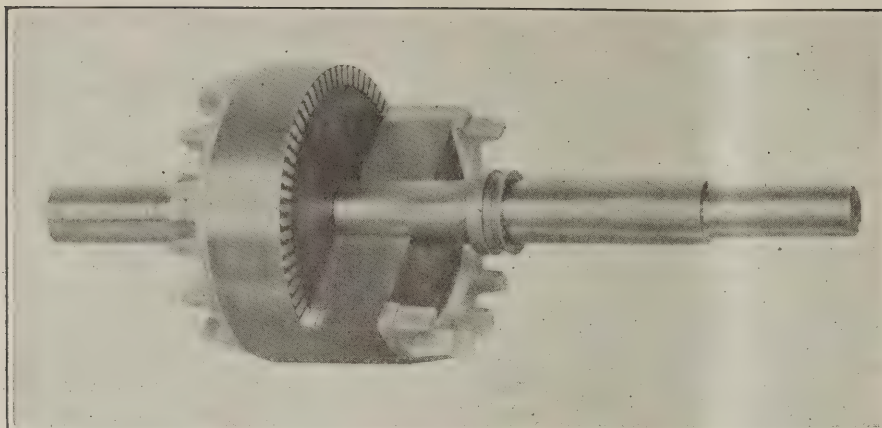
The new polyphase induction motor is designed for 60-cycle circuits and is made in sizes ranging from $\frac{1}{2}$ to 15 hp. It is rated on a 40-deg. continuous-duty basis. The electrical improvements embodied in this motor comprise reduced heating, higher efficiency and higher power factor at full and fractional loads and increased starting torque. The maximum torque ranges from 275 per cent to 300 per cent of its full-load synchronous value. The accelerating-torque curves are free from the dips common to most squirrel-cage induction motors.

The oil reservoirs on these motors have been enlarged from 50 per cent to 100 per cent. Other improvements in-



Improved Motor With Base, Pulley and Conduit-Box Connection

This new single-phase induction motor has unusually high starting torque at low current values. The maximum torque obtainable is nearly as high as that possible with three-phase motors.



Cast Rotor of Polyphase Induction Motor

This illustration shows the cast rotor of one-piece construction. It is claimed that this design eliminates the possibility of any high resistant spots in the winding.

clude a new method of directing the ventilating air to prevent dirt from settling on the windings, and a "cast" rotor of one-piece construction, having no joints nor high-resistant spots.

Stoker Controls Fuel Bed From Hopper to Ashpit

Many new and interesting features of design have been incorporated in the improved Taylor stoker manufactured by the American Engineering Co., Philadelphia, Pa.

Distributing rams of the old flat-end type have been replaced by a series of reciprocating pushers which form the bottom of the retort. This construction is said to give absolute control of the fuel bed from hopper to ashpit; it is claimed that it will keep the entire fuel bed constantly clean and free from clinker and give the full benefit of underfeed firing. Each ram can be adjusted so as to give a speed that is graduated throughout the retort so as to meet the burning characteristics of any fuel. Once these rams are adjusted for a particular kind of fuel, all further control can be obtained by a single adjustment at the front of the stoker.

Another new feature is a planetary-gear power box. This unit is claimed to be more efficient than the usual worm reduction gear. It has no clutches, yet it provides 50-per cent speed variation. Whenever it is neces-

sary to stop the stoker, the power box can be thrown readily into neutral position. An attachment to this box permits simple, positive adjustment of the distributing rams from the front of the stoker. The speed-control lever can be shifted from high to neutral or low speed with little effort.

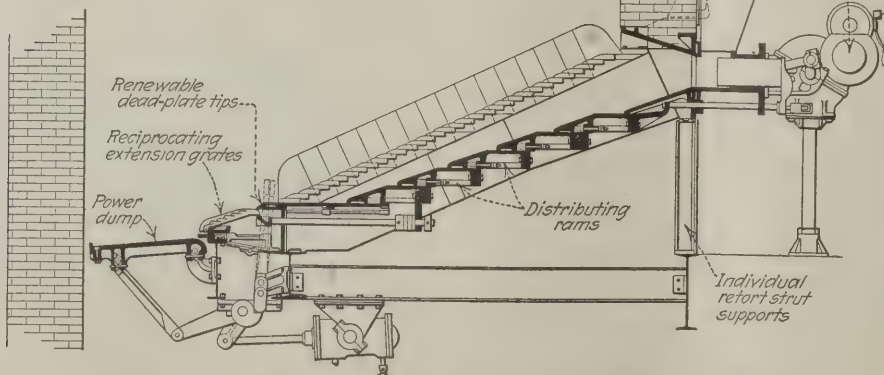
TUYERES INDIVIDUALLY MOUNTED

The tuyeres are designed to change efficiently the static pressure of the air to velocity pressure and direct the air so that it is utilized to the best advantage. Each block of four tuyeres is individually mounted and can be removed without disturbing adjacent blocks.

Removable dead-plate tips are held in place by a key which can be taken out by hand. Just below the tips are reciprocating extension grates which are said to insure the burning of any fixed carbon remaining in the ash. It also assists in the control and removal of the latter.

The power dump swings above the horizontal to remove adhesions from the bridge wall. These plates are exceptionally heavy and can be removed by simply knocking out two keys. Ashes can be dumped and the wall cleaned in but a few seconds without any manual labor.

The front of the stoker is supported



New Stoker Varies Travel of Fuel on Any Section of Grate

Accurately machined parts, many of which are exact duplicates, control the fuel bed over the entire range of operation. The ram box is claimed to be non-sifting and can be renewed by the replacement of a few small parts.

on individual struts, accurately machined and designed to carry a front wall of any thickness and height. They transfer the load to steel work below the fireroom floor, thus eliminating the stoker channel in the front wall.

The stoker is built with from 15 to 45 tuyeres and a fire bed, even though long, can be accurately controlled by the distributing rams which are constructed of accurately machined duplicate parts.

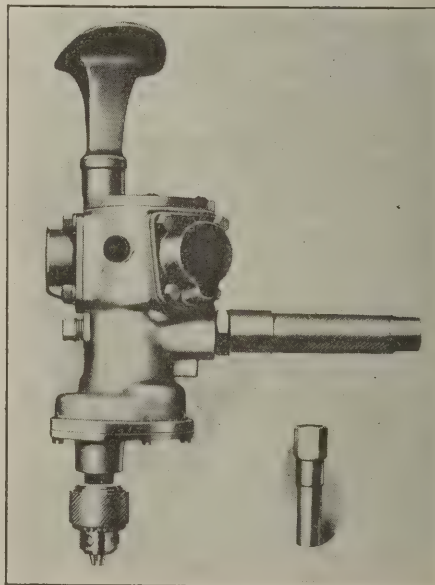
Three-Cylinder Motor-Driven Air Drill for General Use

A lightweight non-reversible pneumatic drill suitable for light drilling up to $\frac{1}{2}$ -in. diameter holes, and reaming up to $\frac{3}{8}$ -in. diameter has been developed by the Ingersoll-Rand Co., No. 11 Broadway, New York City.

This is a light-weight drill which may be fitted with either breast plate, feed screw or grip handle and which thus is made adaptable for a wide variety of work. The construction of this machine is similar to that of Nos. 6 and 600 drills which this company developed two years ago and which were powered for drilling up to $\frac{3}{8}$ -in. diameter.

The features of this type of machine are briefly: light-weight aluminum case, with steel bushings cast in all the bearing holes and the throttle hole; cast-iron cylinders which are renewable and interchangeable and special three-cylinder motor. The renewable cylinders are a valuable feature, as any cylinder after long service, easily may be replaced and the motor made as good as new at slight cost.

The three-cylinder motor has the rotating parts all accurately balanced, eliminating vibration and reducing wear and tear on the machine. The drill is economical in air consumption and cost of maintenance, is high-powered, and, moreover, every part is readily accessible for inspection.



Lightweight Air Drill

The working speed of this drill is 700 r.p.m. when supplied with 90-lb. air pressure. It may be fitted with a breast plate, feed screw or grip handle.

COAL AGE

McGraw-Hill Company, Inc.
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Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

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JUST WHAT IS THE OUTCOME?

FROM start to finish the convention and exposition at Cincinnati was the largest and most important gathering of coal-mining men ever brought together in the history of the industry. The three-thousand visitors to Cincinnati, almost all of whom were closely connected with the coal business as executives, managers, engineers and financiers, canvassed its problems from coal face to markets. Many companies devoted much time and no little expense to attendance on the practical sessions and exhibits.

What is to be the outcome? If it is to be something more than a mere junket it should be followed by intracompany conferences. We hear much about vocational education for workmen and as to the value of a manual laborer spending his evenings in study. However, what we need as much or more is vocational study by the operating heads, conferences between them and discussions of their mutual problems. At no time is that more vital to success than after a conference and exhibit like that at Cincinnati. A clear conspectus was given at the Mining Show of the advance in mechanical appliances made during the past year and men got together and compared notes on their experiences in practical operation.

In too many companies the

story has gone the rounds that the "Old Man" is set in his ways and considers it his main duty to frown on innovations and cancel requisitions. The personnel consequently has viewed the whole problem of operation in a glum and disheartened manner, thinking that parsimony is more valued than economy and believing that a few men removed from the payroll would be more acceptable to the Big Boss than an increased tonnage per dayman employed.

Now is the opportunity for the executive to get together with the staff to remove that impression and to decide what changes must be made whereby costs may be lowered. Only those who make such changes can hope to continue in business. As has been said, "It is modernize or quit."

It is time, therefore, to call intracompany conferences, to revolutionize methods of operation as well as to wipe out inefficiencies which have been recognized by engineers for years but have been allowed to continue due to the division of authority, the aversion of some men to certain kinds of operating problems and to the feeling that the Great Boss is the "Big No" when any proposition is to be decided which entails the expenditure of money.

*Now, the Cincinnati meeting is over
—What is to be the outcome?*

Men with the Hoe

EDWIN MARKHAM'S sonnet on the "Man with the Hoe" describes most of us. We are held by the toils of our mutual relations so tightly that many of us cannot find time to look ahead and find out where we are going and which is the better way of getting there. Like the men in the woods we plunge too often in circles when an observation of the sun or of the moss on the trees might orient us and give us some chance of getting direction. Such a moment's opportunity was afforded us at Cincinnati. New tools to our hand, new ideas to our heads, new plans for our imaginations were provided. It does us all good to throw down the hoe long enough to think anew and plan afresh.

But too many, we fear, will go back and find their desks and mines cluttered with uncompleted tasks, and the will to think, to plan, to consult and to advise will die aborning. How many a strong man has been overborne by routine, by the multiplicity of meticulous duties, by a flood of work that fills from meal to meal, from rise to set of sun! Many a man rested, given opportunity and a little pause for thought might do by planning and machinery what now he does inefficiently by brute force.

Are You a "Mud Horse"?

MANY a running horse can make speed over a good track. It takes stamina to lead the race over a muddy course. Too many of our operators attain their best form when the going is good. It is a real success only when results are obtained under unfavorable circumstances such as are now confronted. The mud horses that make headway in unfavorable weather are now leading the race. Efficiency, system, foresight and a certain venturesomeness in directions not charted put them in the lead. Given high prices and unlimited demand, some men show speed and courage, but given a depressed market, they fail utterly. These difficult days prove one's staying qualities. Where others give up in despair, the men of real constructive genius change their methods, adopt new machinery and stay in the race.

It's All in the Feed

A few years ago, when the electric storage-battery locomotive was first placed on the market, many engineers were dubious of its possible success. One objection raised was the small capacity of the driving motor. The claim was made that its horsepower was too low for the size of the locomotive. Some engineers said that the manufacturers would go through a development period and gradually increase the motor capacity until it would be somewhere near ten or twelve horsepower per ton.

The years have rolled by; many mules have been replaced; in fact, in some mines it would seem strange to see a mule. The storage-battery locomotive has won its place.

Strange to say, its motors have not been greatly enlarged, yet the locomotive has been a success. What is the secret of the small motor? Is it not that the speed of the storage-battery locomotive is slower than that of the trolley locomotive? There is, however, another reason; the storage-battery locomotive carries its own power plant with it, and consequently the voltage drop between the battery and the motor is nil. The motor receives nearly full rated voltage all day. Does

not this indicate that motors supplied with proper voltage will do the work of larger motors which receive low voltage? Then why not reduce the resistance of feeder circuits, install and maintain good bonding, put the direct-current power converting equipment nearer the load centers and make the substations automatic?

Outside Looking In

ANY industry is likely to be so absorbed in its own viewpoint that it cannot see its own woods for the trees. The coal industry is no different from any other in that particular. So it was refreshing to see that the National Coal Association at its convention in Cincinnati more than half filled its program with outsiders. They said things that made two points clear: First, that some of the thinking men of this country outside the coal industry are just beginning to get a true perspective of coal and its major problems and, second, that it is worth while, after all, to meet the public at least half way so that more thinking men can get that same perspective.

It did 300 big coal men good to sit still and hear R. S. Kellogg, secretary of the News Print Service Bureau—an utter stranger to coal—tell them in brisk, interesting style that he believes organized coal men can do much for their industry along trade-association lines and just how he thinks they ought to work. He knows trade associationism and he is just beginning to learn enough about coal to be able to apply his fundamental knowledge to it. His was an outside viewpoint and he surprised many a man wise in coal by showing him that an outsider can think soundly about the bituminous-fuel industry. If some man well known in coal had voiced the same thoughts with equal authority and force, those thoughts would not have registered so deeply on the association.

It was good also that the viewpoint of the retailer was brought in, and of the expert merchandiser and of the head of the world's greatest news-handling agency. Such men as those are outsiders but they are men of the types which count heavily in making up the public mind about coal. The outside viewpoint is a good thing for the coal industry to get. In getting it the industry will learn better how to maintain its public relations.

Why Work in the Dark?

THE public utility power companies once sold electrical energy and only metered that which the consumers used. They didn't know how much power was generated, how much was lost, neither did they know the boiler efficiencies or the cost of distribution. With a blind faith in the possibilities of electric power they struggled on—and some were successful.

A day came, however, when the leaders realized that if profits could be made in ignorance and darkness, better returns could be obtained by a thorough knowledge of power generation. Meters were used, records obtained and studied until now every up-to-date power company official has operating data on every detail of manufacture and distribution.

The advantages of electric application to mining have been so obvious that even some of the largest coal companies have no data upon the operating characteristics of their most important machines. There may be no question about the fact that this electrically driven equipment is saving money, but cannot better results be

obtained? A thorough survey of present electrically operated apparatus may prove it to be more efficient than the officials believe. Should it so prove it will more quickly spur them to further modernization.

A hoist may be causing continual interference with other equipment by peak loads which open the main-line fuses. If that condition is known it may be corrected. A few underloaded induction motors may be using up all the kilovolt-ampere capacity of a transformer bank and necessitating the purchase of larger transformers. Knowing the cause of trouble induction motors of the right capacity can be installed. The high equipment maintenance costs may be due to low voltage on the supply lines. A feeder line may correct this evil when discovered. Perhaps also an examination will show that the motors you are purposing to replace with others are of ample capacity for the work, if the proper voltage is supplied.

Now it is time to turn on the light, obtain test data and find out the facts about transformers, motors, substations, power houses, transmission lines and distributing systems; to effect savings in operating costs, power bills, capital charges, etc.

Economy in Transportation

THOUGH loading machines and conveyors are essential to utmost economy, continuity in operation will produce an important decrease in costs secondary only to that effected by mechanical loaders and belts, scrapers and shaking chutes. With such equipment, it is true, operating continuity is of paramount importance, but even with hand loading, operating without delays is productive of economies that cannot be safely overlooked.

Operators are beginning to realize this, and as a result switches and frogs, mine cars and locomotives that operate without derailments are making remarkable headway. As at the recent exhibition at Cincinnati the loading machines were in a tent in the rear of the hall it was a little difficult to realize that the exhibit was a mining show, so prominent were the booths devoted to transportation. That phase of mining seems to be thrusting itself more and more on the attention of mining men. One can almost foretell the time when every mine will have its transportation engineers who will be responsible for equipment that will keep the mine working steadily without the waits that derailments and breakdowns inevitably cause.

Heavy rails and ties that will not give and break the electric bonds; switches that will be of correct gage throughout and switch points that will not break at the ends, that will close tight and not derail cars or locomotives; frogs that will retain their shape, wheels that will not wobble or become loose, that will not develop false flanges or flat spots; bearings that will run with minimum wear; cars which have strong but flexible frames, all are means to the final end.

Mines are miniature railroads, and not so miniature after all. The absolute need for continuity of operation makes it necessary for every coal company to regard its transportation problem as of paramount importance. Heavier cars and higher speeds are making new standards necessary. No one can foresee where the increase of car size will end. Already where cars enter rooms five- and even eight-ton cars are being constructed. Where cars are not transported to the working place, they may be made far bigger, and if by an extension of the conveyor system, all the coal is transported to

the main haulageways, they may be made even larger still.

There is hardly any limit to the size mine cars may attain with such a system of loading. We might even take railroad cars into the mine were it not that when they are brought to the surface they must be dumped so that the coal can be cleaned on picking tables. Where the coal is clean, however, and top and bottom material does not enter the product, such cleaning would not be necessary. Sizing, if demanded, could be done with advantage at the receiving point, thus eliminating from the screened sizes the coal that is degraded in railroad transportation.

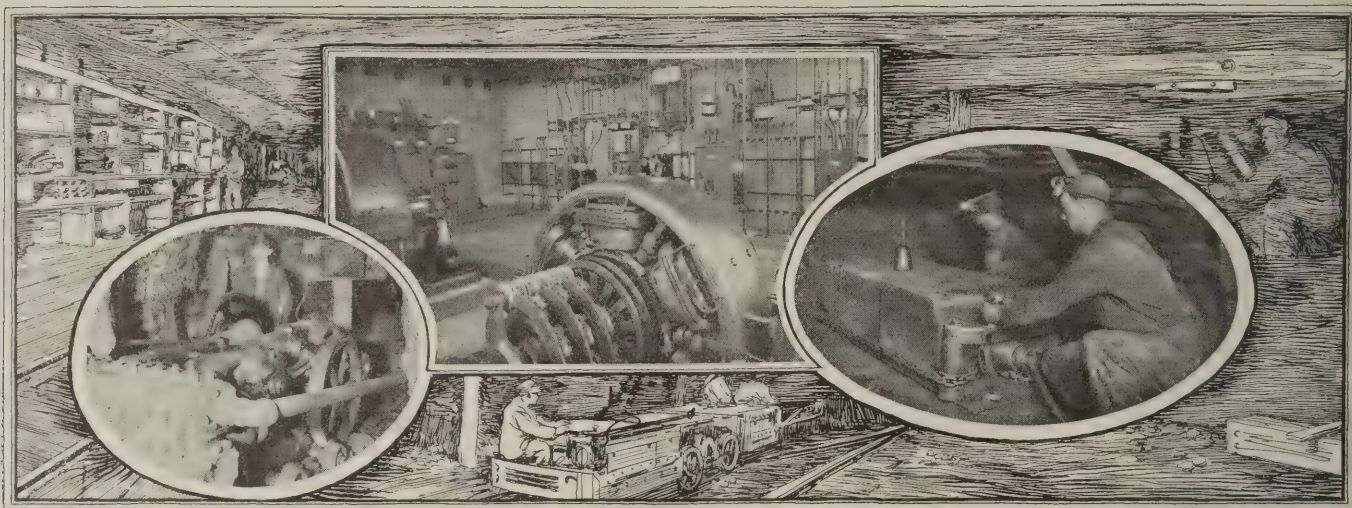
Where Is the Nationalization Noise?

FOR some reason the great clamor for nationalization of coal mines has subsided during the past several months. What is the reason? Can it be that the coal industry has at last done so good a job of producing coal and delivering it to the people of the country at a reasonable price that everybody is satisfied? The industry certainly has been doing that sort of producing and delivering, and if public satisfaction has been the result, then let the coal man congratulate himself if he can, as he anxiously scans his bank balance to see if he can pay the rent without fear of overdraft.

But everybody is not satisfied. There is no use expecting that, no matter how well the industry has done its job lately. In spite of the fact that the price of coal to the consumer is lower now in proportion to producing costs than it ever was in history, there are buyers who are not satisfied and are waiting for it to go lower. *Coal Age* index on the prices of all important soft coals throughout the country had sagged down to \$2.05 the week of May 5 and we hear of eastern Kentucky contract mine run at \$1.65 with spot mine run of that region bringing \$1.25! It costs a good deal more than \$1.25 to buy a ton of dirt for the garden. Yet part of the present slackness of the market is due to the fact that "these coal fellows may have to give it to us for less yet." At this rate of buying, next fall is going to see a strong call for coal, a car shortage, and prices somewhere above the cost of production. Then listen for the clamor. There will be the voice of the nationalizationist abroad in the land.

Secretary Hoover, speaking at Cleveland, May 7, said nobody wants government control of the bituminous coal mines any more. And he is correct—for the present. The elaborate plan which a special committee of the United Mine Workers prepared, telling the country "How to Run Coal," didn't even get a good airing in the miners' international convention last February. When the cry for nationalization doesn't sound in Tomlinson Hall, Indianapolis, then it doesn't sound anywhere—except down among the coal miners of Greenwich Village. So it is true the demand for both government ownership and control is dead.

It is dead because, for once in recent history, there has been a glut of coal for almost a year. The operation of the glut on the coal business has been far from painless, but at least the coal man has rid himself of one worry—the public demand for Uncle Sam to seize the bituminous mines. The chances are this demand will never again become insistent in view of the general world-wide failure of government operation of public utilities. But we may confidently expect to hear voices on the subject as soon as the industry again becomes a going concern with a profit in the price of coal.



Electrical Engineers Discuss Ways in Which Savings in Power Cut Mining Costs

Applying Storage Batteries to Cutting Machines and Main Line Locomotives—Economy of Multiple-Speed Fan Motors—Voltage Regulation—Standardization—Inspection—Testing

Can the Sparking Trolley Be Eliminated?

IMPROVEMENT of electrical methods in coal mines so as to increase safety was advocated in a meeting of the American Mining Congress held on the morning of May 12. R. L. Kingsland, electrical engineer of the Consolidation Coal Co., described the efforts being made by that company to increase safety in a gaseous mine by the use of storage batteries for coal cutting and main-line haulage. The practice in the past, he explained, had been to use compressed air in gaseous mines as motive power for haulage. He said that the company had attempted to standardize the voltage for cutting machines so that standard motors might be used drawing their energy at 220 to 250 volts which is the standard voltage. This makes it readily possible to use standard equipment for charging batteries. For the past year an arcwall mining machine has been used operated by power furnished by a battery truck containing 117 lead cells, storing 80 kw.-hr. of energy. The battery truck runs on its own power but it has no extra power for haulage purposes. A 30-hp. motor with double reduction gear, chains and sprockets is used. The power consumed per ton of coal mined averages between 0.2 and 0.25 kw.-hr. operating in the Pittsburgh seam.

The company believes that from 20 to 24 places can be cut by this machine in eight hours and that it can be done more cheaply by storage batteries than by current from the trolley.

A main-line storage-battery locomotive has been in operation for three months. This locomotive is provided with two batteries with the intention of running it a full shift of eight hours

using one battery for the first four hours and the other battery for the period after the midday suspension. This will be necessary if the locomotive is to have full power for the whole eight-hour shift.

The locomotive weighs six tons, each battery containing 117 lead cells and having a capacity of 108 kw.-hr. It delivers current at an average potential of 225 volts. This gives a total current capacity of 200 kw.-hr. for each eight-hour shift. The locomotive is equipped with two 250-volt motors. The average length of the round trip is now 8,400 ft. It hauls sixteen mine cars, each having a capacity of from 2 to 2½ tons.

MORE POWER HAULING THAN CUTTING

The power consumed per ton of coal hauled is less than that for cutting the same quantity of coal. To date it has been necessary only to use one of the two batteries for the entire shift. In the near future, however, with the increase in the length of the round trip it will be found necessary to use both the batteries. The longer the haul the more power is used because the time lost at the bottom and side track does not change with the increased length of distance traveled and so a locomotive with a short haul loses a longer period in delays and does not use as much current as one with a longer haul which is more of its time traveling on the road.

It will be a difficult problem to get a battery big enough to supply power to haul coal a distance of two or three miles. Up to a two-mile haul it is entirely practical to get two batteries which will do all the work of which one locomotive is capable. Mr. Kingsland added on being questioned that the life of the batteries is closely that guaranteed by the manufacturers.

R. D. Hall, engineering editor, *Coal Age*, described the equipment for haulage which the Phelps Dodge Corporation proposes to install. This has already been published in *Coal Age* in the issue of May 1.

Graham Bright, of Howard N. Eavenson & Associates, said that the conditions at the Phelps Dodge operations were different from those at the Consolidation mine. As he understood it the locomotives at the Phelps Dodge operation were to come to the surface and be operated on the trolley whereas Mr. Kingsland's were kept underground. Consequently the Phelps Dodge locomotive could be charged while on the surface, whereas such a source of power was not available to Mr. Kingsland. This would make it possible for the Phelps Dodge Corporation to get heavier service from the locomotive than it could hope to get if the battery could not be charged in the manner described.

OTHER ADVANTAGES POINTED OUT

L. C. Illsley, electrical engineer, U. S. Bureau of Mines, said that storage-battery locomotives and mining machines had advantages that had not been discussed by Mr. Kingsland. Where the trolley system was used the electric current could not be under close supervision especially at night and at other times when the mine was not under operation. If the trolley wire was alive at such times accidents might happen with no one present to shut off the current and correct what damage might be done.

Mr. Detweiler said that he feared that even if storage-battery locomotives were used a dangerous condition might result should a wreck occur, especially in the presence of a cloud of coal dust.

Mr. Kingsland declared that batteries had such heavy and strong jars that they would stand considerable violence without serious injury. In wrecks of storage-battery locomotives they had never had any fires. Though some hazard undoubtedly existed it did not approach that accompanying the use of a trolley locomotive.

Graham Bright said that, of course, such equipment could not be made hazard-proof. One item in favor of the safety of the storage-battery locomotive was that it traveled at a slower speed than the trolley locomotive and that made wrecks less frequent. A roof fall was another source of danger but only in the presence of gas or dust.

C. L. Harrod, electrical engineer, Indiana Coal Operators' Power Association, said that he had made a test showing that the power cost was one cent per ton lower with the trolley type of locomotive than with the storage-battery type. Mr. Kingsland said he had not made any careful tests, but he thought the input to the storage battery would be less or at least little in excess of the input to a trolley locomotive. He believed that the advantage of using the off-peak current would make the use of the storage-battery locomotive advantageous. Mr. Harrod said he gave no consideration in his test to the period of the day during which the current was taken from the line. The mining company merely wanted to know the relative quantity of current used. All current was figured at 2c. per kilowatt-hour, and the outcome showed that the trolley locomotive gave a rate 1c. per ton lower than the storage-battery locomotive. He did not suggest that this would be universally true but only that it was true in the case he investigated. The batteries were in first-class condition when the test was made. The mine had several steep grades.

Mr. Kingsland, questioned as to the power used per ton hauled, referred to what he had already said and stated the efficiency of a storage battery was not much better than 50 per cent but that of the wiring in most mines was considerably less. The trolley would

show up the better as regards the use of power from the kilowatt-hour standard but on the other hand the storage battery gave the better load factor.

W. Van C. Brandt, manager Power Battery Division, Electric Storage Battery Co., said that the current used in the charging of storage batteries depended on the way in which they were charged. It is possible to waste current in charging if the right equipment is not provided and if the equipment thus installed is not properly used. A storage battery has an efficiency of 72 per cent if you measure the energy at the battery terminals. If you convert the power supplied a lead-cell battery you have another loss in

Can Save Power by Slowing Multiple-Speed Fan Motor

IN his address A. B. Kiser, electrical engineer of the Pittsburgh Coal Co., emphasized the value of variable-speed motors for fans where conditions made the use of several different speeds desirable. He said such fan motors were advisable because they enabled the speed of the fan to be regulated, (1) so that the quantity of air could be adjusted to the needs of the mine when in full operation, (2) so that the speed could be reduced during the night, on idle days or during slack operation, (3) so that the ventilating current could be increased when required, (4) so that the circulation of air could be greatly reduced in case of a mine fire and (5) so that the speed could be regulated to meet the demand whenever the ventilating system is revised.

Whenever such a motor is used the fan has all the advantages obtained when driven by a steam engine. The saving effected by the use of variable-speed motors can be illustrated best by examples. Assuming 306 working days per year at a mine and that the speed of the fan can be reduced from 4 p.m. to 2 a.m. when the firebosses enter the mine to make their examinations. The fan will then operate for ten hours at reduced speed or for 3,060 hr. during the year. Sundays and holidays comprise 59 days in the year or 1,416 hr.

converting apparatus. More attention should be given to the method of charging. In a recent instance a company had invested \$45,000 in charging equipment and was expecting with reason to get that investment back in the savings made within a year from installation. With the old manual control it is possible to overcharge your battery and use more current than you actually need. By the constant-potential method the exact amount of current required by the battery is fed to it and at the end of that time the current is automatically shut off. When your power costs are too high it will pay you to look into your charging equipment and methods.

Adding these together, the speed of the fan may be reduced for 4,476 hr.

A 6x3 ft. fan circulating 100,000 cu.ft. of air per min. against a 3-in. water gage when driven at 305 r.p.m. would require 51 kw. at the fan. Reducing the speed to 209 r.p.m. and diminishing the volume of air in circulation accordingly, only 26 kw. would be required. This saving of 25 kw. for 4,476 hours would represent 111,900 kw.-hr. which at a cost of 1c. per kilowatt-hour would cost \$1,119 per year.

Taking a larger fan 16x6 ft. producing 500,000 cu.ft. of air per min. at 5-in. water gage and running at 137 r.p.m. the energy required would be 525 hp. A 10-per cent reduction in the speed of such a fan during the slack period would save 102 kw. This is a yearly saving of 456,552 kw.-hr. which at a cost of 1c. per kilowatt-hour would make a saving of \$4,565.52 per year.

At many mines a disk fan can be used operating at a low water gage. Assuming that such a fan is 8 ft. in diameter and circulates 100,000 cu.ft. of air per min. at a 1-in. water gage, running at 353 r.p.m. it will require 32 hp. If the volume of air is reduced one half, or to 50,000 cu.ft. per min., the saving will be 21 kw. Assuming that this saving is for 4,476 hr. it will aggregate 93,996 kw.-hr. and at 1c. a kilowatt-hour the saving in cost will be \$936.96.

MOTOR SAVED \$3,065 IN YEAR

During 1923 many mines ran short time. One mine was fitted with a fan driven by a variable-speed motor. When on high speed the fan required 65 kw. or 569,400 kw.-hr. per year. As a matter of fact the speed was reduced and only 262,856 kw.-hr. were used. Thus 306,544 kw.-hr. were saved. This was a saving in cost of \$3,065.44.

Another mine has a fan running at high speed requiring 118 kw. The fan was operated at 128 r.p.m. In the course of a year such a fan would need 1,033,680 kw.-hr. The power actually used was 785,720 kw.-hr.; and the saving in power was 247,960 kw.-hr. which at a charge of 1c. per kilowatt-hour would be equivalent to a saving in cost of \$2,479.60. This mine has been idle since the first of the year.

At another mine the quantity of air is reduced during idle periods to 175,000 cu.ft. by operating the fan at 130 r.p.m. instead of 154. The difference in power required is 39 kw. As the reduction in speed is for six hours in every twenty-four the saving is 234 kw. or \$2.34 per day, or figuring in Sun-

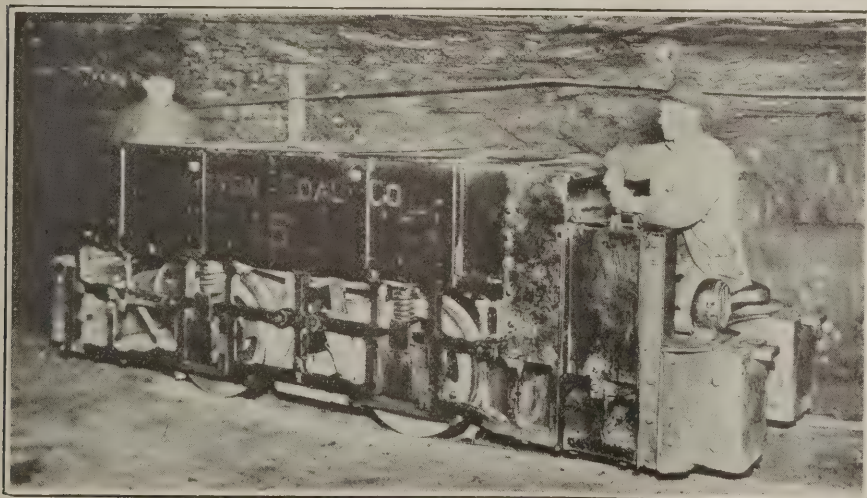


Fig. 1—Storage Battery Haulage Locomotive

In many mines storage battery locomotives are used to accomplish two results—first, to avoid the danger of gas ignition and second, to equalize the load on the power plant. In addition to this, however, the accumulator locomotive is a self-contained unit and can travel anywhere in the mine where track is available.

days \$98.10 per month. The Pittsburgh Coal Co. has 70 fans in operation. Of these 65 are electrically driven, 59 of them having variable-speed drives. Five fans are steam driven. Ten of the fans are 250-hp.; six are 150-hp., the rest 75-, 40- and 20-hp. fans.

Graham Bright said that the subject introduced by Mr. Kiser was two-fold: (1) Is it desirable to reduce the ventilation during idle periods? and (2) If it is desirable what type equipment should be used for that purpose?

J. H. Edwards, electrical engineer, Elkhorn-Piney Coal Mining Co., said that one of the company's mines was ventilated by a 3x7 ft. fan that had been running for fifteen to twenty years, twenty-four hours a day. The power bill for that fan was about \$600 per month. The energy supplied to this fan motor was metered and a few years ago the company sought means to reduce the cost for running fan when the mines were shut down.

At an expense of \$800 a small horsepower motor was connected to the fan. By running the fan at reduced speed, with the small motor, when the mine was not operating at full capacity or was not working at all a saving was made amounting to \$300 per month. It is easy to see the large saving that could have been made if this had been done earlier. The company continued this slowing of the fan for a year or more and even at night during the regular operation of the mine. Lately it has been thought better not to slow down the fan.

Mr. Bright remarked that whether it was advisable to slow down the fan or not depended upon circumstances. Where a large fan is used this is an important question as large quantities of energy are involved, and any advantage should certainly be taken if conditions permit. Mr. Kiser is using a variable-speed motor, but there are two-speed motors which do not give such a wide choice of speeds but nevertheless might serve the purpose. The motor with two speeds in the ratio of 2 to 1 is much simpler than the variable-speed motor.

FREES METHANE AND REMOVES IT

W. H. Luxton said he believed there were some advantages with a variable-speed motor. In a mine ventilated by a blowing fan the workings are under pressure. Any reduction of that pressure allows the gas to escape into the roadways where it can be removed by the fan. With a steady pressure this gas has less opportunity to flow to a point where it can be driven out.

J. F. MacWilliams said that he believed that inquiry should be made in every case to ascertain whether two speeds will serve or whether a number of speeds are necessary. With a variable-speed motor you get a power factor of 58 per cent at 350 r.p.m.; 92 per cent at 550 r.p.m.; then starting on the second connection of the motor 75 per cent at 550 r.p.m. and around 94 per cent at 750 r.p.m. If it is necessary to have a number of speeds this is the type motor to be used. If two speeds will meet your need you can use a motor that at 695 r.p.m. will give you 90 per cent efficiency. At about 335 r.p.m. it gives 40 per cent efficiency.

The power factor of the brush-shifting motor is 54 per cent at 335 r.p.m. At maximum speed, when Y connected, the power factor is 94 per cent and then drops to 75 per cent at slow speeds, when delta connected, and increases to 97 per cent at maximum speed.

Mr. Mitchell said that if a mine generates gas it is necessary to keep it well ventilated. To slow down the fan might result in the ventilation being reduced to such a degree as to not make the gases harmless. If the company using the fan is not operating a gaseous mine there is no need to operate the fan when the mine is idle. Consequently it is first of all necessary to determine what is the object of the fan, to make the mine safe or to furnish the men with sufficient air. If the fan is run to make the mine safe, the fan can be shut down when no men are in the workings.

Mr. Bright in his comments remarked that the first object should be to keep the mines safe at all times and added that if that could be done with the fan running at half speed provision should be made to take advantage of that economy.

J. O. Durkee, of the Bethlehem Steel Corporation, said that men were more lax during idle times than when the mine was operated continuously. Consequently it was his opinion that the gaseous mine should be better ventilated when idle than when working. The Bethlehem Steel Corporation has

seven mines closed down at present. The company had some mines where with 1,000 cu.ft. per man in the mines and 70 per cent of the air reaching the working faces, the return tested 4.7 per cent methane. If such a mine were idle but had pumpers working in it, it would be suicidal to reduce the fan speed. He had noticed that many disasters had occurred as a result of reducing the speed of the fan. The great gaseous mines of Pennsylvania and West Virginia should have about the same volume of air when working as when idle.

C. L. Harrod, electrical engineer, Indiana Coal Operators' Power Association declared that in Indiana, the quantity of air required was based on examination of the gas in the return. He thought that the fan speed should be reduced at idle times provided that the speed reduction was never so great as to reduce the ventilation below the limit of safety.

R. L. Kingsland said that the efficiency of ventilation was greater by 5, 10 or even more per cent at night than during the day when the mine was working because doors were not opened and trips did not interfere with the passage of air. This was one reason for favoring the use of the variable-speed motor. Another was that certain external atmospheric conditions were favorable to ventilation and when they were available less assistance from the fan was needed.

Put Rated Voltage at Face and Lower Power Costs

A LOSS of \$410,000 in power alone, further losses from burnouts and consequent repairs and still further losses from delayed operation were mentioned by Carl Lee, electrical engineer, Peabody Coal Co., Chicago, Ill. as reasons for renewed effort on the part of every operator to put the rated voltage at the mine face thus lowering power costs.

"The power and maintenance cost of electrical equipment around our mines is not a large percentage of the total production cost of coal. Once the miners' wage rate is set, as it now is for a period of three years, there is no honest reduction that can be made in that item and it therefore becomes necessary to consider other ways to reduce the cost per ton.

Statistics indicate that the use of electricity in coal mines is increasing at a very high rate. Accurate figures on the number of motors, mining machines and locomotives are hard to obtain, but can be approximated. Correct figures on electrical power consumption are not obtainable because a large percentage of mines do not meter their power, and, in fact, many coal companies do not even weigh their boiler coal. However, by using the data that is available we can arrive at reasonably close figures.

Taking a general average of hard and easy cutting, high and low coal, the power used will probably be about 0.40 kw.-hr. per ton. If 50 per cent of the coal is undercut, then there would be 100,000,000 kw.-hr. used annually for that purpose.

With gathering locomotives there is a very wide range of conditions encountered. Different grades, sizes of cars, kinds of bearings, methods of handling, types of locomotives, all effect the power consumption per ton. Possibly 0.25 kw.-hr. per ton would be somewhere near the general average. If there are 100,000,000 tons gathered at this rate, then 25,000,000 kw.-hr. would be used.

Haulage locomotives present a complex problem because of very widely different conditions. With improved track and modern locomotives the power used per ton is low, about 0.20 kw.-hr. for a general average. A large percentage of all the coal mined is hauled with electric locomotives, and therefore, assuming 400,000,000 tons hauled at 0.20 kw.-hr. per ton, we find that 80,000,000 kw.-hr. are required for this purpose.

Omitting pumping and all other inside power loads, there would be about 205,000,000 kw.-hr. used annually for bituminous coal production alone. At 2c. per kw.-hr. this would cost \$4,100,000. If the average loss is 10 per cent there would be \$410,000 loss in power alone. The loss in production and the added cost of maintenance would probably be a greater item.

At the outset, however, we must realize that we cannot afford to make the feeders large enough to carry all this power from the generators to the motors with the same efficiency as is used in industrial plants or home lighting. There are several reasons for this. The principal one is the long distances and heavy currents which make the losses excessive. Then again, the load factor is generally low. Even

during the day the load factor will be as low as 50 per cent or less. The 24-hour load factor would then be only 16½ per cent and the yearly load factor possibly 10 per cent. Thus the ratio of the average use of the copper for a year to the use at the peak load is 10 per cent.

However, the electric service must carry the peak load and our problem today is to find how to reduce the losses to the point where the total cost will be a minimum. In a large majority of coal mines the wiring is smaller than required to give a reasonably low total cost.

First, there is a loss due to drop in voltage. This is a direct power loss in the wires and motors. Second, there is a loss due to armature, field, and rheostat burnouts caused by low voltage and consequent repair cost. Third, there is a loss of production which affects not only the investment tied up in the electrical equipment, but all other parts of the mine. This is probably the greatest loss of all. These three principal losses are a direct result of insufficient copper, or its equivalent, to carry the necessary amount of power from the generators to the motors. The proper method of calculating the size of copper necessary and the right tests to use to check such calculations for new mines, or all mines where the circuits are already installed, is a serious and difficult problem.

KEEP DIVERSITY FACTOR IN MIND

Using the nameplate ratings of motors is good if properly applied. Ohm's law for estimating voltage drop must be the basis of all our calculations, but due allowance should be made for the diversity factor and demand factor of a single motor or group of motors. The size of the wire used in various circuits depends greatly upon the load, but is not directly proportional to the connected horsepower. We should try, therefore, to formulate general rules from which the hundreds of engineers and electricians at our coal mines can check the wiring and arrive at more accurate results.

Articles have appeared a number of times in the columns of our trade journals explaining how to make voltmeter tests on complete lines of wires. Such tests can be made accurately, but in most cases, I do not believe that they will be of any material benefit. In my opinion, a test on the return circuit should be made by an individual joint or bond test. The defective bonds can then be marked, and repaired or replaced as that is the only real remedy."

At the conclusion of Mr. Lee's remarks Graham Bright asked what is a permissible drop in voltage. Mr. Lee replied that the allowable drop depended on circumstances. If on a line there were several gathering locomotives and mining machines, the voltage drop should be kept at a minimum, for at all times some of these would have motors running. It would be a waste of power not to give them a good line voltage, but it is different where you have an individual motor which at times makes unusual demands on the line. If, for instance, you have a single locomotive and there is no pump or other machinery to make a regular

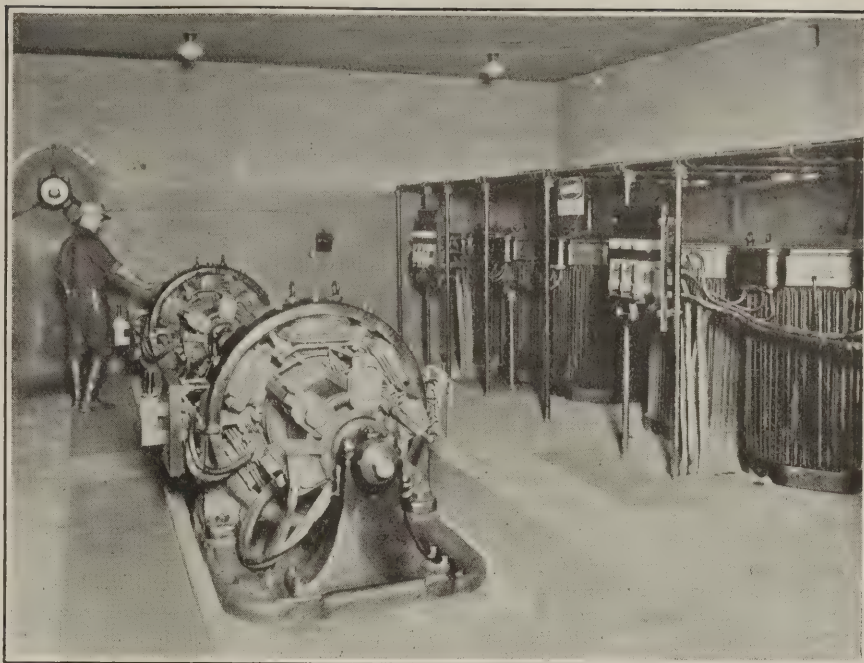


Fig. 2—Substation at Load Centre Underground

Low voltage is the incubus of mine haulage. Carrying high-voltage alternating current underground to a substation located at a load center improves the pressure, cuts down the necessary investment in copper and reduces locomotive repair bills.

draft of energy from the line, then if the voltage drops to 50 for a few seconds, the loss is heavy on that one unit but it will be so for a short time and for only one machine. Consequently it will not pay to install a feeder cable. If, however, we had six units drawing from the line and one of those six could be depended on to be working all the time then a heavy drop in voltage should be avoided by providing a feeder.

Mr. Bright said that the permissible

voltage drop was a matter of compromise. The cost of copper to eliminate all excessive voltage drops would be so great as to be prohibitive.

J. H. Edwards remarked that he agreed with Mr. Lee. His experience urged him to measure the voltage at a main distribution point. If a graphic voltmeter is put on such a line the average value for a working day can be obtained and a figure should be set for a proper average at that point.

How a Bulging Stock Room Beggars Its Owner

WHAT advantages can be obtained by shifting equipment from mine to mine so that each mine will have but one type of any one kind of machine and not a number of different types was explained by J. H. Edwards, electrical engineer, Elkhorn-Piney Coal Co., Huntington, W. Va., who had made full proof of these advantages in the administration of the electrical affairs of his company.

In Mr. Edwards' point of view the engineer who is responsible for the design and installation of electrically driven equipment is very apt to have a viewpoint on the subject of standardization much different from that of the engineer who must operate the apparatus in the most economical way consistent with the delivery of reliable and continuous service. Therefore, it may be well to approach this subject from the viewpoint of the electrical engineer, who is responsible for all phases of design, construction, and future maintenance; his attitude should represent what is best for those who have their money invested in the coal mining industry.

In the first place, standardization must not stand in the way of progress. It appears that it will not; for any tendency in that direction will be taken

care of in a natural way. When present types of machinery prove unsatisfactory for their changed or increased duties, or are known to be inefficient, the operator casts about for improved designs and the manufacturer continually has an incentive for trying to perfect his product. The manufacturer also knows that a new piece of equipment with real and proven merit is sure to have a ready sale, regardless of what has been the standard in the past.

The most important phase of standardization is simplification of equipment and operating methods within individual companies. Any maintenance engineer or other mine official can easily point out many instances where improvements have been made possible by lack of standardization. The many advantages of having in a single mine, in a division, or in a large group of mines, as few types and sizes of equipment as is consistent are so apparent that it seems hardly necessary to enumerate them.

It might be fitting at this point to cite a specific case of what a company operating a group of six properties accomplished in one year by concentrating attention upon standardization. By transfers from one property to another, by selling, and in a few instances by scrapping, this company eliminated nine types of mining machines and seven

types of locomotives. This does not mean getting entirely rid of each type, but rather eliminating certain types from mines where there were only a few of a given type or size. This, of course, made possible the elimination of sixteen sets of spare parts.

The total standardization of all equipment, including the above mentioned mining machines and locomotives resulted in a reduction of over \$45,000 in the value of spare parts carried in stock. Very few pieces had to be scrapped; most of the reduction was effected by transferring parts to other properties. The above figure represents only the most tangible saving effected by standardization. It represents only a minor part of the total actual yearly saving in operating expenses.

Figures indicating the amount of spare parts per ton of coal mined are often an indication of the degree of standardization. For the group of six mining operations mentioned above the actual figures were as follows:

Operation	Before Standardization	After Standardization
No. 1...	\$25.00	\$14.57
No. 2...	27.20	9.52
No. 3...	27.80	10.72
No. 4...	22.00	8.34
No. 5...	25.10	8.34
No. 6...	6.42	7.58

Note—These figures were obtained by dividing the total value of the stock of spare parts by the maximum daily tonnage.

It is concluded from the above that figures of \$5 to \$10 are to be expected, depending of course on the specific conditions. Electrical men connected with coal mining are liable to conclude that standardization is limited to equipment only. Standard methods of installation, periodic inspection, and of repair and part renewal go hand in hand with standardization of equipment toward the goal, of lower cost per ton.

CAN'T KEEP EQUIPMENT STANDARD

In discussing Mr. Edwards' paper T. H. Huddy, general manager of the Sudduth & Bailey Fuel Co., asked if it was possible to standardize equipment and keep it standard. Mr. Edwards replied that his company's standardization had been in effect only a short time. He would say that he did not believe that standards could be maintained indefinitely.

Eli Clemens, electrical engineer, U. S. Coal & Coke Co., said that it was important to standardize motor speeds. If the motor on a stationary machine breaks down it is convenient to be able to take a motor from some other machine and set in the place of the damaged one, so that important machinery can be kept in operation continually. The U. S. Coal & Coke Co. has standardized on certain speed motors with this idea in mind.

Mr. Newton remarked that he had been able to reduce the expense of repair parts by standardization. Seven or eight years ago his company had five or six types of mining machines and an equal number of types of locomotives. About \$250,000 were invested in extra parts, located at different mines. In some cases it was necessary to keep duplicates of parts. After standardization it was found possible to reduce the supply parts so that the stock rooms carried only \$50,000 worth

of stock and yet there were available sufficient repair parts for every machine.

Mr. Bright said that when a company had standardized its equipment it was more likely to provide the necessary replacement parts than if it had a great number of types in use. The expense of carrying a large number of parts is prohibitive.

Mr. Bailey said that standardization of equipment increased the efficiency of the employees. Having only a few types to operate and keep in repair they soon became expert in their handling.

Watch for Breakdowns Before They Affect Your Purse

IN INDIANA the operators have an association, known as the Indiana Coal Operators' Power Association, of which C. L. Harrod is the electrical engineer. He gave an interesting account of its manner of operation, describing how it reduced the power bills of those who maintained it.

He said that the cost of mining coal can be lowered by a survey with the following purposes in view: Improving power supply by bettering distribution, eliminating unnecessary power losses, reducing maximum demand and raising the power factor, reducing the time losses and repairing costs resultant on breakdowns and failure of power supply, eliminating inefficient equipment.

Mr. Harrod said the association had for the past three years attempted to make its electric inspections systematic, and to that end had prepared recently a printed inspection sheet to be filled out by the man making the inspection, a copy being filed with the association and another with its superintendent.

The form divides the inspection of electrical equipment into two parts, that which is a part of the routine of the inspectional forces and is made at least once a month, and that which may be designated "testing." Mr. Harrod referred in his remarks to the first subject only so as not to interfere with J. F. MacWilliams' subject "Testing of Electrical Equipment" which was to follow.

INSPECTORS ANSWER QUESTIONS

The routine inspections cover the following points: Lightning arresters—are they intact and properly grounded? Protective signs around high-voltage mains—are they in place? Foreign or inflammable material—is any stored near switchboard or other electrical apparatus? Exposed wiring—does it conform to insurance regulations? Converter equipment—does frame vibrate? Is there sparking at collector rings? Is there sparking at the commutator? If direct-current circuit breaker is not higher than rated capacity of machine, determine, if possible, how often breaker opens. Fan—give revolutions per minute; if two-speed motor is provided are both speeds used? If variable-speed motor is used, on what controller point is fan normally operated? Do grids heat when normal speed is exceeded? Metering equipment—does demand-chart ink properly?

Does demand-chart indicator return to correct zero at end of fifteen minutes? Does watt-hour meter creep? Is direct-current voltmeter correct at 250 volts; if not what is error? Have power company employees done any work on metering equipment during last month? Electric hoist—is safety stop properly set?

The inspectors also report on tippie motors, car hauls, miscellaneous equipment above ground, the condition of the feeder wires in the shaft, the condition and setting of main underground circuit breakers, repairs to haulage motors and mining machines. They make a ground test of the system and voltage tests during operation. They also examine the bonds.

The greatly increased volume of power used in coal mines and the increase in the value of coal consumed in mine power generating stations make it more and more imperative that every possible saving of power be effected.

CAN'T NEGLECT POWER PROBLEM

The operator of a coal mine is interested in the total cost per ton above ground, and any comprehensive treatment must consider the power problem in its relation to all other factors which determine the total cost. Such subjects are reliability of equipment, capacity of machinery for hauling and hoisting, ample power distributing facilities, training of local electrical operators and maintenance men, selection and installation of new equipment, are all on a par in importance with purchasing power at a low rate.

There are four major power operations necessary in the production of coal from shaft mines, namely, coal cutting, haulage, hoisting and ventilation. Of these, the first two, cutting and hauling, are done electrically in practically all mines, while the change from steam to electric operation of hoists and fans has followed in mines with the advent of central station power.

In any mine the greater portion of the cost of mining is for work done underground, and this includes that portion of the electric system used for cutting and hauling. It is also true that here are met the most unfavorable operating conditions, requiring rugged equipment and constant supervision for the detection and elimination of electrical trouble. Falls of slate, bad track conditions, and continued extensions of lines due to development all contribute to make the problem a difficult one.

AT 4,500 FT. COMES TROUBLE

Coal cutting machines and haulage motors are operated farthest from the source of power when the generating unit is located at the shaft or at the surface. With direct-current operation voltage conditions usually become acute at distances in excess of 4,500 ft. unless a generous amount of copper has been used in the feeders and the track circuit is in unusually good condition.

Where alternating current is used, distribution voltages can be maintained by using step-down transformers and by moving them to new load centers as development requires. In small mines where haulage motors and cutting machines are operated from the same feeders, fed from direct-current gen-

erators located at the top of the hoisting shaft, the problem of maintaining voltage becomes more complicated.

Any man who is responsible for the purchase and use of electric power, and wants to do his work well, should fortify himself with the exceedingly useful and valuable information which can be obtained with a good set of graphic instruments.

The cost of mining coal can be reduced by thorough surveys and tests with the following purposes in view: *a*, Improving power supply by bettering distribution; *b*, eliminating unnecessary power losses; *c*, reducing maximum demand and raising power factor; *d*, reduction in time lost and repair costs due to breakdowns and failure of power supply; *e*, eliminating inefficient equipment.

PUT VOLTMETERS TO WORK

When the haulage motors are pulling on grades in mines where the cutting machines and haulage motors are operated from the same circuits, the voltage becomes so low as to stop the cutting machines altogether. Often graphic time-voltage surveys at the working faces show where a system of cross entry tie lines installed at proper places will improve conditions to such an extent as to make possible good operation of all equipment. In most direct-current underground systems, low voltage can be corrected at very little cost by the installation, where the bottom warrants, of cross lines and automatic circuit breakers and by properly bonding the return track circuit.

Graphic tests make it possible to determine the power consumed by each machine, and a comparison with previous tests or with tests of other machines of the same size and type, shows whether the machine is in normal operating condition.

By keeping charts of all tests filed and indexed, it is possible to accumulate a fund of information that is valuable in checking up trouble, laying out extensions and specifying new equipment. A report on operation, accompanied by records taken on the spot, leaves no room for argument.

A graphic wattmeter, as used for testing individual machines and measuring maximum demand, may also be used for checking up power consumed when the mine is idle, and thus determine the power wasted due to grounds and other leaks. The procedure is to connect the instrument into the circuit and take the load curve of power consumption during idle hours. Short peaks at intervals are usually caused by the occasional operation of a locomotive. The steady part of the load will be a combination of the loads due to small pumps, converters and lights, together with any leakage due to grounds, faults, etc.

Power cost per ton of coal mined, whether purchased or generated locally, is a small proportion of the total cost of production under normal operating conditions. However, it can become a large figure by causing partial or complete loss of tonnage through failure of power supply or equipment.

Service is, therefore, the first requisite all along the line, from the source of supply to the smallest motor, and it is necessary, probably more than in any

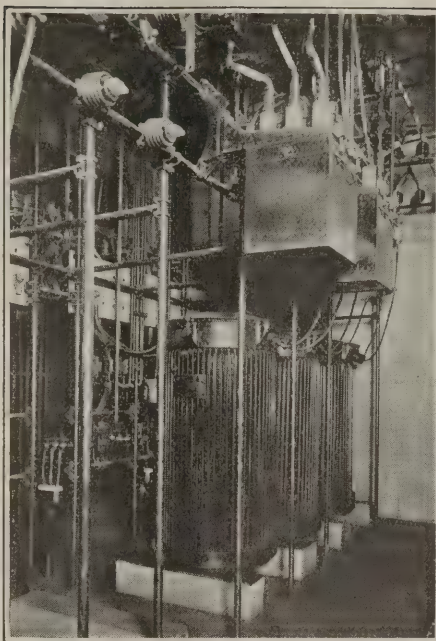


Fig. 3—Underground Transformers

Some transformer stations underground are almost if not quite as elaborate as any to be found on the surface. Carrying high tension current to load centers within the mine has done much to better the voltage on haulage systems.

other industry, that frequent electrical surveys be made and poor operating conditions improved before serious and costly delays result.

Surveys of load conditions, power factor, and voltage can only be accurately made with the use of graphic instruments. However, many things can be found by visual inspection, such as broken and hanging insulators, loose trolley wire allowing trolley pole to come in contact with slate, defective lightning arrester installation, accumulation of copper dust on generating machines, poor commutation, etc.

The following costs are for mines which purchase electric power for haulage, cutting, miscellaneous small motors and lighting, using steam-operated hoists and ventilating fans:

Tons produced in sixty days, eleven mines	515,519
Kilowatt-hours per ton	1.71
Electric power cost per ton	4.0 cents
Cost per kilowatt-hour	2.4 cents

The highest purchased power cost per ton occurs in mines having mixed power; that is, in mines where only a small per cent of the total power used is purchased. Such mines usually create a high maximum demand compared to energy consumption. This condition occurs when the development of the mine has caused a power consumption in excess of the local generator capacity, thus necessitating the purchase of power during working time, and, in many cases, because of inadequate supply of good water for boilers.

In a coal mine, poor running time and consequent high cost of production is generally due to one of four things: lack of orders, car shortage, labor trouble or failure of equipment. The operator has virtually no control over any of these conditions except the maintenance of his equipment, which makes it important to keep the mine in condi-

tion to operate efficiently when the first three conditions are favorable.

Mr. Harrod said that in no single month in the past three years have all the demand charts of the members of the Indiana Coal Operators' Power Association been absolutely correct. One or two of these charts has always been found wrong.

Graham Bright, in commenting on the remarks of Mr. Harrod, said that the average mine knew little about inspection. In earlier years steel mills and street-railway companies had less complete inspection than they have today. Now they spend twice as much on inspection as on repairs. They do this not so much to save repairs as to assure continuity of operation.

Speaking about bonds, Carl Lee said that he did not believe an over-all test of much value, for you may tell the operator that his return is bad but what is he going to do about it. The Peabody Coal Co. runs individual tests of every bond on main-line track and leaves a mark to show the repair man where the repair is needed. In this way good results have been obtained. The number of bad bonds varies. Some 2 to 15 per cent of all bonds are defective. The bonding gang may finish a section one day and the next day it may go back and find that track switches have been taken up and the bonding destroyed. Mr. Lee said: "We have found that tests made from rail to rail are more practical than any others and that the arc-welded bond is the best. Some have been in four years, and we have never found one defective due to imperfect welding."

J. H. Edwards remarked that he supposed the mines of which Mr. Lee was electrical engineer kept their bonds in perfect condition. In that case the tests from rail to rail were to be preferred. Individual bond tests were the ultimate criterion but he had found by experience that for the average mine with its low-grade bonding system the over-all bond test which gave the average condition of the whole mine was the more valuable. In consequence he had abandoned the bond tester.

TAKE OVER-ALL EFFICIENCY TEST

Periodically, or when conditions show that the bonding is deficient, an over-all bond test is made. In case of a converter, it is run with a reduced current and then what the Elkhorn-Piney Coal Co.'s electrical department terms, "a test for efficiency in bonding" is made. By repairing all bonds which were found on visual inspection to be defective, this department has found that the efficiency could be kept 90 per cent perfect.

In one case the general manager suspected something was wrong and notified the superintendent. The latter declared that he believed the bonding was good. Finally a test was made and it was found that the efficiency was only 60 per cent. The bonds were visually inspected and other tests were made and as a result the bonding efficiency was brought up to 95 per cent and the power costs were reduced proportionately.

Mr. Lee said that many of the bonds in the Peabody Coal Co.'s mines were so covered by fallen coal and slate as

to be invisible. He found the quickest way to examine them was with a bond tester rather than with a shovel. He presumed that Mr. Edwards referred to the fact that defective bonds will dry the rail at the joint. He wanted to know how he would detect such bonds where no current passed through the rail. Suppose between the cross bonds there are six joints in one line of rail and among them three or four bad bonds. They prevent the current flowing in that line of rail, and in consequence though they do not heat up they may be extremely defective.

Mr. Edwards remarked that he had used recently a pocket compass as a means of detecting the absence of current. This will show quickly whether one rail is carrying the whole electrical load and the other rail is dead. His experience in six mines in West Virginia and Kentucky, he said, did not include bonds that were invisible except those that were covered by dirt, mud and water. Little satisfaction was obtained with the individual bond tester. He had used the indicator type of tester, also the audible type with the

drill for contact. The latter, however, needed experienced men. He had also tried making a test at the joint but he found that it indicated a good bond when there was no bond whatever.

Mr. Bright said that at one of his mines it was the intention to have all the bonds tested. A crew was sent round and all the bonds were tightened. A high average of bad bonds was found. A good tight plate is essential to a good bond. In one mine a test was made of an average of 350 bonds for a distance of fourteen miles of track. After each 25 bonds examined a mark was placed. Every time a defective bond was found that was marked also. After the whole mine had been examined it was found that 61 per cent of the bonds were defective. After placing some 1,500 bonds a saving was made in the power bill of about 40 per cent. Now the regular bond man makes an inspection during every day that the mine operates. When the motorman sees a bad bond between numbers, say, 50 and 75 of the marking, he reports the fact to the bond man and it is repaired immediately.

Instruments that Decide Your Fortune

By J. F. MACWILLIAMS

Electrical Engineer, Pennsylvania Coal & Coke Corporation

IN THE concluding number of the Symposium "Problems of Electrical Men" J. F. MacWilliams, electrical engineer, Pennsylvania Coal & Coke Corporation, addressed the meeting on the importance of having instruments to test the operation of equipment so that knowledge may replace guesswork.

"With competition in the coal industry as keen as in any other field it behooves all engineers to effect every possible saving. First of all, this means that our engineering must be high-grade and that every piece of equipment must operate efficiently.

To obtain these results, nothing is so important as operating data. If our engineering service is to be paragon we must know how present equipment functions, whether it be efficient or inefficient; and if we are going to get the best results from the apparatus which we install we must be eternally vigilant and prompt to prevent or discover wastes.

The first thing we must do is see that the equipment we purchase is capable of doing its work efficiently. Next, we must make sure that the apparatus is properly installed and maintained so that it will be able to do its work effectively.

Unless some definite system is adopted for the testing and inspection, much time and effort and considerable valuable information will be lost. Our company has therefore decided upon and carried into effect a plan whereby every important piece of new equipment is tested before it is placed in service. This survey usually proves whether the equipment is suitable for the work, checks the performance curves, discloses its limitations, determines whether the installation has been satisfactory, and gives us an opportunity to plan better methods.

In our repair shops, we try to test all

repaired apparatus before returning it to the mines. Such a procedure quickly discloses short-circuits, reverse connection, grounds, etc. Our experience in this work has taught us much. When we first started our present method of testing we found that the number of defective field coils in service on electric motors was astonishing. These coils are of so low a resistance that a ten-degree difference of temperature will in many cases affect the usual testing apparatus more than two or three short-circuited turns of wire in the coil, and therefore make it almost impossible to arrive at any definite conclusion.

We believe the only way to test these fields is by a special transformer which we have designed and which is now being built by the Flood City Manufacturing Co. of Johnstown, Pa. This company is also building a bond tester which we have developed.

As we have increased the personnel of our testing department we have reduced our maintenance force. This, to us, is conclusive proof of the wisdom of such a course. As a result of our tests we have become convinced that the protection of motors by overload relays and fuses is unsatisfactory because they cannot give the proper delay. We have concluded, therefore, that if we could procure perfect thermal protection, we could take care of the motor under any condition. Excellent results have been attained by thermal relays for bearing protection, but disappointment has been the result of installing relays intended to protect the coils of alternating-current motors.

Consequently, we are considering the matter of designing a thermal motor protective device and hope to be able to have one for test in a short time. This device will be built on the principal of the Wheatstone Bridge, the galvanometer being replaced by the trip element, a relay now quite common. Two of the branches of the bridge will be made into a rope placed around the coils.

In the field we must first of all ascertain whether the electric motors are re-

ceiving the voltage for which they are designed. If the pressure is low, we are losing not only the cost of the wasted power but also the cost of the excessive labor required to keep the machine in repair. Then again, there is a serious loss due to the fact that the machine does not earn enough to pay for the investment in it.

At each important mine, we have placed Bristol graphic recording voltmeters which are moved around to the different distribution centers, thus keeping a constant check on voltage conditions. If low voltage is found at any center, an inspection is made, and if the trouble is not located at once, tests are made of the feeders and bonds. The man making the test makes the repair again and tests the circuit. Once a year a general test is made of all feeders and returns by connecting overhead conductors and return circuits solidly together at distribution centers and applying sufficient voltage at the substation to produce the average current required. Thus we determine power loss. We have found that though the Bristol meter may not be as accurate as others, still it will indicate the variation in voltage.

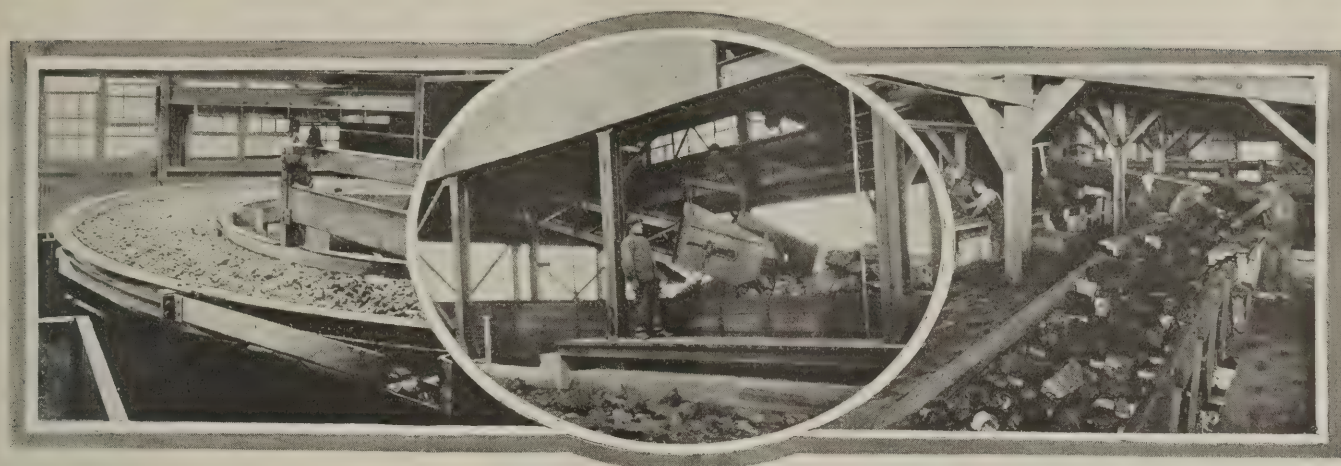
Pumping and ventilating require a great amount of power and if a careful check is not made, efficiencies as low as 30 per cent are common and may be allowed to continue. Pressure and vacuum gages give very good indications of the performance of centrifugal pumps and an ammeter in the motor circuit will check the operation of the motor. Upon a pump or fan giving any sign of trouble, a test should be made to determine the cause. A careful test of every important fan or pump should also be made immediately after its installation. The power input to the motor the discharge as well as pressure readings should be taken.

DON'T OMIT TESTING THE FAN

Fans should be tested under various conditions of speed, pressures and capacity by corrected anemometer or pitot tubes, water gages and thermometers. We make a practice of dividing the section of the airway, where anemometer or pitot tube readings are taken, into not less than 12 parts and use a water gage arranged for various angles of inclination to obtain accurate readings.

For testing locomotives and determining the tractive effort required to haul cars equipped with different kinds of bearings, we use oil dynamometers. In making tests of bearings, a full trip is hauled over a heading having markers established to indicate changes in grade and distance. Drawbar pull multiplied by miles per hour is checked against kilowatt input. The weight of the trip is carefully taken, and the observation car with contents is run over the route at the same speed as the trip. In this way, we are able to determine the power required by the locomotive and observation car."

In discussing Mr. MacWilliams' paper, Mr. Webster said he had designed a bond tester for low current with three rigid sides and one that is hinged and rests on a leg. When a short-circuit is found the tester immediately gives a reading. It is easy for a man to throw in the coil and close the switch.



How to Clean and Size Coal So That a Favorable Market Can Be Maintained

By Air Cleaning, Ash Is Reduced Between 33 and 50 per Cent—Coal Gets to Market Unfrozen—What Coal Should Be Sized in the Tipple and What in a Rescreen

Winnowing Coal to Separate Its Impurities

GETTING dry coal that will not freeze in winter, saving much of the clean coal that is lost in wet-washing processes, running the plant in winter without trouble from frost and obtaining refuse running from 82 to 87 per cent were among the achievements recorded by Humphrey D. Smith, general superintendent, American Coal Co. of Allegany County, with mines around the Bluefield district of West Virginia, at a meeting on coal preparation at the American Mining Congress, May 13.

Mr. Smith said that at the plant of the Crane Creek mine, the 185 tons per hour that goes through the 2-in. circular openings on the horizontal shaking screen is carried to the top of the dry-cleaning building, and thence is passed over screens, through bins and over tables to the storage bins alongside the railroad. At the plant of the Wyoming Coal Co. approximately 150 tons are treated per hour. To return to the Crane Creek plant, this is provided with a battery of 36 Hummer screens, and this divides the coal in seven sizes; 2 to 1½ in., 1½ to 1 in., 1 to ¾ in., ¾ to ½ in., ½ to ¼ in., ¼ to ⅛ in., and ⅛ in. to dust. The coal from ⅛ in. to dust is bypassed and not treated, but the other sizes from 2 in. down are passed through the cleaning process.

STORE COAL OVER AIR TABLES

The coal that passes through the vibrating screen falls into bins of 15 tons capacity, one being placed over each separating table. The bypass coal under ⅛ in. is chuted directly under the floor of the table room. The coal from the bins just mentioned is fed by reciprocating units to the feeding ends of the cleaning tables. It has been found that it is extremely important to keep a constant bed of coal on the

table. The provision of 15-ton bins is valuable as a means of steadying the flow of coal to the tables. The Crane Creek plant has been in use approximately a year and has handled 192,000 tons of coal, running from 2 in. down to dust.

In treating the coal the American Coal Co. has found that on the larger sizes it has not been possible to get enough of the coal to properly bed the table. Consequently, it has been obliged to run the larger sizes, those between 2 and 1½ in. and between 1½ and 1 in., intermittently, using the 15-ton bins in which to store the coal until enough has been gathered for the running of the table. The general average of all tests taken indicates that the percentage of ash in the crude coal averages about 10 to 12 per cent. The average ash in the clean coal as shipped in the railroad cars runs approximately between 7 and 8½ per cent, although some samples run better and some worse.

ASH CUT IN TWO OR CUT A THIRD

Coal that is shipped includes the bypass coal which is not treated on the tables. The coal actually treated by the dry-cleaning process will run from 4½ to 5 per cent ash up to about 6½ to 7½ per cent. The large-size crude coal runs from 13 to 17 per cent ash, and the small-size coal usually between 9 and 10 per cent, thus it is evident that the ash reduction varies between 33½ per cent and 50 per cent. In the operation of the plant we use three fans. One double 72-in. fan which handles the air from the first two largest sized tables which prepare coal running from 2 to 1½ in. and from 1½ to 1 in. The other half of the double fan handles from 1 in. to ¾ in. and the third fan handles all sizes from ¾ in. down to ⅛ in.

The Crane Creek plant has eight tables in operation. About 100,000

cu.ft. of air per minute is handled through the dust-collecting system. The air for the fans comes from large hatches and passes into two large centrifugal dust collectors placed on the outside of the building.

The American Coal Co. is recovering all the dust except the very finest air float, which would be under 200-mesh. The dust from these collectors is piped, taken over to the clean-coal elevator, where it is remixed with the clean coal in the same proportion as it was taken out. Bypass coal also is added in a similar manner.

The present plant being built into an old wet washer has some six or eight operations that would not be necessary if a new building had been erected. In consequence the power consumption is slightly in excess of what would be good practice. Taking the connected load in the plant as approximately 525 horsepower the consumption of power per ton of coal treated would run 2.35 kw.-hr. Some reductions in that consumption are anticipated as a result of changes made in drives. The officials hope in time to be able to handle a ton of coal with a power consumption of 2 kw.-hr.

ABOUT FOUR MEN IN PLANT

In the plant four men are employed and occasionally five. Since the beginning of the year the number of men employed in the building has averaged 4½. In estimating the cost of cleaning this coal a charge for depreciation has been added, and this has been made large because the structure is of wood and may have to be replaced before many years. In round figures the cost of dry cleaning coal at this plant is about 20c. per ton including labor, power charge and plant depreciation. No charge has been added for the loss of rejects, which some might think should be included.

All the coal is sold on the market



Fig. 1—Lump Screens in a Tippel

Thorough screening is a primary requisite of coal preparation. Oscillating screens have almost entirely supplanted those of other types. The perforated plate has also almost completely taken the place of woven wire as a screening medium.

and the loss of this rejected matter reduces of course the product that is available for sale. One of the main advantages of dry-cleaned coal is that it does not freeze in the winter as does the coal from the other cleaning plants of the American Coal Co. which use the wet process. Another advantage in dry cleaning is that the loss of fine coal is at a minimum. The ash in the refuse will average from 82 to 87 per cent, which shows that only a small quantity of coal is wasted in the washery.

REFUSE AT CRANE CREEK HEAVY

The refuse has about twice the specific gravity of the coal, and that makes the cleaning problem more or less easy. Another advantage of this process is that as it is dry it is possible to operate the plant when the temperature is below freezing as well as in warm weather. In fact the cold air makes the tables operate more successfully in winter than in summer.

Replying to G. A. Vissac, general manager of the West Canadian Collieries, Ltd., of Blairmore, Alta., Canada, he said that the larger sized screens were extremely effective, because such a small tonnage goes over them. The smaller sizes gave practically no trouble above $\frac{1}{8}$ in., the screening efficiency varying with the moisture obtained in the coal. Sometimes wet trips that will carry 4 to 8 per cent moisture will come out of the mine and this coal cannot be screened down to $\frac{1}{8}$ in. In that event fine screens block up and it is necessary to bypass some of the finer coal.

In reply to M. B. Morrow, Canmore Coal Co., of Canmore, Alta., Canada, Mr. Smith said that the dry-cleaning plant is equally efficient with coal from 1 in. to 2 in. as it is with smaller coal, but it is absolutely necessary to have enough of any one size to bed the table properly.

The chairman of the meeting, Colonel Warren R. Roberts, declared that these tables at the Crane Creek mine would handle 240 tons an hour and Mr. Smith

said that he believed the plant could be run at that capacity and give efficient service. The tonnage produced in the past year, namely 192,000 tons, passed through the plant in 170 working days of eight hours.

L. E. Woods, president, American Coal Cleaning Corporation, said that there were two pneumatic coal-cleaning plants in West Virginia, a small one in the far West, one in New Mexico, two tables at Niagara Falls cleaning coke and four tables soon will be working in England. All told there are more than thirty tables in operation with an annual capacity of a million tons.

R. W. Arms, of the Roberts & Schaeffer Co., said that air cleaning required more careful sizing than water. Nevertheless it is not absolutely necessary to provide for eight or ten sizes at every cleaning plant. It has been shown that it is possible to select one extremely dirty size and by cleaning that size alone to make an effective reduction in the ash content of the coal. The cleaning of coal involves a shrinkage in the quantity of coal delivered to the market. Each operator should select for himself what shrinkage he is willing to effect in cleaning his coal. He must drive out the dirt with air or wash it away till he strikes a happy medium.

DOES NOT PAY TO OVERCLEAN

Coal men had explained to him that the public does not really want an extremely low-ash coal and that if the ash in coal could be reduced till only the inherent ash were left, the coal would not be a good fuel under ordinary conditions as they now exist. Whether or not that is true is a matter for each man to decide, but it is certain that a product having a uniform percentage of ash is more to be desired than one that has an extremely low but variable percentage. It is found that the air-cleaning system produces a uniform ash, which really is a tangible asset.

E. W. Park of the Interstate Coal Operators' Association, desired to know if the same blast of air is used for all

the seven different sizes in the Crane Creek installation. Mr. Smith said that each table has its own air pressure. The blast with the larger size of coal is heavier than that with the smaller sizes. It is heavier for the 1 to $1\frac{1}{2}$ in. than for the coal larger than $\frac{1}{8}$ in. and under $\frac{1}{2}$ in. The four tables which clean the larger sizes take twice as much air as the tables which clean the smaller sizes. After the air is once adjusted to get the needed suspension the air delivery need not be changed for a month or even months at a time.

Mr. Smith in answer to Mr. Woods said that he did not believe that \$15 had been spent on repairs since the tables had been installed. There is nothing to get out of order. A motor bearing on one of the tables heated and it had to be rebabbitted and one of the original decks that came with the tables is still in use. A small hole about 1 in. square had to be repaired where the refuse left the table by which the largest size was cleaned.

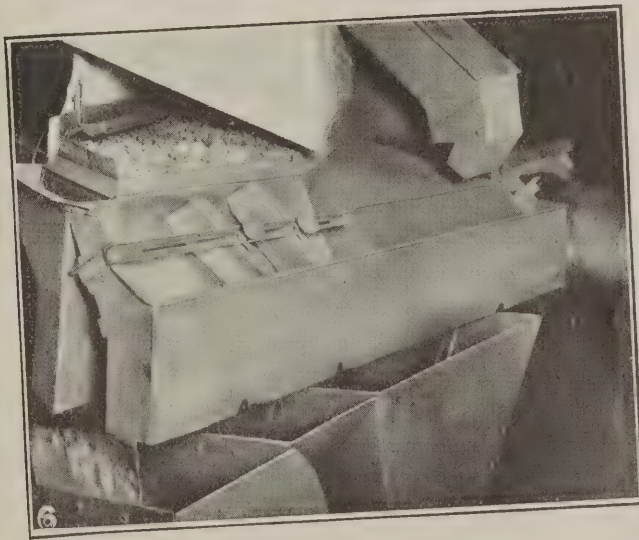
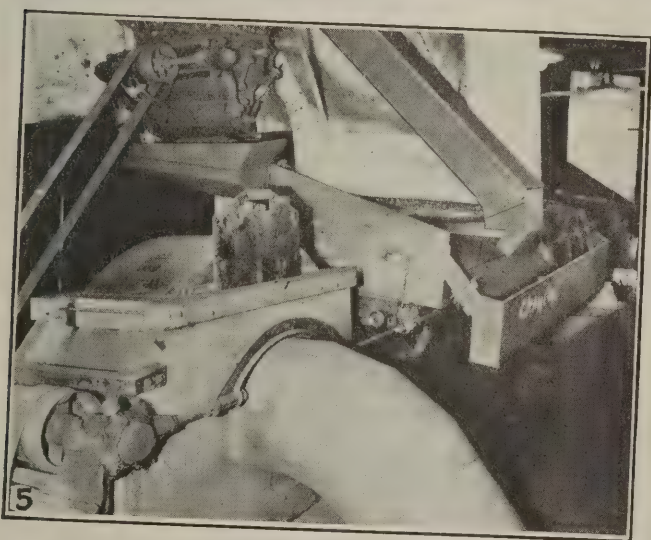
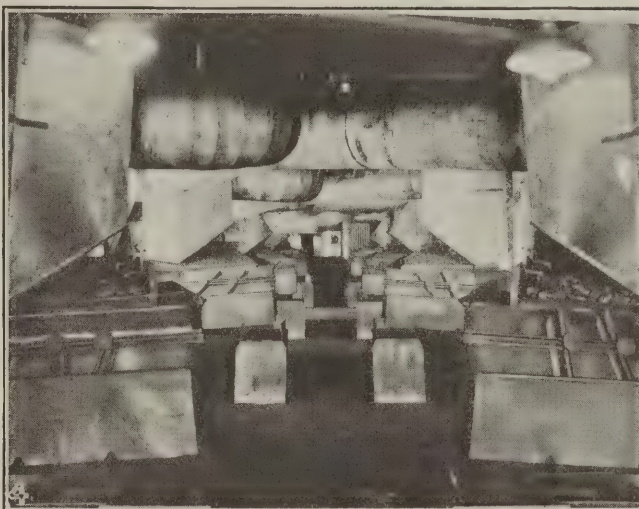
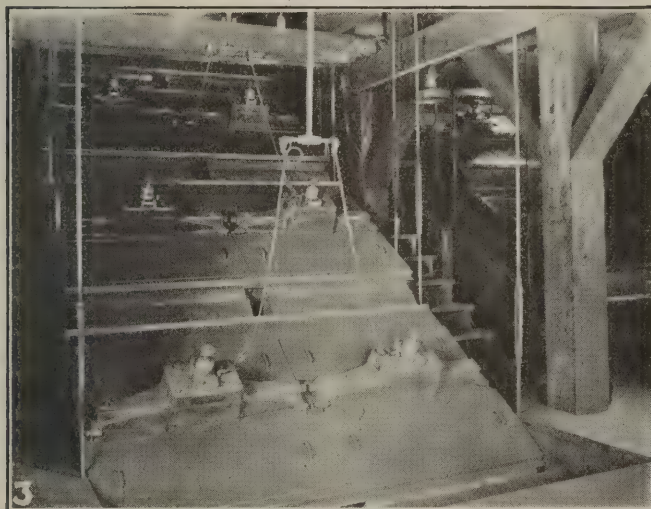
However, the air delivered to the tables should be as clean as can be obtained. Otherwise the small perforations will clog, and the decks will have to be removed so that they can be cleaned from the underside. At the Crane Creek plant the air is obtained from intake pipes running perhaps 50 ft. beyond the building. These pipes are 36 in. in diameter. In this manner clean air is provided.

George Delamater, of the W. S. Tyler Co., said that an 8x5-ft. screen would handle 100 to 120 tons per hour when screening $\frac{1}{8}$ -in. coal. An 8x5-ft. screen requires 1 hp. to operate. A $\frac{3}{4}$ -in. screen with 20-sq.ft. of screen surface will need one horsepower to drive it and will handle 180 tons an hour. Wet coal can be screened satisfactorily down to $\frac{1}{8}$ -in. Below that it will give some trouble. In every instance the vibrator must be given enough vibration to handle the maximum load.

How Should Coal Be Screened And Into How Many Sizes?

Salesmen too often take contracts which compel a reconstruction of the tippel, causing not only much unprofitable expenditure but destroying the whole design to such an extent that the coal is prepared and loaded with excessive degradation, said G. F. Osler, general manager of the Pittsburgh Terminal Coal Co., in the second half of the session on coal preparation in the afternoon of May 13. Hugh Shirkie, president, Shirkie Coal Co., was not present to discuss the relative claims of preparation in the tippel and preparation by secondary equipment in a separate structure.

In Pennsylvania, said Mr. Osler, picking tables did not become general till the year 1917. In the Pittsburgh district only four sizes are being made—slack, nut, stove or egg and lump coal. For this reason Mr. Osler did not consider a Pennsylvania operator competent to judge whether an Illinois producer should do all his sizing under one roof or erect a secondary building in which to do the rest of the work nor where a line should be drawn between the two.



Scenes at the Crane Creek Mines, American Coal Co. of Allegany County, McComas, W. Va.

Fig. 1—Tippie and dry-cleaning plant. Tippie, boom house and dump in front, dry-cleaning plant in rear. A large inclined elevator takes raw coal under 1-in. diameter up to cleaning plant from tippie. Fig. 2—Rear view of dry-cleaning plant. Note the five-track yard for mine cars feeding to dump house, the two large dust collectors and fans taking dust from the screens and cleaning tables. Fig. 3—Vibrating screens set in two batteries. View shows three 8-ft. screens having two vibrators for each screen. The plant has twenty screen units with thirty-six vibrating sections. Coal passing over and through these screens goes in bins over the cleaning table floor.

Fig. 4—Cleaning table floor with eight tables. Starting at front, first table at right treats 1½- to 2-in. coal, first table at left 1- to 1½-in. coal, second table to right ¾- to 1-in. coal; second table to left ¾- to 1-in. coal, third table, right and left, ¾- to 1-in. coal, fourth table, right and left, ¾- to 1-in. coal. Big hoods over each table with large air pipes take air and dust off tables to fans located outside the building. The discharge from the tables includes three separate products—clean coal, middlings which are run over the tables a second time and refuse. Chutes take this refuse to conveyors under the table floor. Fig. 5—Rear of cleaning table showing

fresh-air intake pipe to fan built in table. The valve permits the intake pipe to be closed thus allowing the attendant to control the quantity of air supplied to the table deck. Note that the eccentric drive for oscillating the deck of the table has cone pulleys for varying the number of strokes per minute. Fig. 6—Back view of cleaning table showing discharge from table deck. Movable flights allow changing cut between clean coal, middlings and refuse. Note the hood for the dust collector above the table. The chute above the table leading from the steel bin makes it possible to bypass coal whenever a table needs repairs, thus enabling plant to run.

In his view the principal need was to handle the coal as few times as possible, for every time it was handled the coal suffered from degradation. "The salesman and customer," said Mr. Osler, "are against the operator because the salesman will promise the customer almost anything he asks. He often asks us for a separation of sizes for which we are not equipped." The engineer in designing the tipples builds it to satisfy the requirements of the operator as

weigh basket without degradation. Some of the coal is passed over shaking screens but some still is sized on gravity screens, though that is regarded today as antiquated practice. Most of the operators, engineers and tipples builders do not seem to realize that mine-run coal will break. Where shaker screens are used, the shape of the screens determines in large degree how much slack they will make and how much slack they will remove.

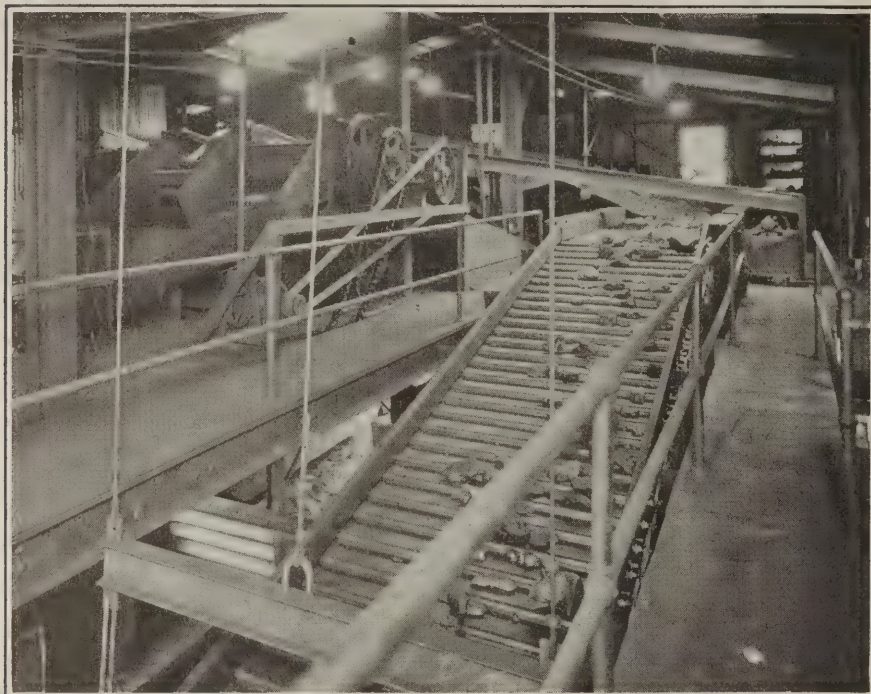


Fig. 2—Interior of a Bituminous Tipples

At many mines four sizes of coal are prepared. Two and sometimes three of these are hand picked on travelling apron or pan conveyors. The two larger sizes also are usually lowered carefully into railroad cars by means of either loading booms such as that here shown or by shaking chutes. Either of these devices may be lifted clear of the car when not in use loading coal.

they have been detailed to him. No sooner is the structure completed—even before it is completed—than the operator finds he wants "to do some stunt with the coal."

The salesman has been busy trying to get the operator to accept a contract having a freak specification. The operator has assented and has cavalierly remarked "We'll fix that. Our engineers will work it out." They do—by dropping the coal some 7 or 8 feet. If operators would take a moment to consider the breakage of coal after screening they would not ask the engineers to handle the coal in so many ways without the use of conveyors. The tendency is to make the primary screening of the coal the only operation.

Coal should always be slidden and not dropped. All chutes should be covered from the screens to the point where they discharge into the car, as the quantity of dust which is blown from the chutes is worthy of consideration. Around a tipples where the chute is not covered by a housing, slack can be found covering everything with a thick coat. The immense quantity of dust in the air is far from healthful for the men working on the picking tables.

In the Pittsburgh district little attention is paid to getting coal into the

In a recent investigation Mr. Osler found that of the nine tipples of the Pittsburgh Terminal Coal Co. equipped with shaking screens, hardly two screens, though they were all of the same type, would screen the coal alike. Wet coal would stick to nearly every type of screen. The best screening medium for wet coal was a screen having a step 6 in. long with a 2 in. rise and not a long sloping screen. He found that the 12-in. steps would become wedged with small pieces of coal and that the wet coal would ride over them. He also found that some of the screens had been so arranged that the coal became worn in passing over them, thus increasing the percentage of slack.

Warren R. Roberts, the chairman, said that in Illinois, where seven sizes of coal are made and the operator desires to put in only a four-track tipples, it is necessary to erect a resizing plant to handle those sizes that cannot be separated in the tipples. This question presents itself: What sizes should be handled in the rescreen plant and which on the main screens? Some plants have been designed so that only the lump and egg were loaded directly under the tipples. No coal should be rehandled that can be sized in the main building.

Frank E. Young, of New Mexico, said that in that state five sizes were made

at the tipples, but he thought that if a sixth size were made it should be taken out by a different separation. The smallest size prepared (1½-in. to ¾-in.) is made at the tipples and is loaded out there. The lump, egg and nut are loaded by booms but the pea coal, which is 1½ in. to ¾ in., is loaded out by a curved chute crosswise of the car. Mr. Young said that lump coal sold for \$4, No. 1 nut and egg for about \$3.25, pea coal for \$2.75 and slack for \$2.25, so there was large saving wherever coal was not degraded.

Mr. Roberts said that Illinois was preparing altogether too many sizes of coal and that he had always endeavored to oppose the installation of machinery for such excessive preparation. He agreed with Mr. Osler that the distant salesman often reported that he had sold a quality of coal that the plant was not designed to deliver and that the engineer was asked to redesign a plant which had been working successfully. This rearrangement ruined the tipples as far as the handling of the coal over the primary screens was concerned. If a company has a plant that satisfies 95 per cent of the orders, it should not be ruined to please the other 5 per cent. The operator should let some other fellow cater to that small percentage. Suppose seven or eight sizes are made and there is a market for only five or six, what is going to be done with the other two? It would be well for operators to reduce the number of standard sizes.

Mr. Tracy remarked that on Jan. 26 in a certain district of Illinois of unbilled cars there were eight of lump, nineteen of egg, forty-six of nut and 192 of slack. The operator is certainly in difficulties when he has only eight cars of lump left to 192 cars of slack. How can he operate profitably, manufacturing such a large quantity of distress coal?

Mr. Smith said that at some portions of the year conditions would be reversed. The demand for sizes was changing owing to the installation of different kinds of boilers. For a while the old-fashioned boilers that could not burn the finer sizes were still in use, but of late years as these boilers played out they were replaced by others that had grates that could burn the finest sizes. Furthermore, all the entirely new installations were of that character. The tendency was toward buying finer sizes of coal.

Industrial Co-operation Lunch

On Thursday, May 15, the American Mining Congress canvassed the subject "Industrial Co-operation" with Harry N. Taylor, president, U. S. Distributing Corporation and Sheridan-Wyoming Coal Co., presiding, and F. W. Smith, F. P. Wright, Lee Lang and Carl Scholz as speakers. The latter showed a cube of oak wood, a cube of coal and a stick of gum, all of which sold for a cent. The cube of oak measured 2½ in. each way, that of coal 6½ in. The coal weighed over 10 lb. and had locked up in it the power of producing 174,000 B.t.u. Mr. Scholz remarked that no wonder the Wrigley Building based on the gum industry was one of the finest in Chicago.

Congress Wants to Do What Is Right But Is Looking for Counsel

Callbreath, Brydon, Parker, Gandy and Moorshead Discuss Present Position of Coal Industry—Congress Not Wrongly Purposed but Often Ill Advised

THE "Get-together" dinner on the second night of the Congress and the night before the National Coal Association began its convention was something more than fried chicken and a succession of funny stories and high-sounding but hollow phrases about co-operation. Some earnest words were spoken in an effort to convince the whole coal industry that there is real necessity for it to get together.

It must get together to combat the rising tide of socialism that is leading toward too much government control over business, J. F. Callbreath, secretary of the Congress, declared. He warned, after his long experience in Washington, that the pressure for legislative supremacy over the judicial is powerful and that real effort must be exerted to stop it.

As for Congress, whose action with regard to coal has long been viewed with alarm by the coal man, he declared that although our national legislative body has been strongly condemned from many sources, yet it is truly representative of the best thought of the nation and that many of its mistakes have been due to inability to get the right viewpoint on the matter in hand. It only needs to have a just cause properly presented in order to do the right thing, Mr. Callbreath thinks.

It is the right thing for the coal industry to adopt an attitude of "sensible selfishness," he said, and to campaign for the things to which it is justly entitled that it may exercise the great American privilege of working out its own destiny. If it gets that, it will prosper and the public will benefit.

The way for the industry to get together and pull itself out of the muck is not by legislation nor yet by consolidation of finances or salesmanship, said J. C. Brydon, president of the National Coal Association, but by a consolidation of thought and effort.

DAY OF SHARP PRACTICE ENDS

"The time has passed," he said, "when sharp practice or mere shrewdness will win any man permanent advantage over the rest of the industry. The most we can hope for now is to raise the general average benefit and enable it to flow to all."

He took the customary crack at the work of the U. S. Coal Commission, inviting anyone to point out a single commission remedy for the ills of coal. He said that the National has been making some use of part of the great mass of information gathered during the time of the commission's life, however, and that some benefit is being derived therefrom. It has aided the National in its successful efforts at Washington to prevent the passage of a mass of foolish legislation.

The battle of prevention goes on day by day against both friends and enemies, he said, reciting his experience with a friend¹ Senator to illus-

trate the point. He dissuaded this Senator from introducing a coal bill even though the Senator honestly wanted to benefit the industry.

"If that's what you want," said Mr. Brydon, "then don't propose it. The best thing for the industry is to be let alone. Whenever it has had the opportunity to operate unhampered it has furnished the public coal when and where it was needed and at a price lower than that of the product of any other industry."

"But," said the Senator, "if something like this isn't passed, the bolsheviks will pass something worse."

"Then let them pass it," replied Brydon. "If they have that much strength, then your bill, even if enacted, wouldn't last long on the statute books. The thought of this country is revolving in such swift cycles nowadays that if bolshevik coal legislation becomes law it will wear itself out in four or five years anyhow, and we will be through with it. So the best thing to do is withhold your bill."

It was withheld.

Mr. Brydon was optimistic about coal even though the industry is at a low point. The fact that Cincinnati had drawn together the greatest assemblage of coal men the industry had ever marshalled in one place at one time made

him think that "in spite of our condition, the spirit to do is with us."

E. W. Parker, director of the Anthracite Bureau of Information, humorously met Mr. Brydon's challenge to "point out a single commission remedy." He said that the commission plainly recommended on one page that the bituminous-coal industry eliminate brutal competition as the anthracite industry had done, and on another page, recommended that the anthracite industry go back to it again. In serious vein, Mr. Parker said that the coal industry must educate the people, difficult though that task seems. The anthracite industry is getting real results in its present campaign to show the public how to burn hard coal more economically.

The sound message of Harry L. Gandy, secretary of the National, was this: Coal problems will certainly be solved in the coming years. They will not be solved by legislation or by the appearance of some Moses of coal but in the everyday life of the men in the mines and the men in the business offices of the industry. His message was heard by an audience that listened to every word and applauded him heartily.

A. J. Moorshead, veteran Illinois operator and president of the Madison Coal Corporation, made an appeal for stronger organization among operators even in regions where conditions seem widely variant. In such cases, as in his own state, he urged that at least the officers of all the groups be associated so that the producing regions of the country could be bound into as strong associations as possible.

How to Get Lump Coal in Place of Slack

Adams Tries Union Co-operation and Instruction—Allais Wants Miner Paid on Similar Basis to Operator—Hatfield Relates a Return to Lump Scale and 6 per Cent Reduction of Screenings

AT THE close of the dinner on Tuesday a session was held to discuss the methods of blasting coal which would afford the largest percentage of lump coal. N. S. Greensfelder, presiding, read a paper written by H. C. Adams, of Chicago, president of the Peerless Coal Co., operating in the Springfield district of Illinois. At the Congress a year ago Mr. Adams led discussions on this same problem, and since then has attempted to carry out some of the ideas that he formulated at that meeting.

The Adams paper described the campaign of education that has been carried on by the Peerless company to get shotfirers to do their work properly. It has been productive of only meager results but still enough to convince Mr. Adams that such an effort is well worth while. It will be carried further.

He first sounded out the union labor officials and found that they were willing to back him up in enforcing that clause in the labor contract requiring the men to shoot the coal in such a way as to produce the lowest proportion of screenings. Then he chose some of his best men to instruct the others, and attempted to follow it up. A few miners were discharged for failure to



Not All the Slack Is Mine Made

Long conveyors often add to degradation. The handling at the tippie, however, frequently without conveyors, is far more harmful than any such transportation. The work of eliminating slack should start at the face and be followed painstakingly to the railroad car—a trip any superintendent might make with advantage, visualizing on the way the tribulations of a lump of coal.



Car of Straight Creek Coal from Bell County, Kentucky

This product is evidently screened coal. There is no really large coal among it but what of that? Large lumps have to be broken to smaller size by the consumer and he thus gets slack which he has paid for as lump.

co-operate. But on the whole the benefit was only temporary.

The overshooting of coal, he thinks, is the operators' fault for previous failure to enforce the contract and to give miners proper instruction. Education is the only way out. He blames solid-shooting operators for not making careful studies of their coal structure so as to determine best shooting methods.

Some concentrated effort in the East is being made to improve shooting methods. It was described by J. E. Crawshaw and C. W. Nelson, of the Bureau of Mines. Exhaustive experiments were made at the Naomi mine of the Hillman Coal & Coke Co. all winter as a co-operative effort between the Carnegie Institute of Technology, the Bureau and the Hillman company. It was shown conclusively that the percentage of lump passing over 1½-in. bar screens in that seam could be raised as much as 7½ per cent and powder consumption reduced 30 per cent. The tests will be described fully in *Coal Age*.

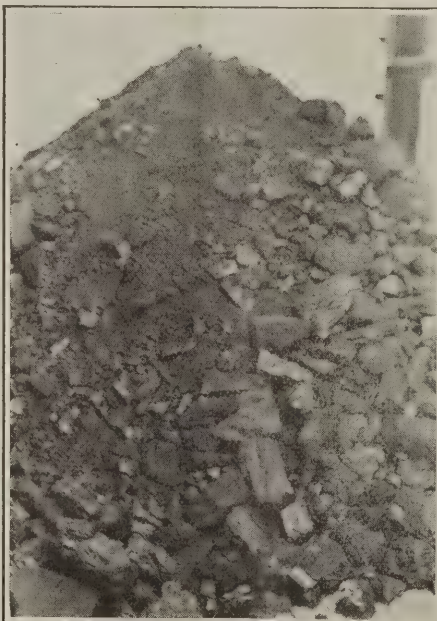
In the discussion of blasting that followed, A. L. Allais, president of the Columbus Mining Co., operating in Indiana and Kentucky, said that while education of miners of course would help a little, it still would be human nature for them to shoot coal down in the way that would reduce their own labor most, and therefore something further is necessary. He believes scales of pay should be changed so that lump shall be loaded out at one rate and screenings at a lower rate.

"That," said he, "is precisely the way the public pays the operator. What is good for the operator ought to be good for the miner."

J. S. Hatfield, of Cincinnati, interested his hearers by telling of a mine

in a non-union field that had actually gone back to a straight lump basis of pay a short time ago. The result at once was that 1½-in. screenings dropped from 40 to 34 per cent.

Shooting for machine loading was discussed briefly by W. J. Whaley, of the Myers-Whaley Co., of Knoxville, Tenn. For machine loading the whole face should be shot down at once so as



Pocahontas Coal on Deck of Ship at Lambert's Point Pier

This coal, like most low-volatile fuel, is friable though not as much so as is other low-volatile coal. As it is used for stokers its fineness is no fault. However there is plenty of larger-size material should it be desired to use it as a substitute for anthracite.

to give the machine as few movements from place to place as possible. Of course, this means a disadvantage as compared to hand-loaded mines where one end of the face can be shot down first and loaded out, leaving an open end which reduces the percentage of screenings for the next shot. To overcome this, he suggested the use of an air snubbing wedge with which the snub cut could be made without making much "bug dust." He proposed that the machine loader mine be organized so that all drilling and snubbing be done by two men working ahead of each machine. It always pays, he said, to delegate such work to a specified pair of men so that they may be held responsible for it.

Gas Proves to Be an Active Rival of Anthracite

By W. M. CARPENTER

Engineer, Empire State Gas & Electric Association

Anthracite is steadily increasing in price and at the same time declining in quality. Following long years of steady prices, where domestic coal continuously sold around \$5 at the New York harbor piers and the average price at the mines was under \$4 a ton, the upward climb began in 1916 at an average increase of 18 per cent each year, so that now the price of domestic coal stands above \$9 at the mines and retails at New York in the neighborhood of \$15.

SHOWS LARGE RATE OF INCREASE

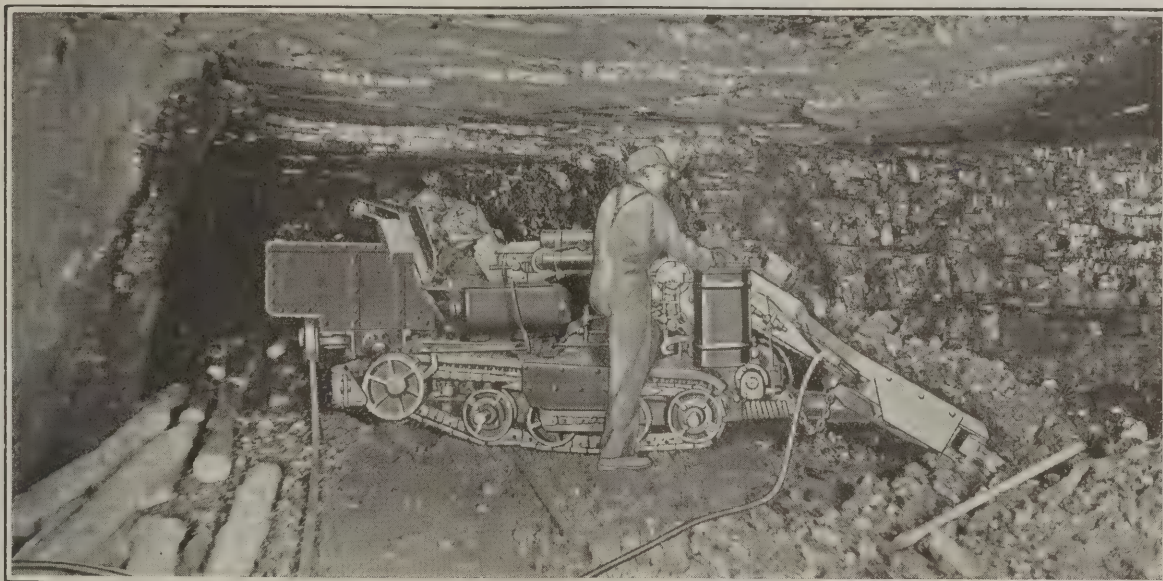
Of all the multitude of articles listed by the U. S. Department of Labor no other commodity in this country has shown such a continuous and extravagant rate of increase as have domestic sizes of anthracite, and the end is not yet apparent. Coincident with these strides in the cost of hard coal a similar increase has been manifested in the use of manufactured gas for heating. The curves of the retail price of anthracite and the domestic consumption of gas show a parallel which is little short of uncanny.

In 1910 the per capita use of anthracite in New York State was 1.75 tons a year and the consumption of gas 6,500 cu.ft. In 1923 there was a 94 per cent rise in the price of coal over 1910 and a 95 per cent increase in the use of gas. The annual per capita use of anthracite has now dropped below 1.50 tons where gas consumption per capita has risen to over 10,000 cu.ft. It has been estimated that the 75c. added to the retail price of hard coal because of the "settlement" of last September's strike will automatically sell—without any effort whatsoever on the part of the gas companies—over 7½ billion cu.ft. of manufactured gas in New York State alone.

Abstract of address delivered at the Binghamton meeting, the Empire State Gas & Electric Association.

Allowable Sweep in Wood Poles

Length of Poles, Ft.	Maximum Sweep, In.	Length of Poles, Ft.	Maximum Sweep, In.
30	10	55	11
35	10	60	12
40	10	65	13
45	10	70	14
50	10	..	..



What the Mechanical Loader Can Do and How It Has Been Brought to Its Present Perfection

Loading Machine No Longer Experimental—All Machines Succeed Only in a Mine Slightly Changed to Accommodate Them—Record of Pocahontas Fuel Co.—Dangers of a Premature Scale—Sizing and Cleaning Problems

Record of Advance in Mechanical Loading

"COAL companies," said Howard N. Eavenson, chairman of the meeting to discuss "Correlation of Mechanical Loading with Haulage and Mining Systems," "seem to think that the inventor of loading machines should develop equipment that would step into the coal mines and do its work without making any change whatever in the methods and organization hitherto in use." Mr. Eavenson estimated that there were about twenty different kinds of loading machines that had been used at some time or other and which had reached various stages of development. Three, at least, of these have been used on a commercial scale.

Mr. Eavenson recalled how difficult it was to introduce the electric locomotive. The roads were built for mule haulage, and operators thought the electric locomotive should be able to use the same weight of rails, the same size ties, the same roadbed, and roadways as crooked as were customary with mule haulage. But in this they soon were disappointed. The new transportation machine had first to revolutionize tracks and roadways. He said that in his opinion the loading machine was about as well-developed as was the shortwall undercutter some twelve or fifteen years ago. The mechanical loader was ready to do its work, but the mine had not yet been adapted to its operation.

D. J. Carroll, chief engineer, Chicago, Wilmington & Franklin Coal Co., said that the history of coal-loading ma-

chines dates back to about 1905, when Mr. Hamilton of Columbus, Ohio brought out the first elevator conveyor type of loader. At that time J. Elwood Jones was working on a loader which is still operating.

In 1908, the Myers-Whaley Co. introduced its machine which loaded out coal successfully. The coal-mining fraternity was not at that time ready for a loader; a contractor wanted to muck tunnel rock and observing the loader in operation, he introduced it into the contracting business. Since then these loaders have been used extensively in connection with big tunnel work.

In 1912 the Jeffrey Manufacturing Co. brought out the entry-driving machine. Its first application, as far as Mr. Carroll knew, was in Old Ben No. 9 Mine in the southern Illinois field. It operated there only a month, and owing to mechanical defects it was not altogether successful. In 1918 it was used in Valier, Ill. and was found quite satisfactory, but had to be abandoned owing to trouble with the Union. No satisfactory rate could be obtained for its operation. Carl Scholz used the machine later in West Virginia with more success.

In 1920 the Chicago, Wilmington & Franklin Coal Co. bought a Joy shovel but held it a year till Orient No. 2 came into service, fear of labor difficulties making it advisable not to introduce it in Orient No. 1. Several more Joy machines and three Myers-Whaley shovels were purchased later, and they have been in operation loading each day 1,200 tons of entry coal in eight hours.

The records of the company are not

as yet satisfactory, for the machines cannot be worked more than 50 per cent of the time owing to switching delays, lack of track facilities and time lost waiting for shots. Nine Joy and four Myers-Whaley loaders are now in operation. Though the machines have not exhibited how much they can load, they have been extremely valuable, for with them 100 per cent more entry has been driven than could have been done with hand loading.

In response to W. L. Robinson of Cleveland, Ohio, Mr. Carroll said that no labor scale had been established. The scale in Illinois is based on the rate paid in 1913 when the Jeffrey entry-driving machine was introduced into the Old Ben Mine, which is \$8.54 a day. The rate is being discussed with the United Mine Workers and it is expected that a scale ultimately will be fixed. No tonnage rate has been set. All men operating the machines are paid by the day.

J. F. Joy, on being interrogated, said that there were 200 Joy loaders in use, 16 in Illinois, 30 in Indiana, 20 to 25 in west Kentucky and the rest located in the prairie country. None are in Tennessee or Alabama, but they are working in the Rocky Mountain Coal Fields, in Pennsylvania, western Kentucky and Ohio. Mr. Whaley said that the Myers-Whaley company had about 40 machines in the coal mines. Asked as to the saving effected by the operation of his machines, Mr. Joy said that the only knowledge he had was from an operator in West Virginia who claimed that he could load with his Joy



Fig. 3—A Large Shovel at Work

Shoveling machines will do much to increase the size of mine cars as it takes no longer to shift a big car than a small one. Best work will be done by a mining machine when a whole trip can be loaded without uncoupling a car of the locomotive. Room and pillar mines may be so laid out as to accomplish this result. This permits the machine to work a large percentage of the time and secures large output from a small area.

loader at about 30c. per ton less than by hand loading. This was based, he believed, on the 1920 wage scale.

W. J. German said that the Pocahontas Fuel Co. had 23 coal-loading machines and last year loaded 998,000 tons by machine. At Big Branch the company has three machines which among them loaded 1,100 tons every day. It is having less trouble with its loading machines than with its main-line and gathering locomotives, which speaks well for the construction of the machines. The company's figures show they have less accidents per 1,000 tons loaded by machines than they have with hand loading. At the mine mentioned there are no miners, all the work being done by machine.

For the last two months they have had machines at work that are only 44 in. above the rail. The mine is run by room-and-pillar, one car being loaded at a time. The machine used is the "Coloder," made by the Coloder Manufacturing Co., Columbus, Ohio. The only coal company using them is the Pocahontas Fuel Co. It mines the Pocahontas No. 3 seam which runs at this plant from 6 to 7 ft. thick and has the usual parting which has to be removed.

Drawslate Does Not Prohibit

There is also a drawslate running from 3 to 10 in. thick. This has to be brought down and removed before the machine begins to load. Fortunately it is not found everywhere in these workings. In most places it comes down with the coal when shot. Success has been obtained largely because the company is determined to make the machines successful. Mr. German added: "The company must be sold on the idea before the machine will be a success."

R. A. Walter, consulting engineer of New York City, said that a series of observations on these machines showed a daily average of 585 tons for one machine, the test extending over several months. Mr. German added that Mr.

Jones had said to him that anyone who wanted one of his machines could have it by paying for it. The company has been working for fifteen years developing this machine and they believe it is still far from its ultimate development. They are building now solely for their own use, but anyone who wants one can purchase it.

Only One Man Has Been Injured

Mr. Eavenson said that he had been informed that up to about a year ago only one man had been injured when at work at the machines since they had been installed. He added that the company had been getting more and better coal from the pillars with the machines than by hand. They were able to do this because they excavated the coal more rapidly than could be done by manual methods. This, Mr. Eavenson believed, was true of all machine loading because a machine can do in an hour as much as two men in a whole shift. In consequence when in a dangerous place the coal can be withdrawn so fast that the roof breaks where it does not endanger the men and timbering does not have to be done so frequently.

Mr. Smith, of the Illinois Coal Corporation, indorsed Mr. German's insistence on the importance of having the coal company back of the machine. He hoped, however, that in their anxiety to get the mechanical loaders working satisfactorily, the officials of the coal companies would not make unfavorable working conditions that could not be broken throughout the life of the industry. Years ago the meager performances of the earlier mining machines set the rate for those which followed. The shortwall undercutter has been introduced since then and so have arcwall machines. However, they have never achieved as much for the industry as they might have done, for their production has been restricted to the performance of the earlier breast machine.

Where Loading Machines May Defeat Their Purpose

SEVERAL loading machines are idle, said Thomas F. Downing, Jr., general manager of the Logan County Coal Corporation, because the operator forgot that he would have to clean his coal and would have to obtain salable sizes, and the loading machine prevented him from doing this effectually. The fault is not with the machine but with the operator who failed to give proper consideration to this problem and chose the wrong machine for the particular seam he had to market.

One may save 20c. in the cost of loading, but the advantage thus gained must be obtained without losing that 20c. by decreasing the percentage of lump and egg which is produced for the market. The relative percentage of large sizes may readily be decreased 10 or 15 per cent, and if that occurs the operator has lost in one way what he has gained in another. Preparation begins at the face where the coal is shot down and even with the undercutter that precedes the shot.

Many operators have laminated beds of coal and cut in different parts of the seam. They may cut right under the lamination and pry the lamination loose and then load the upper bench. If they are going to use a loading machine they will have to satisfy themselves that they can find one that will load out the coal as it is loaded out by hand before they invest in such a machine, or they may find that they are unable to keep the impurities out of their product. Mr. Downing said he knew of no machine on the market that would do that satisfactorily.

When loading machines are used the operator must shoot down the whole seam. When he does that he is in dire trouble. Some manufacturers declare that with their machines the coal can be cleaned inside the mine. Perhaps some picking can be done underground, but most of it will have to be done above ground, and it will be necessary to provide the equipment to haul the impurities to the surface, separate them on the tippie and dispose of them when they have been separated.

Before deciding whether you can afford to load the refuse you have in the mine with the coal, pick out four or five places in the mine, have them shot in the same way they will be shot for machine loading, bring the coal out in the cars with the impurity it will contain when so loaded, run it over the tippie, have extra hands to pick it and wash it. Then you will be able to tell whether it is practicable for you to use machinery for loading your coal. Your tippie may be run intermittently and by storing your coal and running the picking tables slowly you may be able to clean the coal without new equipment or more men.

Some have said that if you break up the coal loading it mechanically, prepare more sizes, but one of the curses of the anthracite field is the number of sizes. I don't think the bituminous field should make the mistake of introducing such meticulous sizing into its market, which in most parts of the country is still free from it.

What Will It Cost and What Must Be Done to Keep Coal Mines Free from Dust Explosions?

Bright Claims Five Tons of Dust Should Be Distributed per Mile—Deike Says 1.8 Tons Will Serve After Roads Have Been Once Treated—Fear's Shale Costs \$3.70 per Ton

THE Friday afternoon session of the Cincinnati Exposition meeting, which George S. Rice termed "the first national gathering entirely devoted to rock dusting," was attended by about 150 men. John E. Jones, safety engineer of the Old Ben Coal Corporation, as chairman of the meeting, had suggested that the discussion of all papers be saved until last.

J. W. Paul was unable to be present, but he presented a paper on "Occurrence, Characteristics and Behavior of Coal Dust," which was read by Graham Bright. John E. Jones read an address entitled "Actual Experiences with and Tried Methods of Applying Rock Dust."

George Deike, president of the Mine Safety Appliances Co., read a paper on "Methods of Procedure," by John T. Ryan who was not able to attend because of sickness developed while aiding in the exploration work in the Benwood mine. A comparison of the inefficiency of water and the effectiveness of rock dust as means to prevent the propagation of coal dust explosions was made by Edward Steidle, supervisor of the Co-operative Mining Department, Carnegie Institute of Technology, in a paper on "Rock Dust vs. Water." Finally George S. Rice wound up the presentation of the problem by talking on the "Co-operation of the U. S. Bureau of Mines," in which he reviewed the past work of the Bureau and suggested what might be expected of it in the future.

BRITAIN'S MINES ARE DRIER

Mr. Rice pointed out the differences between the mines of this country and those of Great Britain, which influenced the latter country to go to rock dusting. Generally speaking the English mines are drier than ours, for which reason much water was required to hold down the dust. The application of water in large amounts to roof and ribs of the English mines caused spawling, with the result that the mines were rendered dangerous.

He advises every operator to experiment with rock dust to determine the best procedures to follow and to find out the relative cost as compared with that of sprinkling or humidification. Mr. Rice believes that in practically every case rock dusting will cost less than thorough watering.

Mr. Rice sees in mechanical loading the elimination of one of the biggest factors in the origin of coal dust. Mine cars loaded mechanically will not be cribbed high above the sides, to cause the spillage of coal by irregularities in the track or in the movement of a trip. Rock dusting does not remove entirely the necessity for the use of water, for

the latter should be used as an added safety measure in sprinkling trips and wetting down that part of a face in contact with the cutter bar of a cutting machine.

The U. S. Bureau of Mines has co-operated in the past by assisting individual companies, notably the Old Ben Coal Corporation, in testing and analyzing samples of coal dust and offering its experiences otherwise in the solution of problems relative to rock dusting. The Bureau is ready to aid any or all companies in applying rock dust and requests that its advice and service be sought.

L. P. Tracy announced that the Illinois Geological Survey is getting out a bulletin on the location of limestone measures in that state. This bulletin will be ready for distribution in a month or two; all those desiring a copy should write to the experimental station at Urbana, Ill.

WETTING IS MORE EXPENSIVE

Graham Bright took issue with some of the figures contained in John T. Ryan's paper. For instance, he said that Mr. Ryan appeared to be entirely too optimistic in saying that limestone dust in small quantities can be produced at \$1 per ton. The cost given for applying the rock dust also seems low and therefore the total cost of 0.44c. per ton of coal mined is hardly sufficient, according to the remarks of Mr. Bright, who based his remarks on conjecture alone. He is satisfied that if the cost of producing and applying rock dust is not more than 1c. per ton of coal mined, operators will be willing to adopt rock dusting. Certainly the average cost of wetting and humidification is greater.

The quantity of rock dust to be distributed, 1.8 tons per mile, as suggested by Mr. Ryan, did not meet with the approval of Graham Bright, who said that John E. Jones recommends 2 lb. of rock dust per linear foot of entry, or about 5 tons per mile. Mr. Bright closed his remarks by hoping that compensation rates will be reduced for all mines using rock dust. A reduction of this sort would be an impetus favoring the adoption of rock dusting in other mines.

George Deike answered several of the questions raised by Graham Bright. He said that the charge of \$1 per ton for crushing limestone to dust is based on the employment of no extra labor aside from that expended on a part time basis by regular outside company men. The quantity of 1.8 tons per mile represents the average quantity of rock dust required in each application when dusting is done systematically and at regular intervals.

Thomas Fear, general superintendent of the Inland Collieries Co., briefly stated his experiences with rock dusting extending over a period of three months. The Indianola mine has a capacity of 3,000 tons of coal per day. Entries and crosscuts total about 64 lineal miles. The usual rule is to apply 2 lb. of rock dust per lin.ft. of entry. Two men can apply about 4,000 lb. of dust per hour or 14 tons per shift, over a distance of 14,000 lin.ft. Shale taken from the roof of his mine is crushed on the job at a cost of \$3.70 per ton (not \$1 as given by Mr. Ryan). Mr. Fear believes that the total cost of applying rock dust per ton of coal mined will be no more than 4c. He expects to get credit for rock dusting in his compensation rates.

Experiments in the application of rock dust in the Indianola mine proved to Mr. Fear that with the particular types of distributing machines used (two kinds, fan and compressor types) the end of the nozzle should be held from 20 to 36 in. from the surface to be coated with rock dust. There is a definite relation between the characteristics of the distributor and the distance that the nozzle is held from the surface to be coated. An experienced nozzle man can apply a coat of rock dust to roof and ribs as much as $\frac{3}{4}$ to $\frac{5}{8}$ in. thick.

The desirability of heavily coating the ribs and roof was pointed out by Mr. Fear. He said that the floor represented approximately only one-fourth of the periphery of an entry. Though most of the rock dust tends to settle on the floor, an attempt should be made to coat the ribs and roof heavily, where it is undisturbed by the movement of haulage.

ROCK DUST IN STEMMING HELPS

Rock dust used in the stemming of shots adds safety to the blasting of coal. The rock dust is so fine that little of it is loaded out with the coal. It mingles with the coal dust. About 10 lb. of rock-dust stemming is used in each 6-ft. cut.

George Rice asked if the coating formed by rock dust on ribs and roof would retard the rate of weathering or spawling. Mr. Fear believes that it will have this effect. In his Indianola mine he expects to have less trouble with the roof which is bad, by the substitution of rock dust for water, and he is certain the cost of the former is considerably less than the latter.

Chairman Jones checked Mr. Fear's estimate that 4c. per ton of coal mined will cover the cost of applying rock dust. He said that is the actual cost for applying rock dust along 122,270 lin.ft. of entry in one of the Old Ben mines.

National Coal Association Elects S. P. Hutchinson President at Cincinnati Convention

In Quiet but Heavily Attended "Town Meeting" Sessions
It O. K.'s Mellon Plan of Tax Reduction, Pats Coolidge
on Back, and Hears Many "Outsiders" on Coal Problems

A "TOWN MEETING" style convention of National Coal Association in Cincinnati, Ohio, May 14-16, gave that body of bituminous coal operators a chance to speak its mind. Not much was said but the association did register, on the one hand, its approval of the Mellon plan for tax reduction and of President Coolidge's veto of the bonus and pension bills, and on the other hand, its disapproval of governmental interference in business, of the proposed plan for publicity of tax returns, the proposed surtax on undistributed corporation profits, and of the Coal Commission's suggested scheme for changing the basis of mine-car ratings.

The convention was not filled with big issues or fighting points. Main interest centered about the election of S. Pemberton Hutchinson, of Philadelphia, as president to succeed J. C. Brydon, who retired amid plaudits of the operators for the services he has rendered during the past year for the association and as chairman of the Bituminous Operators Special Committee.

The only contest for official position came on the floor of the convention when F. S. Love, of Pittsburgh, Pa., was nominated as a fifth candidate for the four directorships at large. The four nominated by a committee for the purpose and later elected were W. H. Cunningham, E. L. Douglass, Phil Penna and P. J. Quealy. In the voting the first three of these received almost the unanimous vote of the membership, while Mr. Quealy got 750 and Mr. Love 362. However, in a later session, Mr. Love was chosen a Pennsylvania director to succeed Mr. Brydon, who, as retiring president, automatically became a director ex-officio, thus leaving an unexpired term.

Association Sound Financially

The association was able to show that it had done a good deal of work during the past year at a minimum of cost, and assurance was given that no special assessments over the regular one mill assessment are contemplated during the coming year. The financial report showed the association to be in sound condition and the membership report indicated that had it not been for the recent withdrawal of the entire Southwestern Interstate Coal Operators' Association with its 125 member votes, the total membership would have been enlarged over the previous year.

Registration was heavier than it ever had been at any previous convention, a fact that must be credited in part to the presence in Cincinnati of the American Mining Congress meeting and machinery show, which ran simultaneously. The programs of both were arranged so as not to conflict. They touched at

one or two points, such as the "get together" dinner on the night of May 13 and at a luncheon of the Congress May 15, at which H. N. Taylor and W. H. Wright spoke.

There were many good words during the convention for Harry L. Gandy, executive secretary for the association, who has finished his first year with the organization and was re-elected with a spontaneous show of approval.

"LEAVE CAR RATINGS ALONE" SAYS NATIONAL

The National Coal Association, at its convention in Cincinnati last week, took a stand against any change in the present system of rating mines to receive cars, stating that the association "was opposed in principle to the use of a commercial factor in the rating of coal mines" as the U. S. Coal Commission suggested.

The resolutions committee had brought in a resolution favoring tax reduction without naming the Mellon plan. But T. W. Guthrie, of the committee, rose to insist that it be named. H. N. Taylor, also of the committee, and C. E. Bockus, chairman, explained that while probably all the members of the committee believed in the Mellon plan and could well campaign for it as individuals, yet it might be impolitic for the association, as such, to single out any one bill aiming at the desirable object of lower taxes. It might cause needless irritation in certain quarters in Washington.

The amendment was adopted by a vote of 16 to 12 and the resolution was passed.

In the opening session the morning of May 14 President Brydon, after a year of service, delivered a report without specific recommendations except suggestions that the association keep up the work it has been carrying on, to study labor conditions continuously, to compile facts about coal regularly, keep up the public educational campaign, and be prepared for any contingency that may arise. His recommendation last year that the presidency be put upon a full-time salary basis was not adopted by the directors last autumn because it was felt that expenditures should be kept at a minimum and because the executive secretary was able to assume many of the duties that might have devolved upon the president.

Mr. Brydon reviewed the work of the Bituminous Operators' Special Committee which served during the time of the U. S. Coal Commission's life. It submitted to the commission no less than sixty briefs setting forth the coal

industry's case. He spoke also of the plan worked out by the association last summer for emergency distribution of bituminous coal—a plan which can be put into effect whenever the necessity arises. He reported that the publicity efforts of the association had resulted in the sending out of 429,000 copies of briefs submitted to the Coal Commission and of Commission reports.

Incidentally he announced that the association is about ready to issue an annotated edition of all the reports of the commission—two 1,000-page volumes.

Harry L. Gandy, executive secretary, in his report spoke of the retrenchment program of the association and of its determination to give the members a maximum of service at a minimum of cost. The association maintains no continuing counsel, he said, yet the employment of counsel in such matters as the defense against Federal Trade Commission demands saved the operators of the country more than the defence cost.

Although various further reductions in expenditures will be made, he said it is necessary to keep up most of the statistical work of the association in order to meet the frequently arising need for exact and satisfying data on coal that is requested from so many sources and which has been used so effectively during the past year in the country-wide campaign of education.

He recommended that the association conduct systematic researches to place before the industry and the public approve modern methods of combustion and proper combustion appliances. Mentioning the publicity work he said *Coal Review*, the association's magazine, has lost money but that it has served a purpose and has saved the cost of issuing bulletins that otherwise would have been necessary.

The association is still operated on its ordinary 1-mill assessment and he gave assurance that no special assessments are in prospect. Increased revenue, if any, he said would come from increased membership.

The foreign trade committee reported with pleasure that Section 28 of the Merchant Marine Act will not take effect next month, as originally ordered. On May 8 the U. S. Shipping Board withdrew its certification from the Interstate Commerce Commission and that commission will cancel its order to the railroads. This leaves Section 28 under suspension indefinitely. This section provided that in order to get the benefit of the export rail rate to tidewater, goods exported had to move from the port in an American ship.

W. H. Cunningham reported for his committee on government relations,

mentioning its watchfulness over the legislative matters at Washington, which included scanning 227 bills of interest to coal and active participation in hearings on two. The May 7 hearings before the Mines and Mining Committee in the House on the general question of mine safety moved the committee to say this: "Opinions from the field indicate that while keenly appreciative of the necessity for carrying on mine safety work and education, yet local conditions should and do govern safety orders, and that it is hardly probable general orders could be issued from Washington or any other central point that would properly apply to the entire country, even if it be established that such a centralization of authority would be legal."

Publicity work for the year was of two classes, according to the report of C. E. Bockus, chairman of the committee on publicity. It covered publicity for the Bituminous Operators' Special Committee and regular association publicity. The first cost \$80,000, including \$22,000 for the speakers' bureau.

A brisk and interesting address on the service of trade associations was delivered by R. S. Kellogg, of New York, secretary of the News Print Service Bureau. He said such associations are needed keenly in an industry like that of coal, where there are so many small units and such diversity of interests among operators. A trade association is of service both by setting standards of commodities and practices and by gathering and setting forth facts to guide legislation and public thought in the best interests of the industry and the country.

At a final meeting and luncheon of directors, Charles W. Connor, of the Northeast Kentucky Coal Operators' Association, was chosen from that district to succeed E. L. Douglass. There was no Wednesday afternoon session so as to avoid conflict with the American Mining Congress meetings afternoons all week, but that evening Secretary Gandy delivered an address to the public on coal, its comparative inex-

haustibility and service to the people.

A good deal of outside viewpoint on coal was brought to the convention in the Thursday morning session, when speeches were made by President Samuel B. Crowell of the National Retail Coal Merchants Association; John Lee Mahin, head of a New York advertising agency; Melville E. Stone, president of the Associated Press, and George H. Cushing.

After 38 years in the coal business, not only as a retailer in Philadelphia but also as an operator and wholesaler, Mr. Crowell, speaking on "Our Customers," said they are really the employers of both producers and retailers and that both should join in thought and energy to hold the good will of those consumers.

From the retailer's standpoint he urged that as an economy measure the number of sizes of bituminous coal marketed be reduced. He appealed to the operators to devise some system of labor relations so that the supply of coal to the public will not be shut off every time there is a disagreement between miner and mine owner.

He advanced once more his idea for a "coal institute" backed by all the factions of the industry to better educate the public in matters relating to coal and to improve the economics and the methods of the industry.

Marketing of coal ought to be regarded with more foresight by the coal industry, according to Mr. Mahin, who is president of the Federal Advertising Agency. The industry may be too prone to listen to the opinions of men who consume coal directly. Instead, it should look beyond to the people who make use of the energy which is in the coal. It is the user of the railroad—the one who actually profits by the energy in the coal which the railroad consumes—who makes the coal market. Therefore, the coal industry should look broadly to him and cultivate him in order to merchandise properly the fuel it produces.

The head of the Associated Press, one of the world's greatest agencies for

collecting and disseminating news, contended for better co-operative effort between employer and miner.

Both operators and miners ought to recognize that they hold a trusteeship for the public. They have no right to exercise monopolistic control of the coal this country needs, and neither of them should be monopolistic in their own division of the work of the industry. He believes in competition, in the labor of coal digging, and in the selling of coal just as he does in the gathering and handling of news.

The complete list of new officers and the list of directors chosen to fill this year's expiring terms follow:

President, S. Pemberton Hutchinson, president of the Westmoreland Coal Co., Philadelphia, Pa.; vice-presidents, Ira Clemens, president, Clemens Coal Co., Pittsburg, Kan.; Michael Gallagher, general manager, M. A. Hanna Co., Cleveland, O.; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago, Ill.; Walter Barnum, treasurer, Pacific Coast Co., New York, N. Y.; treasurer, C. E. Bockus, New York, N. Y.; executive secretary, Harry L. Gandy, Washington, D. C.

Directors-at-large: E. L. Douglass, Cincinnati, vice president, First Creek Mining Co., Kentucky; Philip H. Penna, Terre Haute, Ind., secretary, Indiana Bituminous Operators Association; Walter H. Cunningham, Huntington, W. Va., secretary, West Virginia Coal Operators Association; P. J. Quealy, Kennermer, Wyo., president, Gunn-Quealy Coal Co.

The following district directors were chosen: George B. Harrington, Chicago; L. C. Madiera, 3d, Philadelphia; George H. Tytus, Columbus; Walter Barnum, for Washington State; C. E. Bockus, New York City; Ira Clemens, Pittsburg, Kan.; M. L. Gould, Indianapolis; T. W. Guthrie, Pittsburgh, Pa.; W. H. Huff, Denver; W. F. McGeath, Omaha; T. F. Farrell, New York City; J. G. Puterbaugh, McAlester, Okla.; C. W. Taylor, Greenville, Ky., and S. L. Yerks, Birmingham, Ala.



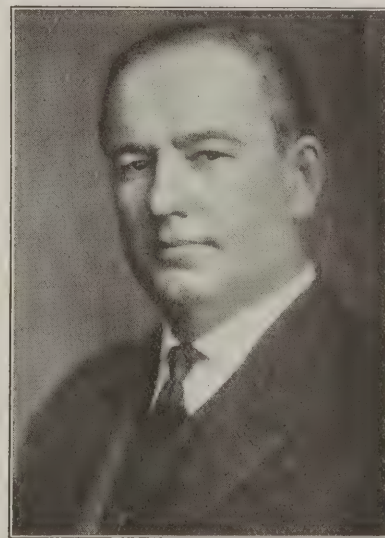
Walter Barnum

Director of National Coal Association, Resident of New York and Seattle, Connected with Pacific Coast Coal Co.



S. Pemberton Hutchinson

Newly Elected President, National Coal Association, and President, Westmoreland Coal Co., Philadelphia, Pa.



Harry L. Gandy

Re-elected Executive Secretary, National Coal Association, Former Representative in Congress of South Dakota

New Equipment Shown at Cincinnati Convention

Many New Devices Making Mining Safer or Cheaper Exhibited—Pumps, Car Greasers, Track Equipment, Locomotives, Cars and Car Dumps Among Major Items—"Side Show" Attracts Much Attention

BY FRANK H. KNEELAND
Associate Editor, *Coal Age*
New York City

IN ORDER to enter the Convention Hall at Cincinnati, it was necessary for the delegates to pass into the Machinery Exposition. Here the booths of the exhibitors were arranged upon either side of three long aisles, with breakthroughs between them at suitable intervals, so that it was unnecessary for the visitor to pass to the end of an aisle in order to gain admission to another.

Although a vast amount of equipment and machinery useful to the coal producer was on display, no attempt will be made in these pages to describe or even enumerate all of the exhibits. Volumes might be written on such a subject without exhausting the possibilities of the show. It will be rather the intention here to take up briefly those pieces of equipment and devices that are new to the coal industry and which, therefore, are of particular interest to coal mining men. We will, accordingly, pass along the booths in approximately the order in which they were numbered, noting the various items or new equipment and apparatus as found.

In space 3, which was shared by the Roberts & Schaefer Co. and the American Coal Cleaning Co., G. R. Delamater had on exhibit what is known as the Delatester. This is an apparatus invented by the exhibitor who devised it as a ready means for quickly and

simply applying the float and sink test to coal. It is shown in Fig. 1. In this apparatus a complete separation of free pieces of coal from free pieces of slate or other impurities can be made by means of a solution that will float the coal but allow the impurities to sink.

The float and sink test is made by mixing a sufficient amount of granular commercial zinc chloride with water so that the resulting solution will have a specific gravity of, say, 1.60 and then depositing in this solution a sample of the coal to be tested and thoroughly stirring. Particles having a specific gravity of less than 1.60 will float, while those of a greater

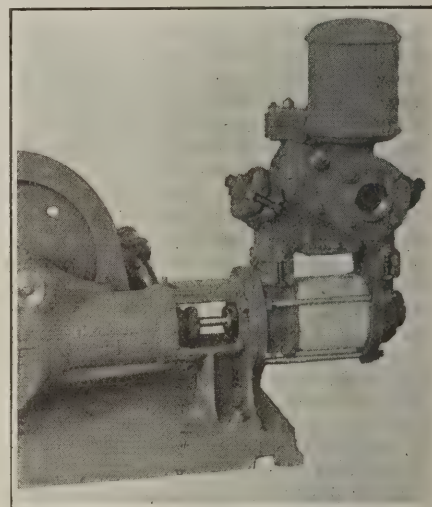


Fig. 2—Gathering Pump

The vitreous china cylinder of this pump is proof against the attack of acid. Other parts of this machine coming in contact with the water are of bronze or other acid resisting material.

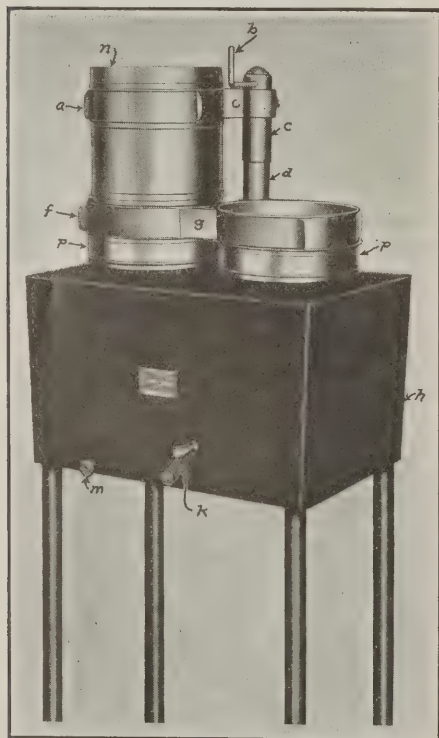


Fig. 1—Delatester Assembled

By use of this machine the float and sink test may be readily applied to a mixture of coal and slate to determine the possible advantages that may be derived from concentration, washing or other means for bettering quality.

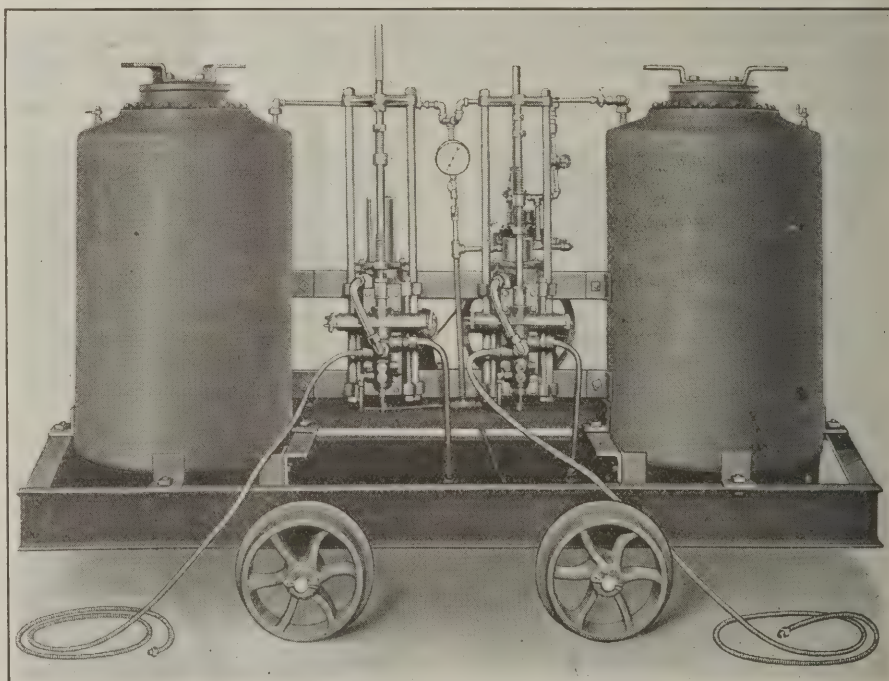


Fig. 3—Lincoln Car Greasing Machine

By means of this machine a measured charge of grease is forced into each car bearing. On test one man has greased the four wheels of a car in one minute.

specific gravity will sink. The percentage of material that floats may then be determined and this material analyzed for ash, sulphur, etc., in the ordinary way. The sink may be treated in a like manner.

Similarly tests may be made on coal samples using a liquid of any desired sepecific gravity down to, say, 1.30. Ordinarily, as the specific gravity of the liquid is decreased, the percentage of material that will float in it will also be decreased, as well as the ash content of that portion of the material which floats. The float and sink test may be employed for preliminary investigations to determine the extent of improvement possible through concentration methods, or for the control of coal cleaning plants in general. As may be seen, the Delatester is a simple apparatus that may be readily operated by

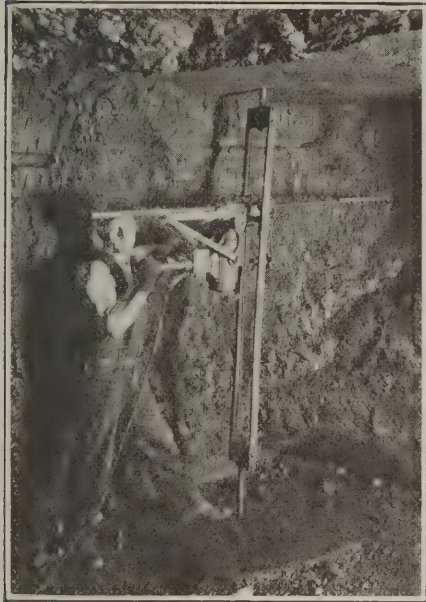


Fig. 4—Coal Drill at Work

The post mounting of this drill is little heavier than that necessary for a hand auger yet allows the drill to be operated at any height above the floor and at almost any angle, thus assuring correct placing of the shots.

ground to size inside with the ends faced off in a like manner. This is held in place by three long bolts extending between the front and rear cylinder heads. They not only hold the rear head in place, but clamp the entire cylinder to the pump frame. The two cylinder heads are joined to the valve chest by their upper flanges. The removal of five nuts (two from the bolts joining the rear cylinder head to the valve chest and the three from the tie bolts) permits the cylinder to be withdrawn. The piston is normally packed with square flax packing. The valves are of rubber working on bronze seats.

Although bronze was used in the metal parts of the pump on exhibition, for handling water of medium acidity cast iron parts might be employed. Specific advantages claimed for this pump by the manufacturers are: That the china cylinder being entirely immune to the action of acid, undergoes no deterioration in use



Fig. 5—Five Oxygen Cylinder Manifold

Although this manifold weighs only a few pounds and when taken apart may be packed in the regular tool kit, by making available the oxygen contained in five cylinders it permits the completion of a fair sized job without interruption.

almost any one after a little practice.

In space 10, the Deming Co. exhibited a mine gathering pump fitted with a vitreous china cylinder. This pump is intended for handling extremely acidulous water and is shown in Fig. 2. It is provided with a bronze valve chest, and in every other way made as nearly acid proof as possible. The cylinder or barrel is a plain straight cylinder or short tube of hard unglazed vitreous china,

except that arising from the friction of the piston. The china resists abrasion from grit in the water far better than would bronze, it being so hard that a fragment will readily scratch glass. No relining of the pump is necessary, and inasmuch as the cylinder may be turned in any desired position all of its inner surface may be worn away evenly.

The Lincoln Steel & Forge Co., occupying booths 15, 16 and 17, among other equipment showed its new car-greasing machine. This consists of two grease tanks of about 500 lb. capacity each, one of which may be used while the other is being filled or both may be used simultaneously. Two grease pumps are employed, both of which draw from either tank. A measured charge of grease is drawn into one of the pumps, the hose nozzle from this pump is inserted into the grease chamber of a car bearing and the grease cock opened. A measured charge of grease is thus forced, under pressure, into the bearings, after which a warning signal sounds and the grease cock is cut off. The machine is then ready for the next bearing without any appreciable wait.

The size of grease charge administered to each bearing is readily adjustable by moving a collar on the vertical piston rod. This adjustment takes but an instant to make and the charge may be varied between about $\frac{1}{2}$ and 2 lb. On test, a car (four wheels) has been greased by one man in less than one minute. The entire machine is mounted on a regular-gage car truck and may be taken anywhere, where mine track is available for its transportation.

The total weight of this machine with the tanks empty is about 1,400 lb., or approximately 2,400 lb. with both tanks full of grease. A single-tank machine is

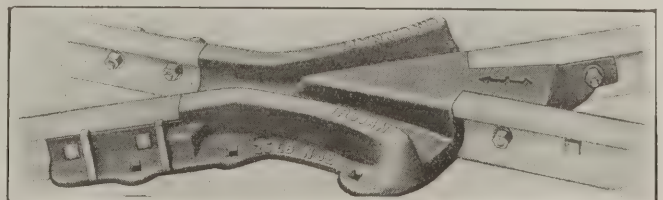


Fig. 6—Cast-Steel Mine Frog

This frog is made from a tough alloy steel intended to withstand over long periods the rough usage to which all mine track equipment is subject.

also made. The double-tank type, however, permits the greasing of cars from both sides of the track simultaneously, or the filling of one tank while the other is being emptied. An air compressor may be supplied on the machine, or air may be drawn from the mine air system if available.

In booth 38, the Chicago Pneumatic Tool Co. had on exhibition its Little Giant coal drill fitted with a portable post mounting. This machine is shown in Fig. 4.

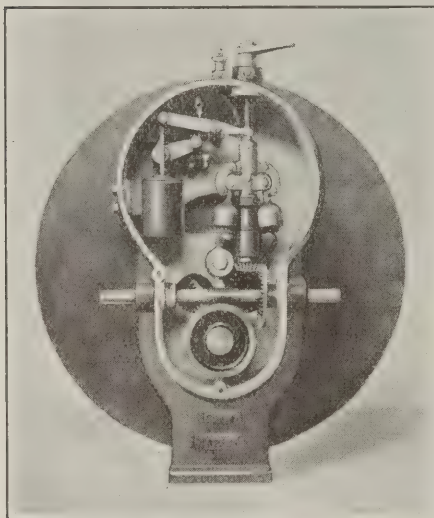


Fig. 7—Hoist Indicator

This is an overwind preventor and speed governor as well as a position indicator. Attachment to the hoist drum may be made upon either side.

change of augers in drilling the deepest shot-holes. It is unnecessary to remove the feed bar in order to change augers, as a split nut enables this bar to be slipped through it to its rearmost position. This saves much time both in setting up the drill and in changing augers.

The Oxweld Acetylene Co., occupying booth 40, among other useful devices had on exhibition its five-cylinder, portable oxygen manifold. This manifold is small and of light weight, designed especially for work in the field. By its use five oxygen cylinders can be connected together, thus supplying a sufficient amount of oxygen for a considerable job. This device weighs only 10 lb. and when taken apart may be carried in the tool kit.

In detail, this manifold consists of a hexagonal brass block with six connections, five for the cylinder and one for the regulator. Four of the five cylinder con-

The mounting here employed is especially designed for use with Little Giant drills. It is light in weight and can be readily set up by one man as quickly as a post for a hand auger. When in operation the weight of the drill itself is borne by the mounting, thus permitting the proper placing of top holes in high coal. The feed bar is 5 ft. long, which necessitates only one

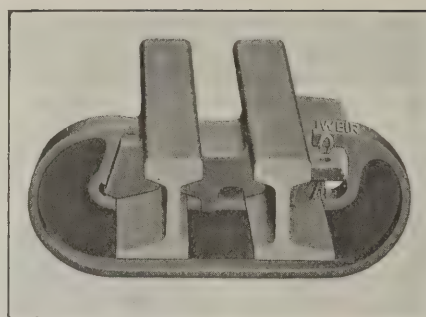


Fig. 9—Guard Rail Clamp

This clamp holds the guard rail securely in position without the use of either bolts or spikes.

nections are at the ends of flexible, double-coil copper tubes, while the fifth is short and rigid and connects the block directly to the valve of the cylinder, thus serving as a support for the entire manifold. The oxygen regulator is coupled directly opposite this rigid connection. When less than five cylinders are employed, the extra connections are closed by means of caps attached to the block by chains. A manifold of this kind is particularly useful in small shops that do not handle a sufficient volume of work to warrant a 10-, 20- or 30-cylinder manifold. This device is shown in Fig. 5.

In booth 57, the Cincinnati Frog & Switch Co., among other exhibits, showed its cast steel mine frog. This is illustrated in Fig. 6. The chief point of excellence of this frog is the alloyed steel of which it is made. This is an extremely tough metal intended to endure indefinitely the pounding and rough usage to which all track appliances in the mines are inevitably subjected.

In booth 65 the Duro Metal Products Co. had on exhibition several of its speed indicators for hoist engines, one of which is shown in Fig. 7. As may be seen, this is an extremely simple device, thoroughly protected from dust and dirt. The governor in this indicator is dampened by an oil dash pot, so that sudden changes of speed or jerks will not cause it to become operative and shut down the hoist prematurely. As may be seen in the figure, the drive shaft is available for connection to the hoist upon either side. The side chosen should be the one where best protection is secured and where it will be out of the way of workmen. As a rule, this controller must be positively driven in a proper ratio from the hoisting drum shaft. Steel roller chain and cut steel sprockets are employed for this purpose. The standard drive speed is 130 r.p.m. and the gears employed are arranged to afford a maximum amount of dial movement for the full travel of the cage.

Booth 71 was occupied by the Rail Welding & Bonding Co. The bonds used by this firm instead of being

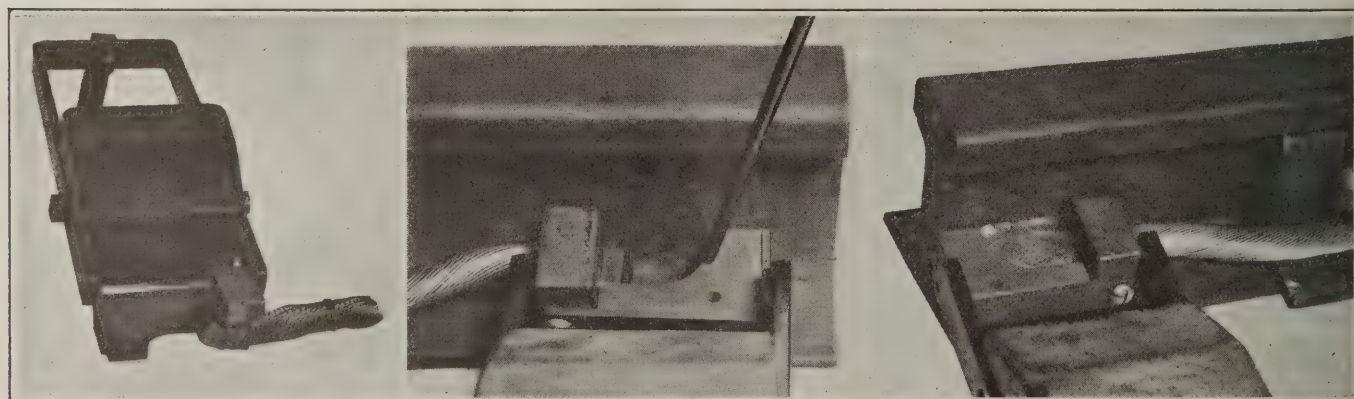


Fig. 8—Brazing a Bond to the Rail

First the terminal is gripped in a mold which is fastened in proper position. Next the electrode is fed down until the mold is full of molten metal. This is allowed to cool before the mold is removed. In this way the bond is effectively brazed to the rail and a good electrical contact made.

welded, steel to steel, on the rail are attached by what practically amounts to a brazing process. As may be seen in Fig. 8, the ends of the bonds are clamped in a suitable mold after which a metal electrode of the proper composition is applied until the mold is full of molten metal. This adheres to the bond terminal and likewise to the rail. The contact area between bond terminal and rail secured by this means is from four to six times the cross-sectional area of the bond cable. This furnishes a large factor of safety and is an excellent electrical connection because the copper bond head is welded or rather brazed direct to the steel rail.

In booths 74 and 75, the Weir Frog Co. showed its Titan guard-rail clamp intended for light rails. This clamp is shown in Fig. 9. It consists of a yoke of heavy forged steel shaped to fit the rails and a steel key tapered where it fits the yoke. When this key is driven up tight, there is no chance of the guard rail rolling or tilting out of position. No spikes, bolts or rail braces are necessary with this clamp. It is now manufactured in sizes to fit rails weighing from 25 to

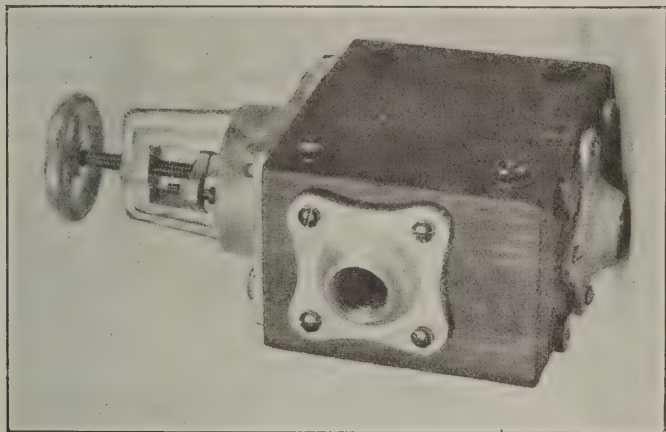


Fig. 10—Acid-Resisting Valve

All parts of this valve coming in contact with the water are made of wood or rubber. Extremely acidulous water accordingly may be handled by it without injury.

45 lb. per yd., and is especially adapted to tracks where motor haulage is employed.

A decidedly unique device designed to contend with extremely acidulous water in mine drainage was shown by Bennett & Meyer in booth 85. This consisted of a line of valves, all parts of which coming in contact with acid water were composed of wood. A valve of this kind is shown in Fig. 10.

These valves which may be made in the angle straightaway globe and check types, may be fitted for connection to screwed or flanged metal pipe or to the ordinary wood stave pipe employed under extremely acidulous conditions. The valves are so built that a wooden disk bears on a wooden seat. As a variation of this construction, a rubber seat may also be employed.

In booth 56 the General Automatic Scale Co. had on exhibition its Weightograph. This is practically

an automatic scale wherein the weight indicated is projected onto a ground glass in front of the observer. The figures showing the weight are engraved on a small quadrant within the machine behind which an electric light is placed in such a manner as to project the

figures before the eyes of the weighman. When a load is placed on the scale, it is balanced and indicated promptly and automatically by one moving member. As the scale is depressed by the weight of the load, the light flashes on and the chart revolves into position, showing the weight on the reading screen in large illuminated figures and graduations. This gives a clear plain reading that can be seen from any angle and almost any distance. This device at a mine renders it necessary only for the weighman to record the weight indicated. It is shown in Fig. 11.

In booths 91, 92 and 93, the Enterprise Wheel & Car Co., along with other equipment, showed a new car of interesting design and large size. This is shown in Fig. 12. This car is especially adapted to machine loading, as it stands only 36 in. above the rail. The car box is 10 ft. long inside, 6 ft. 8 in. wide and is 24 in. deep. The length over the bumpers is 12 ft. and the weight 4,300 lb. It is a solid body car intended for use in connection with rotary dumps.

At the end of the right-hand aisle in the Exhibition Hall, in a space which might have been designated as 96-A, the Davies Mine Switch Lock Co., Inc., showed a model of its solid and automatic mine switch locks.

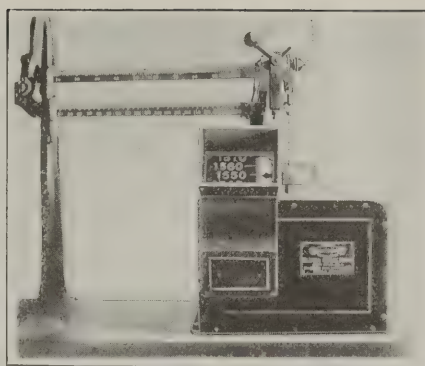


Fig. 11—The Weightograph

The weight on the scale platform is shown in illuminated figures. The weighman accordingly need only record the figures shown by the machine. No shifting of beam weights is necessary.

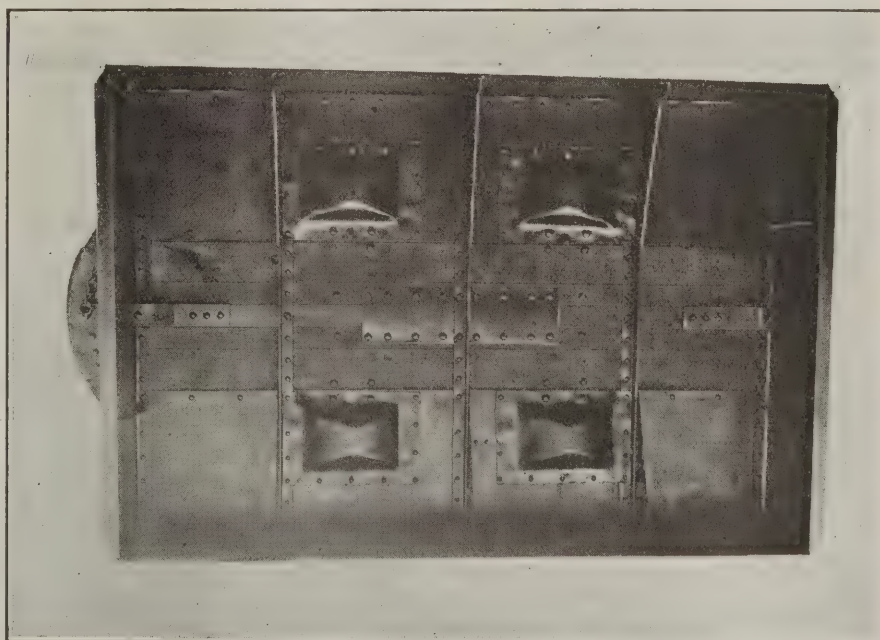


Fig. 12—Large Car Intended for Machine Loading

This view is looking almost directly down into the car box. Only by getting alongside this car can its unusual size be appreciated adequately.

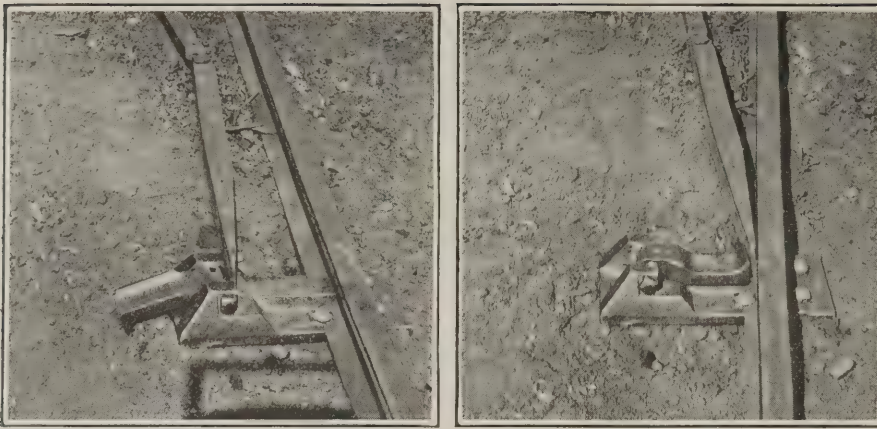


Fig. 13—A Switch Lock Installed

This lock not only forms a bed plate supporting the switch point but when the point is thrown and the tongue folded down the switch is locked in position.

One of these is shown in Fig. 13. This device is intended to lock the switch latches of rails weighing from 25 to 40 lb. per yd. It consists of a chair or plate upon which the rail rests, and to which is fastened a tongue, which when the switch is thrown may be folded over securely locking the switch point in position.

This device is simple in construction and may be readily and easily installed. It can be adjusted to fit any size of lock or switch point and its use will eliminate, so it is claimed by the maker, the numerous difficulties encountered in present-day operation such as spreading of the track gage, tilting of the rails, lowering of the latch point below the rail level, or the springing open of the latch. It will also obviate the use of wood either to support the latch or to hold it in position, likewise the holding of the latch in position by hand when a trip is approaching, or the accidental disengagement of the latch through the stubbing of the toe by either a man or mule, and the slewing or pushing of cars to make them take a switch.

Alongside of this space, or in what might have been called booth 96-B, the General Mine Equipment Co., of Birmingham, Ala., showed moving pictures of a new gravity-operated rotary dump. This device is the invention of William R. Coleman, of Birmingham, and is intended for use with solid body cars. It is particularly applicable at slope mines, although it may be installed at any operation suited to any rotary dump.

This dump is so designed and constructed that a trip of cars coming out of the slope may be hauled through it and then lowered back by gravity, the dump automatically discharging one car at a time. As may be seen in Fig. 14, only one man, the weighman, is located in its vicinity. The operation of the device is entirely automatic, except that when a car of slate or of rock is to be discharged the weighman throws a lever whereby this material is dumped into a separate bin from that receiving the coal. The advantages claimed for this device are as follows: It uses solid body cars; there is no wastage of coal on the slope; it requires no switching, spragging or uncoupling of cars and dumps continuously; the cars feed and spot themselves automatically, while the oil-cylinder con-

trol of this machine prevents shock or vibration; it entails minimum degradation of coal and no power other than the force of gravity is required for its operation; the machine is entirely automatic and will discharge a minimum of five cars per minute; only one man, the weighman, is required. The construction necessary for its installation is decidedly simple; it may be built to accommodate any size or type of car.

In booths 104 and 105, the Irontron Engine Co. had on exhibit its storage battery locomotive, type WLS, especially designed for low coal. This machine stands only 25 in. above the rail, yet has a storage capacity of from 30 to 40 kw.-hr., depending on

the type of battery used. The effective length when rounding curves is 10 ft. 6 in., while the width is made equal to that of the cars employed. The total weight of this machine is from 5 to 6 tons, varying with the type of battery. It is fitted with band brakes on the drive shaft and a worm drive. In appearance this machine seems to be extremely rugged while it is also convenient in operation. All control devices are so located as to be readily within the reach of the locomotive driver, even when because of low coal he must lie on his side on the bottom plate of the machine.

In booth 100, the Cincinnati Electrical Tool Co. showed various electrical devices particularly applicable to mines and mine shops, among others was this company's one-man electric coal drill for boring shotholes. This machine is intended to make holes from 1½ to 1¾ in. in diameter and is wound for 250 volts, direct current. It weighs only 22 lb., and is said to be the lightest machine of this capacity at present on the market. This machine has been tried out in both anthracite and bituminous coal and after six months of operation is said to work satisfactorily in every way.

Booth 112 was shared by the Flexible Steel Lacing Co. and the McKinlay Mining & Loading Machine Co. The latter firm exhibited a model of a new mining machine intended to drive an oval or elliptical heading. This machine consisted of two cutter-heads revolving in opposite directions and a cutter chain which removed or cut away the triangular segment left by them. Although the idea of the revolving cutter-head is by no



Fig. 14—Gravity Operated Rotary Dump

This dump needs no power for operation other than the force of gravity. It automatically feeds, spots, dumps and releases the cars. A trip need not be uncoupled during the dumping process thus saving much delay.

means new, several unique features have been added to this machine. Thus lump coal is produced by what might be termed revolving weights, working in the slots made by the cutters on the revolving heads. The coal cut down is delivered to a belt conveyor of adjustable length and is eventually loaded into cars on the heading. The machine is forced forward to its work by means of hydraulic jacks. While apparently heavy and cumbrous, it is in reality extremely simple and cuts an almost ideal heading in the coal.

In booth 81, among other exhibits, the Watt Mining Car Wheel Co.

showed model cars equipped with a device known as the Bulldog automatic coupler. This device is shown in Fig. 16. The construction of this coupler, as may be judged from the accompanying photographs, is decidedly simple and few parts are employed. The coupler will operate upon straight track or upon any curve found in the mines. Lost motion between cars is practically eliminated and the labor entailed in coupling and uncoupling is saved. It is estimated that about 6 per cent of mine accidents occur in the operation of coupling cars and the makers of this device claim that its installation will eliminate this danger entirely.

One of the reasons for making the present hitchings of mine cars long, allowing considerable play between adjacent car bumpers is the fact that an uneven track causes a decided relative vertical movement between the car ends. This automatic coupling is so arranged as to provide for this movement without possibility of the cars becoming detached from each other.

Booth 45 was shared jointly by the Timken Roller Bearing Co. and the Dodge Manufacturing Corp. This latter firm had on exhibition its Timken-equipped shaft hanger intended for use on line shafts of all kinds. This device is applicable to any type of hanger using a four- or two-point suspension. The bearings proper are manufactured by Timken and marketed by the Dodge company. The saving in power effected by this use over that entailed by ordinary plain bearings is 10 to 50 per cent, depending upon conditions.

The bearing proper consists of two Timken roller bearings mounted on a ground steel tube and fitted with an accurately machined cast-iron housing. Grease seals are provided and two clamping collars are mounted on the threaded ends of the steel tube. This tube is slotted at either end, and is held to the shaft by the two collars which are also used to obtain accurate

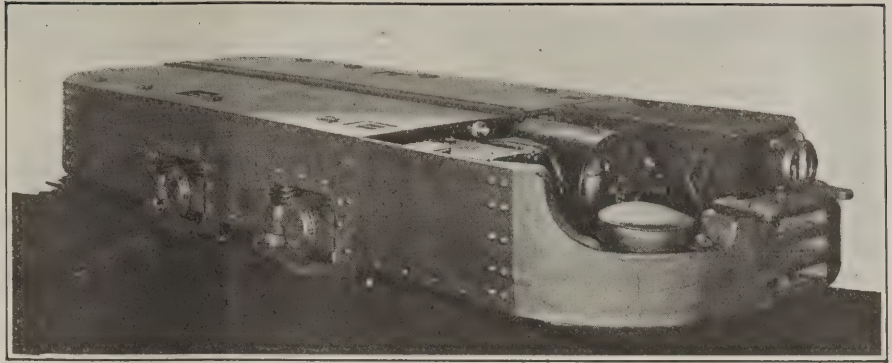


Fig. 15—Low Storage-Battery Locomotive

This machine is so low that it could pass under a table. It is fitted with band brakes and it is claimed that the motorman can slip the drivers by the pull of one finger on the brake lever.

adjustment of the bearings on the steel tube. This adjustment is made at the factory and need not be altered by the user. Housings of this kind are adapted for use in practically any type of hanger. The mounting of the tapered roller bearing as described insures full utilization of the bearing for both radial and thrust loads. It also provides a bearing of great ruggedness and is of particular value in resisting the side weave of heavy driving belts.

The method of fastening the bearing sleeve to the shaft permits its use on ordinary commercial shafting which may vary slightly in diameter. The sleeve is fastened to the shaft by setting up the set screws in each of the clamping collars. Space between the housing and sleeve is filled with grease which supplies lubrication over a long period.

The foregoing are a few of the "high-spots" in the equipment exhibited. As stated in the beginning, volumes might be written on the show as a whole without exhausting its possibilities. It would hardly be just, however, to conclude any description of the exhibition at Cincinnati without mentioning what might be termed "the side-show." This was a tent in rear of the Exhibition Hall, in which two loading machines were shown at work. The operation of rail bonding was also exemplified. Almost everyone who visited the Exhibition Hall also paid a visit to this tent in the rear, where those inexperienced in the use of loaders gained a clear idea of how these machines were operated and acquired a reasonably accurate conception of their possibilities in actual use underground.

Taken all in all, the exhibition of machinery at this convention was a decided success. Upon all sides one heard the opinion voiced that the convention of 1924 was the most successful meeting of its kind ever held by coal men anywhere.

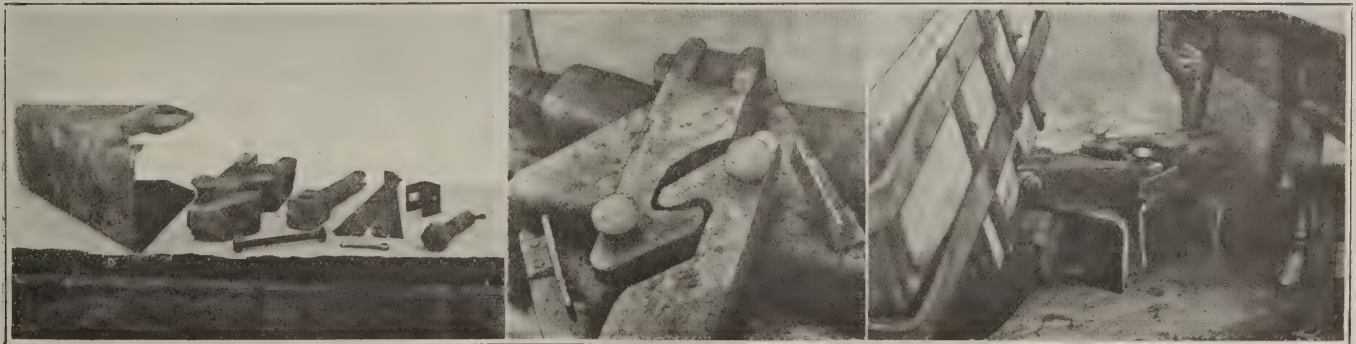
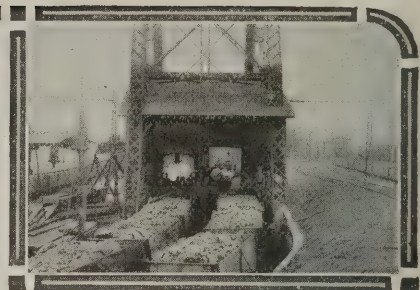


Fig. 16—Automatic Car Coupling and Its Parts

This coupling will operate upon any curve and its component parts are few and strong. Vertical movement between the car ends does not disengage the drawheads. Lifting one of the hooks uncouples the car.



News Of the Industry



Farrington Dominates on All Issues At Illinois Miners' Convention

Two-to-One Majority Sustains Peace with Lewis—Illinois President
Threatened with Howat's Fate—Deposed Kansas Leader
Says He Was Not Expelled from Union

(Special Dispatch to Coal Age)

Peoria, Ill., May 19—Frank Farrington, district president, tonight still held the whip hand over the biennial convention of the Illinois Miners' Union, supported by a two to one majority on all issues. His "peace" with International President Lewis was approved, as also was his "desertion" of Alexander Howat, deposed Kansas president, whom he charged in an address with joining W. Z. Foster and the communists at a Pittsburgh (Pa.) conference.

Farrington told the convention that Lewis had also threatened him with Howat's fate. Howat also spoke, saying he had been informed by Secretary Green two weeks ago that he had never been expelled. He said he had returned to work in the Kansas mines and wanted nothing but readmission to the union. He said he desired no back pay, nor anything but justice. He asked Illinois miners for "moral support." Decision was deferred. It is probable that the convention will adopt Farrington's proposal to investigate the feasibility of giant power plants.

Would Amend State Mining Law

Resolutions adopted by the convention included the following:

Demanding amendments to the Illinois state mining law, as follows: (1) Prohibiting mine examiners from carrying an open light into the mine, and compelling operators to provide an electric safety light for them.

(2) Requiring that there shall be an attendant at any and all doors in coal mines in the State of Illinois, to replace the present provision which is "that in any or all mines where doors are constructed in such a manner as to open and close automatically, attendants and places for shelter shall not be required." Such an amendment, the resolution says, if strictly complied with, would prevent "75 per cent of mine explosions," by preventing dangerous accumulations of gases, resulting from drafts caused by open doors. Automatic doors are unsafe, the convention was told, for the reason that chunks of coal get in the way, and sometimes the mechanism fails to act.

(3) Limiting the speed of mine locomotives or motors.

(4) Prohibiting coal companies from

turning a current of electricity into any coal mine until the mine has been examined for gas in all parts of the mine where wires are located.

(5) Requiring that all rooms in a mine, except those sealed up, both in old and new works, shall be examined by a mine examiner four hours preceding the day shift or night shift.

(6) Requiring coal companies to arrange separate compartments in wash houses, whereby miners could have their mining clothes in one compartment and their clean clothes in another, and so arranged that coal dust, grease and other dirt could not soil the clean clothes.

(7) Prohibiting miners from carrying into mines in their pockets detonating explosives, caps and detonators.

(8) Requiring two men on moving motors and mining machines.

(9) Requiring every mine to have its own shotfirers, thus abolishing the system in some places which requires each individual miner to shoot his own shots.

Considerable debate was occasioned by a resolution which demanded that "it shall become a part of our agreement, after April 1, 1924, that all operators must be bonded for all payrolls, and also compensation bills where they are not protected by some reliable insurance company."

President Farrington addressed the convention regarding this proposal. He said the only thing that could be done with it was to refer it to the scale committee which meets the operators three years from now. He said the only recourse miners have against operators who fail to pay their employees wages before closing down is to forbid them reopening until all back wages are paid.

Dan Harrington Leaves Bureau of Mines

Dan Harrington, Bureau of Mines engineer for years in the Rocky Mountain region, joins the Utah Fuel Co. and the United States Fuel Co., both of Salt Lake City, July 1 as consulting engineer in safety. His place in the West for the Bureau will be taken by Albert A. Munch, of the Pittsburgh, (Pa.) experiment station.

Hardwood Men to Compile Trade Data Soon Again?

The compiling of statistical information may soon be resumed by the American Hardwood Institute, one of the leading participants in the fight for trade statistics. At Louisville, Ky., May 9, the Institute gave its board of directors permission to re-establish the statistical program whenever the board feels that it can do so safely. The Hardwood people stopped compiling statistics some years ago as a result of interference from Washington, re-established the department, and again stopped it in January of this year, when the then Attorney General Daugherty wrote an unfavorable letter to Secretary Hoover.

Miner Plotters Confess

It was reported from Madisonville, Ky., on May 10, that Sam Coffman, of Madisonville, and Tom Richardson, formerly of William County, Ill., had been arrested and were in jail at Madisonville, charged with "confederating and banding together" in connection with an alleged plot to dynamite a plant of the Hart Coal Corporation, last February. Richardson confessed the plot and implicated Coffman, and also a member of the United Mine Workers office at Madisonville, who couldn't be apprehended at the time of the other arrests. A written confession was made by Richardson to County Attorney Franklin. The Hart Corporation has had some trouble in camp for months past as a result of going non-union.

Shipping Board Bids Fall Within Narrow Range

Bids received by the U. S. Shipping Board at New York on May 16 for furnishing and delivering alongside vessels operated by the Board in New York harbor of 1,430 gross tons of bituminous coal containing a minimum of 14,500 B.t.u. resulted in prices ranging from \$5.17 to \$5.48 per gross ton, or from about \$1.92 to \$2.09 per net ton f.o.b. mine. There were four bidders: Imperial Coal Corporation, \$5.17; H. B. W. Haff, \$5.39; W. A. Marshall & Co., \$5.20, and Seiler Coal Co., \$5.48. These prices compare with about \$1.92 to \$2.77 net ton f.o.b. mine in the bids opened by the Shipping Board on May 12, when 18 bids were received for furnishing and delivering alongside upward of 216,000 gross tons.

British House of Commons Rejects Labor Measure to Nationalize Coal Mines

The mines nationalization bill was rejected by the British House of Commons May 16 by a vote of 264 to 168. The bill was introduced by George Henry Hall, Labor member, a Welsh colliery checkweighman, who said that nationalization had been demanded by the miners for a generation.

While agreeing with the principles of the bill, the Labor government took a cautious position, it being stated on behalf of the Cabinet that the Ministry disapproved of certain clauses, and consequently the bill was allowed to stand on its own feet as a private member's proposal.

Mr. Lloyd George declared the bill was the first concrete example of the new socialism which was to be put into effect as soon as the Labor Party got a majority. He declared that in addition to giving the miners the right to strike, the bill gave the same right to officials of the Mining Council, which meant that they could participate in a strike against a decision of the council, of which they were members.

Calls It Gigantic Trust

He stressed the fact that so much attention was paid in the bill providing for losses, the money for which was to come out of the public funds, while if profits were made they were to go back into the industry. This was not nationalization, he insisted, but a gigantic coal trust in the interests of one section of the community.

Mr. Lloyd George agreed that mining conditions were unsatisfactory, but he reminded the House that the Labor Party had rejected the government's ameliorative proposals of 1919. At the same time he was sure the House would not examine in a niggardly or partisan spirit any broadminded proposals to improve the miners' lot.

Emanuel Shinwell, Parliamentary Secretary of the Department of Mines, explained that while the government recognized that no mandate had been obtained from the electors to pursue a policy of nationalization, they heartily accepted the vital principle embodied in the measure. There was, he said, no solution of the problem confronting the mining industry, whether regarding production, distribution or utilization of the commodity, other than was to be found in national ownership. Sooner or later the principle would be accepted by the nation as a whole.

Sir Douglas Hogg said the present bill would be unjust to the miners, dishonest to the state and wholly inequitable to the interests of the consumer, and was deliberately devised to carry class warfare, not of one class against another but of one class against the community.

Mr. Smillie said it was the duty of the government to carry the bill into law. It was not only the miners but the whole trade union movement which was pledged to it.

Some Miners Manage to Keep Wolf from Door

Net income tax returns of \$9,100 each for the year 1923 have been filed by two employees of the Soper-Mitchell Coal Co., of Morgantown, W. Va. Both men are coal cutters. Another miner employed at the same plant filed a return for \$6,500 with an apology for its size, stating he did not have steady employment. Another man reported \$2,700, claiming \$7,300 exemption for his wife and 12 children.

More Pennsylvania Companies Revert to 1917 Scale

Following the lead of the Keystone Coal & Coke Co., the Hillman Coal & Coke Co. has made a wage reduction of 20 per cent at its Edna mines, Westmoreland County, Pennsylvania. The men at Edna No. 2 mine accepted and are working 100 per cent, but those at Edna No. 1 mine refused to accept the cut and are idle. This is in the Irwin gas coal basin.

In the same field, the Whyel Coal & Coke Co., whose two plants have been idle for several months, attempted to resume operations May 1 at a 10 per cent wage reduction, but the men objected and these mines are still idle.

In Somerset County all the companies (including the Consolidation Coal Co. and the Hillman Coal & Coke Co.) except the Berwind-White Coal Mining Co. reduced wages to about the 1917 scale and are working part time without any trouble. Union mines in the Pittsburgh and adjoining districts are getting slim picking, where they are working at all.

Connellsville Coke Operation Cuts Wages 20 per Cent

The Lincoln Coal & Coke Co., Scottsdale, Pa., a merchant coke operator in Lower Connellsville with 300 ovens, on May 1, reduced wages 20 per cent from the Frick scale, outside day labor being cut from \$5.40 to \$4.32 and common day labor from \$3.60 to \$2.88. The company then had 200 ovens in operation. No business was forthcoming, however, and the 200 ovens have since been blown out. The men accepted the cut without question and work continued long enough to show that the reduced wages were actually in force.

Other coke operators are considering wage reductions, as this was the first reduction at a regular Connellsville coke plant. The prediction now is that before long many independent operators will reduce, and that then the Frick company may follow.

One More Illinois Merger

The expected consolidation of Big Creek Coals, Inc., and the Harrisburg Colliery Co., both in southern Illinois, has taken effect. The new name of the company holding and operating the several Big Creek mines and the one 4,000-ton Harco mine is the Saline County Coal Corporation, headed by Charles I. Pierce, of Chicago, former president of Big Creek Coals, Inc., which only two months ago bought the Harco mine. The corporation controls 28,500 acres of land in Saline and Fulton counties, 8,565 acres of which is owned in fee and the balance held on long-term leases, principally from a subsidiary of the Big Four railroad. The total capacity of the group of mines is rated at 15,000 tons per day. The corporation is issuing \$2,500,000 of 6½-per cent 20-year bonds.



Courtesy U. S. Distributing Corp.

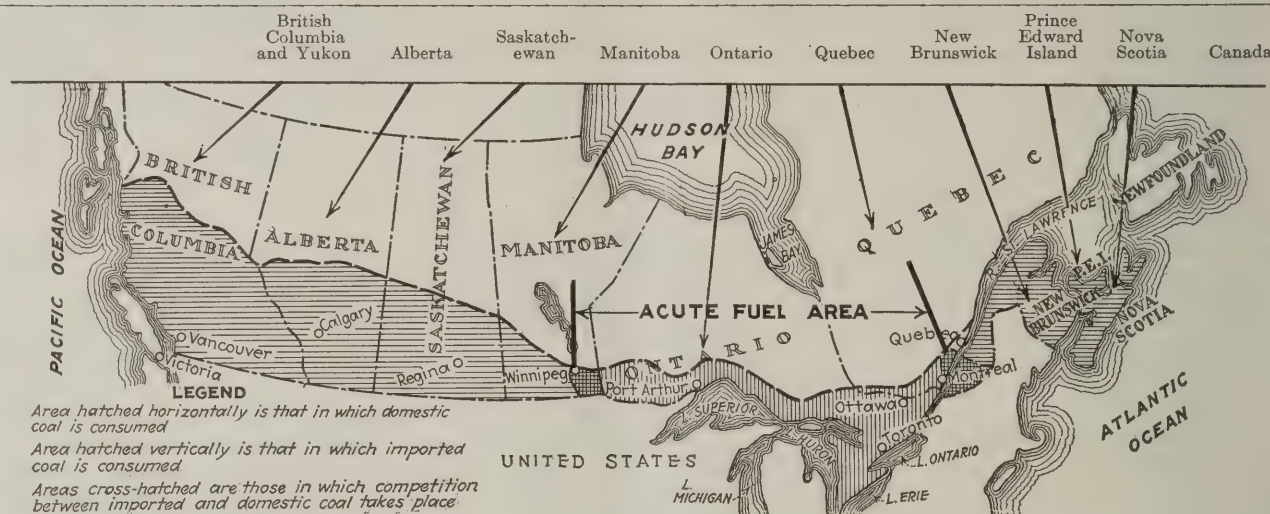
Loading Coal Into Barges on the Hudson River

At Edgewater, N. J., one of the upper ports of New York Harbor. Most of the principal Eastern railroads have coal terminals on the New Jersey side of the river, where coal destined for New York is dumped into barges for shipment across the river. In the distance some of the buildings on the west side of midtown Manhattan are discernible.

Coal Output, Exports, Imports and Consumption By Canada in 1923

(Preliminary figures, in Net Tons)

	British Columbia and Yukon	Alberta	Saskatch- ewan	Manitoba	Ontario	Quebec	New Brunswick	Prince Edward Island	Nova Scotia	Canada
Output.....	2,823,317	6,848,538	439,892	785,314	80,755	1,540,283	276,603	80,916	6,595,672	16,984,022
Received from.....	108,676	18,054	1,249,549	877	3	561,258	32,112	2,175,220	4,424,805	4,424,805
Shipped to.....	62,151	1,933,144	222,178	8,213	17,212,768	4,976,898	115,364	679,771	1,654,406	1,654,406
Exports (1).....	838,063	605	11,510	167,990	17,292,646	6,517,178	192,625	5,566	106,036	22,687,320
Imports (2).....	20,429	1,110	3,898	945,091	17,292,646	6,517,178	883,010	86,482	3,846,717	38,016,936
Consumption (4).....	2,052,208	4,933,953 (3)	1,459,651	17.8	99.8	76.4	21.8	6.4	2.7	60
Foreign imports in per cent of consumption.....	0.01	.....	0.03	17.8	99.8	76.4	21.8	6.4	2.7	60
Coal equivalent of developed water power (annual) (5)....	3,318,000	298,000	.....	1,458,000	13,009,000	10,058,000	401,000	20,200	492,000	29,554,000



(1) Statistics give exports by port of exit, not by province of production. For instance, the bulk of that exported from Alberta is shipped via Fernie and Cranbrook, B. C.

(2) Total imports were 22,687,000 tons, of which 530,000 or 2.3 per cent, were from Great Britain.

(3) Over 2,000,000 tons supplied to railroads for traffic east and west.

(4) Production plus imports and minus exports.

(5) On basis of 9 tons per installed turbine horsepower per annum.

Big Coal Development at Cape Breton Island

The Atlantic Coast Collieries, Ltd., has been incorporated with a Nova Scotia charter and will immediately develop coal areas located at Mabou, on the west coast of Cape Breton Island.

The company will own a large amount of land at or adjoining the mine property, on which will be located a power plant, bank head and other surface equipment together with railway yards, sidings and $7\frac{1}{2}$ miles of standard-gauge railway connecting the mining property with the Canadian National Rys. at Mabou Station. The company also will hold under lease from the provincial government an area of 17 square miles, partly on land and partly submarine, all in the neighborhood of Mabou. This property contains four workable seams of coal of proven thickness and quality, viz: 7 ft., 8 ft., 15 ft. and 5 ft., in the order named. There also are three other known seams, viz: 11 ft., 4 ft. and 3 ft., which have not been proven and are not taken into consideration.

The report of A. J. Tonge, chief engineer and superintendent of mining operation, states that the amount of coal in the property is estimated at 400,000,000 tons, but partly owing to the uncertainty as to the depth of the seams may

attain seaward and partly owing to the possible inaccessibility of a portion of the area, particularly on the south side, it is estimated that within two miles seaward of the slope mouth and within reasonable working distance from the slope there are approximately 150,000,000 tons of coal.

The board of directors are as follows: President, Charles Fergie, president and managing director of the Intercolonial Coal Co. and vice-president of W. A. MacKenzie & Co.; A. H. Whitman, managing director of Robin, Jones & Whitman, Ltd.; A. J. Tonge, chief engineer and superintendent of mining operations; J. McG. Stewart, solicitor, of Henry, Harris, Rogers & Stewart; James Stewart, colliery owner, and George Ross, president of Ross & MacDonald, Inc.

An offering of \$4,000,000 7-per cent 20-year bonds of the company is to be made soon.

Rock Dust Expert Tours West

J. E. Jones, safety engineer for the Old Ben Coal Corporation in Illinois, is now on a special tour of the Rocky Mountain region preaching the doctrine of mine safety by rock dusting under direction of the Bureau of Mines. Mr. Jones, after years of study and experimentation in rock dusting in the Old Ben mines of southern Illinois, is recognized as one of the country's experts in the subject.

New Freight Rates Benefit Southwestern Field

The one element in the coal situation which is heartening to the coal producers of the Southwest Interstate region, comprising Kansas, Oklahoma, Arkansas and Missouri, who recently signed up for three years at practically the old contract with the union, is the new set of lowered freight rates from mines to principal markets. The rates help the operators to meet stiff Illinois and far western competition in the Missouri Valley territory, and take effect June 5 by railroad initiative although they were ordered for July 10 by the Interstate Commerce Commission. The following table tells the story:

	Present Rate		Rate Ordered	
	Lump	Slack	Lump	Slack
To Kansas City				
From				
Rich Hill.....	\$1.46	\$1.22	\$1.45	\$1.05
Pittsburgh.....	1.70	1.34	1.65	1.25
Arkansas-Oklahoma	3.28	2.31	2.65	2.25
Spadra.....	3.40	2.31	2.90	2.25
To St. Joseph				
From				
Rich Hill.....	1.70	1.70	1.75	1.35
Pittsburgh.....	1.82	1.70	1.95	1.55
Arkansas-Oklahoma	3.52	3.04	2.95	2.55
Spadra.....	3.77	3.04	3.20	2.55
To Omaha				
From				
Rich Hill.....	2.31	1.94	2.45	2.05
Pittsburgh.....	2.67	2.31	2.65	2.25
Arkansas-Oklahoma	3.89	3.52	3.65	3.25
Spadra.....	4.25	3.89	3.90	3.25
To Sioux City				
From				
Rich Hill.....	3.77	3.04	2.95	2.55
Pittsburgh.....	3.77	3.04	3.15	2.75
Arkansas-Oklahoma	5.22	4.50	4.15	3.75
Spadra.....	5.47	5.47	4.40	3.

New National Coal Association President Well Known to Official Washington

Was Active in Capital as Member of Wilson Industrial Conference and Industrial Rights League—Record Notable for Fair Dealing with Consumer—Is Authority on Labor Relations

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Selection of S. Pemberton Hutchinson as the new president of the National Coal Association has aroused much interest in various official quarters in Washington. Those officials whose duties bring them in contact with the coal industry are acquainted with Mr. Hutchinson, who has been a frequent visitor to the capital. He spent much of his time in Washington during the war, when he was connected with the Railroad Administration. Later he attracted official attention because of the part he played as a member of President Wilson's industrial conference. His duties as chairman of the League for Industrial Rights, which formerly had its headquarters in the capital, also brought him in contact with administrative officials and members of Congress.

Official Washington is interested particularly because it attaches deep significance to the National Coal Association. Most officials regard it as an essential organization. Without a national association, the coal industry could not speak its mind. In turn the government would be unable to deal with the industry if it were not for some such body.

Association Judged by Leader

In the public mind an organization is judged to a considerable extent by its president. This is particularly true when the body is composed of such scattered and diverse interests as those composing the National Coal Association.

Washington was quick to recognize in the selection of the new president a promise to accentuate more than ever the need of faithful dealing with the consumer. The Westmoreland Coal Co., of which Mr. Hutchinson is president, has a long and honorable record of service to its customers. It produces a coal of exceptional quality in the Irwin gas district and is the mainstay of many gas utilities in New England and in the Middle Atlantic States. The company frequently is cited by coal specialists in Washington as an example in pointing out the benefits of good performance on contracts. The type of business that Mr. Hutchinson represents in dealing with consumers always is ready to sacrifice any immediate advantage in the spot market and maintain its contract deliveries.

Valuing trade associations as it does, Washington may wish that Mr. Hutchinson were more versed in the details of association work. He comes from a district in which there is no local operators' association of the ordinary type. He long has been a director in the National Association, however, and has learned much of the detail of the National's business recently through his

duties as its treasurer. He has not, however, had that day-to-day contact with the statistical and traffic services of a vigorous local association such as those of Indiana and southern West Virginia. There is no reason to think, however, that he will look unsympathetically on the service functions of the National. One of the hopes most frequently expressed in connection with the change of administration has been that it would be marked by building up the National's bureau of coal economics and the traffic service to the point where it ought to be built.

On one phase of the association's interest Mr. Hutchinson brings definite experience. He is an authority on the problems of labor relations. It is true that the National is eschewed from direct dealing with labor matters, yet its course and its activities are so closely related to them that a president with such experience cannot but be in a better position to assume leadership.

Foe of Growing Union Power

Until a year ago Mr. Hutchinson was chairman of the League for Industrial Rights. This organization long has been associated in the public mind with that group of American employers who are seeking by legal means to check the power of trade unions. Mr. Hutchinson and the League not only believe that employers have a right to operate their plants without dealing with their men collectively but that it is feasible and expedient to do so. They believe that through legislation and through litigation it is possible to maintain the complete freedom and independence of the employer. Their experience has gone far to justify this belief. Mr. Hutchinson's own company and own district long have been non-union. Though the district was partly shut down by the 1922 strike, it emerged from that struggle without having surrendered any of the independence it seeks to retain.

The League has won some notable legal victories, one of which was the Danbury Hatters case, and another was the Bucks Stove & Range Co. case. It has been termed the liberal wing of the employers' movement. It is a storehouse and a clearing house for all information relating to the legal and constitutional phases of the labor problem. Mr. Hutchinson is clearly representative of the attitude of no compromise with the labor unions and a determination to exercise to the full the constitutional rights of employers. The public will see in his election the probability of a development of a labor policy in the National Coal Association. It also is admitted that his election will strengthen the belief that the associa-

Will Miners Take Up Polo And Mah Jong Next?

Frank Hodges, Civil Lord of the Admiralty in the British labor government and formerly secretary of the Miners' Federation of Great Britain, partnered by Evan Williams, president of the federation, defeated the Duke of York and his partner, Captain Basil Brooke, 2 and 1, in a foursome golf match at Ton Petre, South Wales, May 17. The match was the outcome of a challenge by Mr. Hodges at a dinner a year ago, which was immediately accepted by the Duke.

It was played on the miners' course of nine holes, which was laid out by the miners themselves on waste land. All of the contestants are members of the Council of the Industrial Welfare Society.

tion is getting away from its original determination not to deal with labor matters and is becoming more and more the spokesman of the non-union branch of the industry.

Says Vancouver Coal Reserve Has Been Overestimated

Coal mining on Vancouver Island was discussed recently by Charles Graham, mine manager of the Canadian Collieries (D), Ltd., before the Board of Trade of Vancouver, when he declared incidentally that the coal supply of the Vancouver district had been overestimated. Earlier surveys had placed the resources tentatively in the neighborhood of 4,733,000,000 tons of coal, while that made by the late Major J. D. Mackenzie shortly before his death two years ago, reduced this total to approximately 800,000,000 tons. While this is only an estimate over a large area, it is impossible to recover that tonnage, he said, while actual mining operations often proved that only a small percentage of an estimated tonnage could be produced.

In one mine at South Wellington only 10 per cent of the estimated tonnage had been recovered. By strange coincidence three out of four diamond drills sunk over an extensive area had struck small deposits. Subsequent mining operations proved the great bulk of the property to be absolutely barren of coal. Faults are frequent in Vancouver Island mines, necessitating considerable expenditures of an unproductive character to pass these in search of additional measures.

Mr. Graham declared that mining operations were conducted as economically as possible in all the Vancouver Island mines. Owing to the frequent faults and geological formations it often is impossible to mine by machinery. The increased use of fuel oil in Vancouver industries has caused a heavy marketing loss to the mines of the Island. At Cumberland the mines average only about three days' work each week. Other mines also are either working short time or are producing less coal than formerly, employing fewer men. Little if any development work is being undertaken, he declared.

Who's Who in the National

The following list of members and voting strength in the National Coal Association formed the roll call at the 1924 convention in Cincinnati, Ohio, May 14-16:

Association or Company	Votes
Alabama Fuel Association.....	22
Albuquerque & Cerrillos Coal Co.....	1
Anchor Coal Co.....	1
Atlantic Crushed Coke Co.....	1
Bair-Collins Co.....	1
Bear Creek Coal Co.....	1
Black Hawk Coal Co.....	1
Bridgeport Coal Co.....	1
Canon-Reliance Coal Co.....	1
Chicago, Wilmington & Franklin Coal Co.....	1
Coal Opers. Assn. of the Thick Vein Freeport Seam of Penna.....	12
Coal Opers. Assn. of Georges Creek.....	28
Cochran Coal Co.....	1
Colorado & Utah Coal Co.....	1
Consolidated Coal Co. of Saginaw.....	1
J. K. Dering Coal Co.....	1
Diamond Coal Co.....	1
Elk River Coal & Lumber Co.....	1
Gallup-American Coal Co.....	1
Good Clay & Coal Co.....	1
Greensburg Coal Co.....	1
Harlan County Coal Opers. Assn.....	43
Hazard Coal Opers. Exchange.....	74
Hillman Coal & Coke Co.....	1
Indiana Bituminous Coal Opers. Assn.....	62
Indiana Coal Producers Assn.....	9
Indiana Coal Traffic Bureau.....	43
Irwin Gas Coal Co.....	1
Jackson District Coal Assn.....	19
Jamison Coal & Coke Co.....	1
Kanawha Coal Opers. Assn.....	70
Keystone Coal & Coke Co.....	1
Latrobe Connellsville Coal & Coke Co.....	1
Lion Coal Co.....	1
Logan Coal Opers. Assn.....	51
Madeira-Hill Coal Mining Co.....	1
Loyal Hanna Coal & Coke Co.....	1
Mather Collieries.....	1
Miami Coal Co.....	1
Monongahela Coal Assn.....	17
Morris Run Coal Mining Co.....	1
New Alexandria Coke Co.....	1
New River Coal Opers. Assn.....	64
Northeast Kentucky Coal Assn.....	44
Northern W. Va. Coal Opers. Assn.....	83
Northwestern Pa. Coal Opers. Assn.....	30
Operators Assn. of Williamson Field.....	49
Pittsburgh Vein Opers. Assn.....	24
Owl Creek Coal Co.....	1
Pocahontas Operators Assn.....	36
Ramsey Coal Co., Inc.....	1
Rockhill Coal & Iron Co.....	1
Roundup Coal Mining Co.....	1
Royal Fuel Co.....	1

Wuxtry! Howat at Work!

Alexander Howat, once president of the Kansas district of the United Mine Workers, but two years ago booted out for not taking orders from Indianapolis, is at work with a pick. He has tried every other way to get back in the union and failed, so now he is riding out from Pittsburg, Kan., in his automobile and going down in a mine of the Debut Coal Co. while his application for membership in Local 5517 at Skidmore, Kan., awaits action.

All he has to do now is answer certain charges still held against him before the International board of the union. Then perhaps he will be back in again and can continue his rebellious actions against the Lewis administration from within instead of from without. Hearl Maxwell and James McIlwrath, former district board members, who were expelled with him, also have gone back to work, and August Dorchy, his former vice-president, and John Fleming, one time board member, will soon follow.

Railroads Speed Up Freight Movement in March

Freight cars were handled faster by class 1 railroads in March, 1924, than during any March on record, according to the Bureau of Railway Economics, the average daily movement per freight car for the month being 27.3 miles per day. This exceeded by 0.3 mile the average for March, 1923, and by 3.3 miles the average for March, 1920.

The average load per freight car in March was 26.6 tons, a decrease of 1.3 tons compared with March last year, and one and one-half tons under the average for the same month in 1920.

Freight traffic in March amounted to 36,420,962,000 net ton miles, a decrease of 2,800,772,000 net ton miles, or 7.1 per cent, compared with March, 1923. Compared with the same month in 1920, it was a decrease of 1,431,090,000 net ton miles, or 3.8 per cent. For the first three months this year, freight traffic amounted to 106,884,737,000 net ton miles, a decrease of 2.4 per cent from the corresponding period last year, when the greatest volume of traffic for any corresponding period on record was handled by the railroads.

Washington Hopes to Beat Last Year's Record

Coal production of the State of Washington for the first quarter, January, February and March, 1924, according to Wm. R. Reese, chief state mine inspector, was 794,504 short tons.

By maintaining this ratio of production for the balance of the year the industry will show an increase of production of nearly a quarter million tons over that of the previous year (1923).

Present indications are that this will be realized. Fuel oil in the California fields is at the peak, if not on the decline, and prices inclining upward, which must reflect on the coal industry advantageously.

Lumbering also is showing a decided slowing down, which will decrease the supply of hog fuel and other lumbering wastes now competing with our coal.

Imports from foreign countries are also on the decline compared with the past few years. In fact, the present outlook carries with it much encouragement for the coal producers of this state.

West Virginians Re-elect

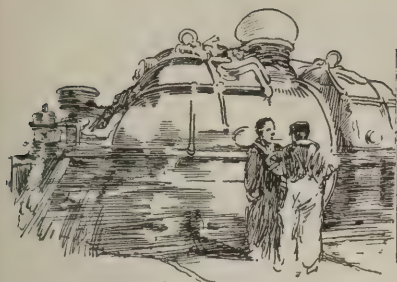
The entire staff of officers for the West Virginia Coal Association, composed of the various associations of that state, was re-elected May 14 at Cincinnati in a meeting held during the National Coal Association convention. The officers are: President, J. G. Bradley of Dundon; vice-presidents, Everett Drennen, of Elkins, and G. H. Caperton, of Charleston; secretary, W. H. Cunningham, of Huntington; treasurer, C. C. Dickinson, of Charleston; assistant secretary, James E. Hart, of Huntington. The association urged the nomination of T. F. Farrell for director of the National from the smokeless field and Mr. Cunningham for director-at-large.



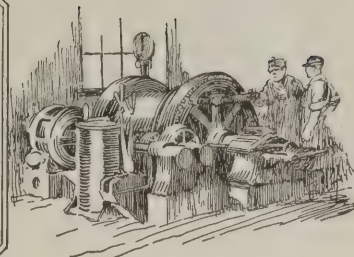
Courtesy U. S. Distributing Corp.

Coal Awaiting Transportation by Barge

These trains are lined up in one of the big railroad yards on the New Jersey side of the Hudson River opposite New York preparatory to dumping in barges for shipment to the metropolis.



Practical Pointers For Electrical And Mechanical Men



Permissible Equipment for Underground Coal Loading Machines

Mining Will Be Made Safer By Use of More Permissible Electric
Equipment — Loaders Must Not Endanger
Lives or Mines

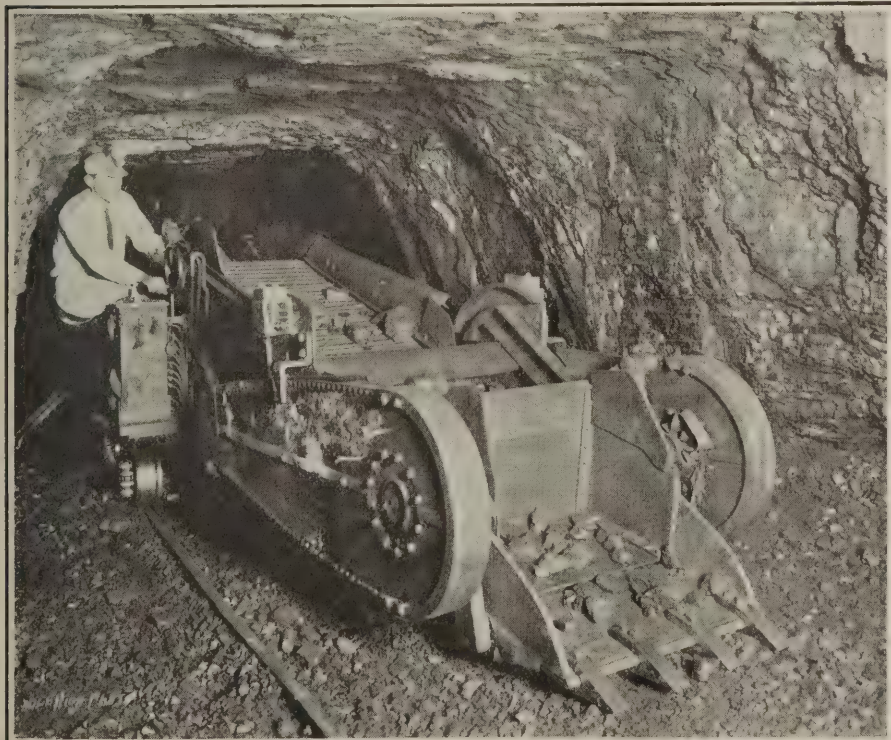
CHARLES M. MEANS
Consulting Engineer,
Pittsburgh, Pa.

UNDERGROUND coal loading machines are destined in the very near future to come into general use in the production of coal. The application of loading machines will follow in the wake of undercutting machines and electric locomotives. Just what particular type of machine will survive cannot be determined. Neither is it possible to forecast mining methods that will best fit the changed system of loading.

Electricity has thoroughly established its adaptability for operating mechanical equipment of various kinds used in coal mining. When electricity was first introduced in mines, it

created a certain hazard because the sparks and open arcs will ignite gas or coal dust. However, increased knowledge of the behavior of electricity has made it possible to so design and operate equipment that this difficulty has practically disappeared insofar as mining machines and storage-battery locomotives are concerned.

Electrically operated mining machines of various types, storage-battery locomotives and certain other devices have been perfected so that they are



Loading Machines Must Be Safe from Fire and Explosion

The capital investment in a loading machine is high; therefore every provision must be made to keep it in operation as much as possible. It must also be safe so that all hazards of destruction will be practically eliminated.

An Old-Fashioned Way to Load Coal

The need of a mechanical loading machine probably came from such a suggestion as this. The demand grew from the desire to get the coal out quickly at low cost per ton.

now passed as permissible by the U. S. Bureau of Mines. Equipment so designed as to be passed as permissible does not mean that it is supposed to be operated where there is explosive gas or coal dust, but does mean that should such a condition be encountered the possibility of explosion is practically eliminated if the equipment has been properly maintained. It is now generally recognized that any device of this character used near the face of any mine where such conditions exist should be of the permissible type.

When we consider coal-loading machines we are dealing with a class of equipment that should be surrounded with all the safeguards that are used for other equipment under similar conditions. A loading machine is required to work close to the face where the actual conditions can only be determined from day to day if the work is advancing. If the actual mining is retreating, danger is also present due to roof disturbance and a possible liberation of a pocket of gas. Dust is usually in suspension and may be of such quantity and character as to be a serious hazard.

Before coal loading machines can be universally applied, they too must be fitted with permissible motors, controllers, wiring, etc., if a reasonable degree of freedom from accidents is to be obtained. Such electrical equipment has not been placed on the market as yet, but when a fair degree of standardization of loading machines has been attained it will no doubt be available. The development of permissible electrical equipment suitable for operating loading machines would be along fairly well standardized lines. With requirements clearly defined, no special problem will be involved in manufacture.

Until such a time as permissible equipment is made available for loading machines, their development will be retarded and their application limited to districts where explosive gas and dust is not likely to exist. As our mines get deeper the demand for permissible equipment will increase and the time will come in the not far distant future when all electrically operated mine equipment not used in intake air must be of the permissible type.

Electric Current Explained By Ventilation Analogy

As a rule technical writers employ the usual hydraulic analogy to explain the fundamental principles of the simple electrical circuit. However, as colliery electricians and others employed in mines usually have a knowledge of ventilation, an analogy comparing similarities between electricity and mine ventilation may be more helpful. But of course, analogies should always be carefully used, as they seldom prove correct if carried beyond certain limits. The hydraulic analogy serves its purpose up to a point, and that of ventilation may do the same, but beyond these limits, reference to either is unsafe.

Potential Like Water Gage

In order to force a current of air through an airway, it is necessary that a difference of pressure exist between the inlet and the outlet. In a similar sense it is also necessary to produce a difference of electrical potential or pressure between two points in an electric circuit so that a current may be transmitted from one point to another. Let us assume downcast and upcast shafts of a mine connected by an airway. At a point between the two shafts is a door which is closed. It should be distinctly understood, however, that references are made to conditions of pressure and current only. With a fan running and the door closed, there is a difference of pressure between the two sides of the door equal to the water-gage of the fan under the particular conditions, assuming that there is no leakage.

If the door is opened a current of air begins to circulate from the downcast shaft, through the airway, to the upcast shaft. There is no longer a difference of pressure between opposite sides of the doorway, but it is transferred between the top of the downcast and the inlet to the fan on the top of the upcast.

Further, it will be noticed that, whereas with the airdoor closed no difference of pressure existed between

points on either one side or the other, now there is a definite drop of pressure between any two points in the air course. This drop in pressure is caused by the resistance offered to the current of air by the surface of the airway, and the total of all the pressure-drops between all points is equal to the water-gage pressure forcing the current through the mine. Assuming the size of the airway to remain the same, an increase of pressure would cause an increase of air with a corresponding increase of pressure drop between points, the total of which must always equal the water-gage pressure at the inlet of the fan. This fact is important, as it has a striking parallel with relation to conditions in a simple electric circuit.

Current Increases with Airway

Again, if the airway is increased in section, while the pressure is assumed to remain constant, a larger volume of air will pass while the drop in pressure from point to point remains as before the airway was increased in section.

In these instances we have conditions typical of electric circuits. (A) If the water-gage pressure is increased for a given airway the volume of air will increase, as will also the pressure drop from point to point along the airway. (B) Resistance is offered to the air-current by the rubbing surface of the airway. If the pressure is kept constant, while the section of the airway is increased, the current will increase, and if the cross-section of the airway is reduced the current of air will also be reduced.

Referring now to an ordinary electric cell, let us assume a simple circuit connected to its terminals. The circuit is open by a piece of insulation so that no current can pass along the wire. The wire represents the airway, and the insulation takes the place of the door in the ventilation analogy. There is a certain difference of electrical pressure between the two points on either side of the insulator. The distribution of pressure in the electric circuit is similar to that when the air-door was closed: there is no difference of pressure between points on the wires connected to the same terminal of the cell, but the pressure between a point on one wire and another on the other wire is the same as that between opposite ends of the insulator.

Like Opening Door in Airway

If the insulator is removed and a continuous path is provided, a current will flow through the wire from one terminal to the other. This is equivalent to opening the air-door and allowing the difference of pressure to send an air-current through the airway, the fan acting like a huge cell from which the current is taken and returned. The assumption that a flow of current takes place in an electric current is justifiable, and that it also has direction is made evident from the fact that certain kinds of measuring instruments will read backwards or forwards, depending upon the direction of the current. It is very convenient to be able to refer to an electric current as flowing in a wire, because it assists the student to grasp more easily the theory of the subject.

Assuming the insulator to be re-

moved, it is now necessary to compare the simple electric circuit with the ventilating circuit, when the door in the airway is open. As soon as the insulator is removed, and the current starts to flow, the full difference of pressure between the two ends of the insulator vanishes and is transferred to the terminals of the cell, assuming this pressure remains constant.

This is just what happened when the air-door was opened. The full difference of pressure was transferred to the top of the two shafts. Further, the wire offers resistance to the passage of current, and consequently, a drop in pressure exists between any two consecutive points in the circuit. The total drop through the wire is equal to the difference of pressure necessary to force the current through the circuit. This is the pressure between the two terminals of the cell and corresponds to the difference of pressure between the tops of the ventilation shafts when a current of air was passing. An important point is that the current is not used in the circuit in the sense of being consumed. The amount returning to the negative terminal of the cell is the same as that which leaves the positive terminal, just as in the case of the airway, where the amount of air entering the downcast shaft is equal to that leaving the upcast.

Work Done Against Resistance

A definite amount of work is done in both cases, the one in overcoming the resistance offered to the air-current by the rubbing surface of the airway, and the other in forcing a current against the resistance of the wire. The drop in pressure from point to point in both represents work being done. Finally, we have the same two principles referred to regarding the airway: (A) If the pressure is increased for a given circuit, the current through the wire will also increase, as will the pressure-drop from point to point along the wire.

(B) Resistance is offered to the electric current by the wire. Assuming the pressure to be constant, if the cross-section of the wire is increased, a larger current will flow, and if the cross-section of wire is reduced the current flowing will be less. Hence, we see that the simple ventilating theory has much in common with the electric principles.

ENGINEER.

Lubrication of Locomotive Motor Bearings

High-grade oil should be used for lubricating the sleeve bearings of locomotive motors. The common practice is to use one or two gills of oil at each oiling period, which is on the average every seven days. The best results are obtained by pouring the oil into the separate oil-well chamber so that it must feed up through the waste to the axle. By this means dirt in the oil does not get to the bearings, the waste acting as a screen or filter. If the oil is poured on top of the waste, it will tend to flood the bearing and thus be wasted. It is not economy to try to operate with too little oil as any apparent saving is more than offset by the resultant short life of the bearings.



Production And the Market



Continued Excess of Consumption Over Output Hastens Inevitable Upturn in Soft-Coal Trade

The seeming anomaly of production at a level far below consumption and with demand and prices practically at rock bottom continues to prevail in the soft-coal markets of the country. Nevertheless, the long-deferred but inevitable upturn is slowly but surely approaching. A number of brave prophets in industrial affairs say that the present slowdown is only a breathing spell preparatory to a business revival in the autumn. Some irrepressible optimists profess even now to see the first faint gleams of sunlight through the dark clouds that have enshrouded the trade for many weeks. There is no question, however, that the trade is steadily settling toward a more stable basis, that a firm foundation is being laid for a revival—regardless of the forebodings of the incurable disciples of gloom. Meanwhile buying, such as it is, is largely of a hand-to-mouth character, even those whose stockpiles are no longer big showing no alacrity about entering into fuel contracts while there is the remotest possibility of prices going lower.

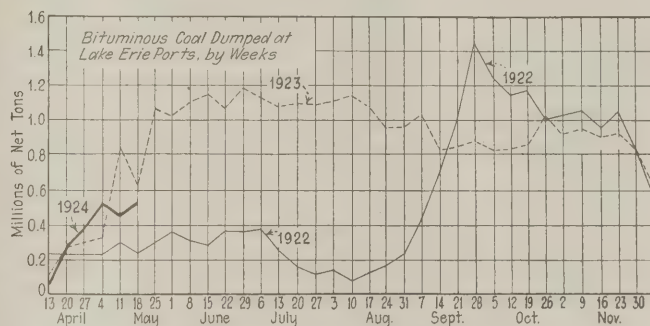
Shipping Board Bids as Market Indicator

The surplus of empty cars continues to swell steadily to a yawning void that fairly seems to ache for the initiation of the reported government scheme to set a summer coal-buying plan in motion. Shipments to tide-water as well as inland are at a low ebb and the demand for lake tonnage is markedly weak. Much light is thrown on market conditions by the bids submitted May 16 to the U. S. Shipping Board for supplying and delivering alongside vessels in New York Harbor 1,430 gross tons of bituminous coal running not less than 14,500 B.t.u. Four bids were received, the prices ranging from about \$1.92 to \$2.19 per net ton f.o.b. mine, compared with \$1.92 to \$2.77 in the bids submitted May 12 on 216,000 tons.

Coal Age Index of spot prices of bituminous coal

again failed to register any change during the last week, standing at 169 on May 19, the corresponding price being \$2.05.

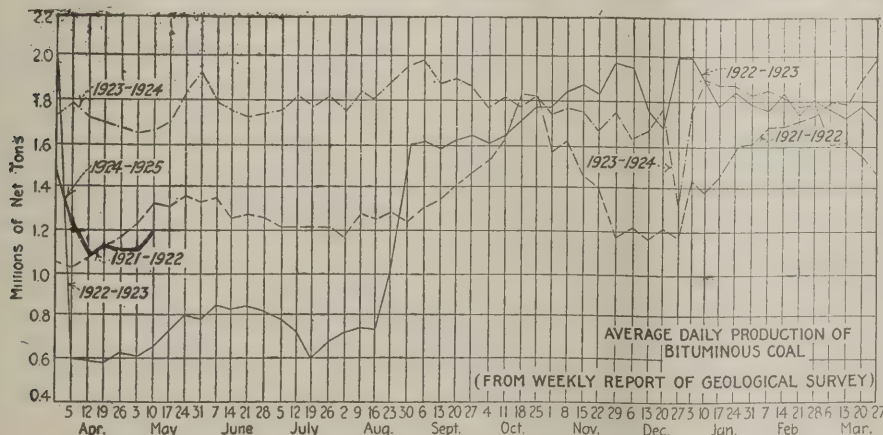
Dumpings at Hampton Roads for all accounts during the week ended May 15 amounted to 261,732 net tons, as compared with 293,849 tons dumped during the preceding week. Coal dumped at Lake Erie ports during the week ended May 17, according to the Ore & Coal



Exchange, were as follows: Cargo, 523,499 net tons; fuel, 35,697 tons. The totals for the previous week were 450,570 tons of cargo coal and 32,726 tons of fuel coal.

For the first time since March the production of bituminous coal passed the 7,000,000-ton mark during the week ended May 10, when, according to the Geological Survey, the output was 7,121,000 net tons. This compares with 6,832,000 tons produced during the previous week. There also was a marked increase in the output of anthracite, 1,924,000 net tons having been produced, compared with 1,616,000 tons during the week ended May 3.

Despite the upturn in anthracite production, due largely to the settlement of local labor disturbances, the hard-coal market shows no diminution in strength.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
April 26	10,103,000	6,724,000
May 3 (a)	10,061,000	6,832,000
May 10 (b)	10,175,000	7,121,000
Daily average	1,696,000	1,187,000
Cal. yr. to date (c)	197,272,000	176,281,000
Daily av. to date	1,767,000	1,581,000

ANTHRACITE

April 26	2,116,000	1,205,000
May 3	2,021,000	1,616,000
May 10	1,903,000	1,924,000
Cal. year to date	37,518,000	33,173,000

COKE

May 3 (a)	407,000	205,000
May 10 (b)	401,000	177,000
Cal. yr. to date (c)	7,173,000	5,065,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Demand for the most-wanted sizes, particularly stove, is still greater than the supply, but the most pressing demands are being taken care of when the consumer is willing to take some of the less wanted sizes along with the popular favorites.

No Life in Midwest Yet

There has been practically no activity in the Chicago market during the last week. Domestic sizes, as heretofore, have been difficult to move and steam sizes have been in medium demand only. Mines running have been doing so very largely on railroad orders. Prices appear to be attractive enough to the purchasing agent; what is holding him back is a well defined uncertainty as to the future. On this low market it is surprising that there is not more price cutting, even on the better favored coals of the producing districts. The tendency to hold prices firm probably is a natural development arising from the large consolidation of coal properties already effected and to be effected a little later on in the season. It might be explained, too, by April balance sheets, now trickling into the front offices.

Eastern coals continue their inroads on the territory of the Illinois and Indiana mines. A substantial tonnage of

smokeless coal is moving into the Middle West and more is booked to move in later on. The demand for anthracite is reasonably good. Extra activity on eastern Kentucky coal is explained by the new and favorable freight rates recently published covering shipments from eastern Kentucky mines to points in Illinois, Iowa and Minnesota.

The past week has seen just a slight movement of domestic sizes from the Williamson and Franklin County field of Illinois. It is not an early storage movement, however; it is just a case of where unseasonable weather in two or three places cleaned out the dealers. In a general way there is no change. All mines have unbilled coal of all sizes on hand, excepting No. 2 nut and the smaller sized nut and screenings. No. 2 nut is unusually scarce throughout all fields and screenings are not plentiful. In most fields the mines are crushing mine run to make screenings.

The movement of domestic coal at St. Louis is practically at a standstill. Neither high nor low grade is being bought and wagonload steam is decidedly sluggish. It is expected that the storage of coal will begin in June this year. Country domestic is unusually quiet. There is a little country demand for steam sizes, but locally outside of the demand for screenings, which is good and which exceeds the supply, there is nothing out of the ordinary.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
	Market Quoted	May 21 1923	May 5 1924	May 12 1924	May 19 1924†		Market Quoted	May 21 1923	May 5 1924
Smokeless lump	Columbus...	\$6.25	\$3.40	\$3.40	\$3.35@ \$3.60	Franklin, Ill. lump	Chicago	\$3.80	\$2.75
Smokeless mine run	Columbus...	4.05	2.25	2.25	2.20@ 2.35	Franklin, Ill. mine run	Chicago	3.10	2.35
Smokeless screenings	Columbus...	3.70	1.85	1.85	1.75@ 2.00	Franklin, Ill. screenings	Chicago	1.80	2.15
Smokeless lump	Chicago	6.10	3.10	3.10	3.00@ 3.25	Central, Ill. lump	Chicago	2.60	2.60
Smokeless mine run	Chicago	4.10	2.00	2.00	2.00	Central, Ill. mine run	Chicago	2.10	2.10
Smokeless lump	Cincinnati	6.25	3.35	3.50	3.50	Central, Ill. screenings	Chicago	1.85	1.90
Smokeless mine run	Cincinnati	4.25	2.05	1.85	1.75@ 2.00	Ind. 4th Vein lump	Chicago	3.35	2.85
Smokeless screenings	Cincinnati	4.25	1.75	1.75	1.50@ 2.00	Ind. 4th Vein mine run	Chicago	2.85	2.35
*Smokeless mine run	Boston	6.85	4.40	4.40	4.35@ 4.60	Ind. 4th Vein screenings	Chicago	1.85	1.95
Clearfield mine run	Boston	2.60	2.00	1.95	1.65@ 2.40	Ind. 5th Vein lump	Chicago	2.85	2.35
Cambria mine run	Boston	3.25	2.55	2.35	2.25@ 2.75	Ind. 5th Vein mine run	Chicago	2.10	2.10
Somerset mine run	Boston	3.00	2.30	2.10	2.00@ 2.50	Ind. 5th Vein screenings	Chicago	1.55	1.80
Pool 1 (Navy Standard)	New York	3.75	2.85	2.85	2.60@ 3.00	Mt. Olive lump	St. Louis	2.85	2.85
Pool 1 (Navy Standard)	Philadelphia	3.80	3.00	3.00	2.75@ 3.25	Mt. Olive mine run	St. Louis	2.50	2.50
Pool 1 (Navy Standard)	Baltimore					Mt. Olive screenings	St. Louis	2.00	2.00
Pool 9 (Super. Low Vol.)	New York	2.90	2.20	2.20	2.00@ 2.40	Standard lump	St. Louis	2.25	2.15
Pool 9 (Super. Low Vol.)	Philadelphia	2.85	2.20	2.20	2.00@ 2.45	Standard mine run	St. Louis	1.80	1.95
Pool 9 (Super. Low Vol.)	Baltimore	2.75	1.80	1.80	1.75@ 1.95	Standard screenings	St. Louis	1.50	1.80
Pool 10 (H.Gr. Low Vol.)	New York	2.50	1.90	1.90	1.75@ 2.00	West Ky. lump	Louisville	2.60	2.35
Pool 10 (H.Gr. Low Vol.)	Philadelphia	2.35	1.85	1.85	1.70@ 2.00	West Ky. mine run	Louisville	1.30	1.60
Pool 10 (H.Gr. Low Vol.)	Baltimore	2.30	1.65	1.65	1.60@ 1.75	West Ky. screenings	Louisville	1.60	1.65
Pool 11 (Low Vol.)	New York	2.05	1.55	1.60	1.50@ 1.75	West Ky. lump	Chicago	2.60	2.25
Pool 11 (Low Vol.)	Philadelphia	2.05	1.50	1.50	1.30@ 1.70	West Ky. mine run	Chicago	1.80	1.60
Pool 11 (Low Vol.)	Baltimore	2.00	1.55	1.55	1.50@ 1.65				
High-Volatile, Eastern					South and Southwest				
Pool 54-64 (Gas and St.)	New York	1.85	1.50	1.50	1.40@ 1.65	Big Seam lump	Birmingham	2.70	2.80
Pool 54-64 (Gas and St.)	Philadelphia	2.05	1.55	1.55	1.45@ 1.70	Big Seam mine run	Birmingham	2.05	2.00
Pool 54-64 (Gas and St.)	Baltimore	1.80	1.45	1.45	1.40@ 1.55	Big Seam (washed)	Birmingham	2.35	2.20
Pittsburgh sc'd rag	Pittsburgh	2.85	2.40	2.40	2.30@ 2.50	S. E. Ky. lump	Chicago	3.75	2.25
Pittsburgh gas mine run	Pittsburgh	2.00	2.10	2.10	2.00@ 2.25	S. E. Ky. mine run	Chicago	2.35	1.60
Pittsburgh slack (Gas)	Pittsburgh	1.85	1.35	1.35	1.30@ 1.40	S. E. Ky. lump	Louisville	3.75	2.10
Kanawha lump	Columbus	3.25			†	S. E. Ky. mine run	Louisville	2.50	1.50
Kanawha mine run	Columbus	3.25			†	S. E. Ky. screenings	Louisville	1.90	1.05
Kanawha screenings	Columbus	1.75			†	S. E. Ky. lump	Cincinnati	3.35	2.05
W. Va. lump	Cincinnati	3.10	2.00	2.15	2.00@ 2.25	S. E. Ky. mine run	Cincinnati	1.80	1.35
W. Va. gas mine run	Cincinnati	1.80	1.35	1.40	1.25@ 1.50	S. E. Ky. screenings	Cincinnati	1.60	.85
W. Va. steam mine run	Cincinnati	1.80	1.35	1.40	1.25@ 1.50	Kansas lump	Kansas City	3.85	4.50
W. Va. screenings	Cincinnati	1.65	.90	1.05	1.00@ 1.10	Kansas mine run	Kansas City	3.25	3.25
Hocking lump	Columbus	2.75	2.45	2.45	2.25@ 2.60	Kansas screenings	Kansas City	2.60	2.50
Hocking mine run	Columbus	1.95	1.60	1.60	1.50@ 1.75				
Hocking screenings	Columbus	1.45	1.30	1.35	1.30@ 1.50				
Pitts. No. 8 lump	Cleveland	2.95	2.40	2.40	2.10@ 2.75				
Pitts. No. 8 mine run	Cleveland	2.15	1.85	1.90	1.85@ 1.90				
Pitts. No. 8 screenings	Cleveland	1.65	1.55	1.50	1.40@ 1.60				

* Gross tons, f.o.b. vessel, Hampton Roads.

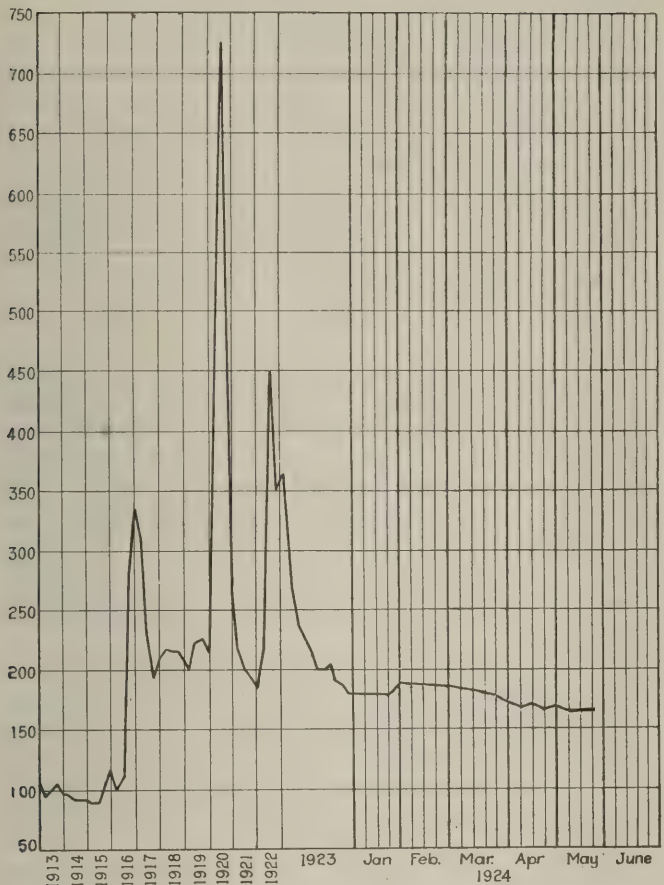
† Advances over previous week shown in heavy type, declines in *italics*

‡ Strike on.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		May 21, 1923		May 12, 1924		May 19, 1924†	
Broken	Market Quoted	Freight Rates	Independent	Company	Independent	Company	Independent
Broken	New York	\$2.34		\$7.75@ \$8.35	\$8.50@ \$8.60	\$8.00@ \$8.75	\$8.00@ \$8.75
Broken	Philadelphia	2.39		7.90@ 8.10		8.60@ 8.75	8.60@ 8.75
Egg	New York	2.34	\$8.50@ \$11.00	8.00@ 8.35	8.75@ 9.25	8.35@ 8.75	9.00@ 9.25
Egg	Philadelphia	2.39	9.25@ 9.50	8.10@ 8.35	8.35@ 9.50	8.70@ 8.75	8.35@ 9.50
Egg	Chicago*	5.06	12.00@ 12.50	7.20@ 8.25	7.68@ 7.77	7.73@ 7.81	7.68@ 7.77
Stove	New York	2.34	8.50@ 11.00	8.00@ 8.35	9.00@ 9.50	8.35@ 9.00	9.00@ 9.50
Stove	Philadelphia	2.39	9.25@ 9.50	8.15@ 8.35	8.70@ 9.60	8.75@ 8.95	8.70@ 9.60
Stove	Chicago*	5.06	12.00@ 12.50	7.35@ 8.25	8.03@ 8.17	7.94@ 8.14	8.03@ 8.17
Chestnut	New York	2.34	8.50@ 11.00	8.00@ 8.35	8.75@ 9.25	8.35@ 8.85	8.75@ 9.25
Chestnut	Philadelphia	2.39	9.25@ 9.50	8.15@ 8.35	8.75@ 8.85	8.70@ 9.60	8.75@ 8.85
Chestnut	Chicago*	5.06	12.00@ 12.50	7.35@ 8.35	7.90@ 8.03	7.81@ 7.99	7.90@ 8.03
Range	New York	2.34		8.30		8.60	8.60
Pea	New York	2.22	6.30@ 7.25	6.00@ 6.30	5.50@ 6.00	5.50@ 6.00	5.50@ 6.00
Pea	Philadelphia	2.14	7.00@ 7.25	6.15@ 6.20	5.75@ 6.25	5.75@ 6.00	5.75@ 6.00
Pea	Chicago*	4.79	7.00@ 8.00	5.49@ 6.03	5.36	5.36@ 5.91	5.36
Buckwheat No. 1	New York	2.22	2.25@ 3.50	3.50@ 4.15	2.35@ 3.00	3.00@ 3.15	2.35@ 3.00
Buckwheat No. 1	Philadelphia	2.14	3.00@ 3.50	3.50	2.50@ 3.00	3.00	2.50@ 3.00
Rice	New York	2.22	1.50@ 2.50	2.50	1.90@ 2.25	2.00@ 2.25	1.90@ 2.25
Rice	Philadelphia	2.14	2.00@ 2.50	2.50	2.00@ 2.25	2.25	2.00@ 2.25
Barley	New York	2.22	1.00@ 1.50	1.50	1.50@ 1.75	1.50	1.50@ 1.75
Barley	Philadelphia	2.14	1.15@ 1.50	1.50	1.50	1.50	1.50
Birdseye	New York	2.22		1.60		1.60	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in *italics*



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924			1923
	May 19	May 12	May 5	May 21
Index	169	169	169	221
Weighted average price	\$2.05	\$2.05	\$2.05	\$2.63

This diagram shows the relative, not the actual, prices on four-teen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Kentucky Full of "No Bills"

Business continues generally quiet with the coal trade of Kentucky, neither the eastern nor western fields having much business in hand, while there is considerable unsold coal reported on tracks, at mines, at marketing points, and rolling, due to a general lack of orders. Cold weather over the week has resulted in just a few orders for small lots of coal, but retailers are cleaning up yard stocks and placing very little business. Utility, industrial and lake buying are all reported slow. Railroad consumption is a little below normal.

The general outlook for the next thirty to sixty days is poor, as competition is very keen, business is being done on very narrow margins, and the trade is anything but satisfactory. Prices are unchanged. The western Kentucky strike goes ahead uneventfully with the non-union mines producing more than enough to glut the market.

The movement of coal from West Virginia was greatly retarded for a few days by swollen streams throughout the state. All grades of smokeless are in a somewhat better market position. High volatile splint lump prices are a little weaker, but mine run is in a little better position than it was. As not much coal is being prepared, slack is becoming somewhat scarce.

Northwest Quiet Too

Duluth trade is very dull. Little coal of any kind is moving in. A slight spell of cold weather has been the only bright spot for the coal men. Prices still hold in both hard and soft, but some docks are being accused of cutting from 50c. to \$1 in order to obtain a few of the large contracts.

The trouble with hard coal is that it is expected that smokeless will go big here next winter, and the spread between hard and soft is so great that it is worth the consumer's while to buy smokeless. This is the frank opinion of coal men, and those who used smokeless this winter reported fine results.

Figures of coal on Head-of-the-Lakes docks at the first of the month show in all 2,900,000 tons of soft and 145,000 tons of hard. Of the soft, 1,700,000 is free coal. Shipments for this month will show a marked falling off from those of last month. The rate on lake coal from lower lake ports to Duluth has been set at 40c. a ton. This is 5c. below last year.

The coal trade at Milwaukee is very quiet. Naturally there is little demand for anthracite at this time of the year, but there should be a better movement of soft coal to industries. Jobbers who have canvassed the interior say there are no stocks of any consequence on hand, yet consumers continue to hold off. Coal keeps coming by lake in fair volume. Thus far this season the receipts of anthracite aggregate 68,576 tons and of soft coal 175,699 tons. The movement is bound to slacken when storage becomes a problem.

Western Trade Drags

There is little activity through the Southwestern district. A substantial surplus accumulated by independents during the shutdown of mines controlled by members of the Southwestern Interstate Coal Operators' Association is increasing. A few mines with small industrial contracts have resumed operations since the signing of the new agreement. The Western Coal & Mining Co. has reopened to supply the Missouri Pacific, but most operators are waiting for a market.

Kansas lump is \$4.50; nut, \$4; mine run \$3.50 and screenings, \$2.50. Arkansas semi-anthracite lump is \$6 and mine run \$3.25@3.50. No slack is available. Henryetta (Okla.) lump is \$5.50; nut, \$3.75; mine run \$3.50; and screenings, \$2.50.

In Colorado the coal market continues to drag. Industries are buying very little and the domestic consumption has fallen off considerably. Mines worked on an average of 22 hours per mine last week. Prices are unchanged.

Utah coal mines are working about two days a week. Mine-controlled retail agencies are stocking lump, but this total is small. Some of the operators are unable to supply the demand for slack, due to the light movement on the larger sizes. Prices remain firm. Operators declare they have reached bed rock. Whether dealers will offer storage rates this year has not been decided yet. Mine prices: lump, \$3.50; domestic lump, \$3; egg, \$2.50; nut, \$2.25; screen slack, \$2; slack, \$1.50.

Trade at Cincinnati on Even Keel

Lake business at Cincinnati is swinging back to its natural channel and business generally is beginning to run on a fairly even keel. Demand for steam coal is a little better, lending a steadying influence. Large sizes are a little firmer due to the pressure, perhaps that has been put upon the price of the resultant. There has been no change in the status of the specialized coals. In smokeless the firmness is all found in the lump and egg with production lagging a little behind demand. There is no change in the retail situation. The high water has interfered a bit with the bringing down of river coal and this even with a reduced tonnage because of the Kanawha shutdown.

While there are inquiries here and there for commercial tonnage, the steam trade at Columbus is dull. Consumers are content to buy in the open market, confident that low prices will continue for some time. Operators are not inclined to contract at present figures and outside of certain small renewals there is little doing in that line. Railroad contracts have been closed and the price for Hocking mine run is around \$2. The amount of distress coal on the local market is not as large as formerly, although a fair tonnage is being picked up by utilities and other large steam users. Prices continue irregular and weak and more mines in the Hocking Valley field are closing down. Domestic trade also is quiet. In the Lake trade quite a few vessels are moving from the lower lake ports to the head of navigation. Inquiries for lake tonnage are almost entirely lacking in marked contrast with previous seasons.

The market at Cleveland shows no revival from the lethargy that has prevailed of late. Production in the east-

ern Ohio No. 8 field in the week ending May 10 increased 41,000 tons over the preceding week. The total output was 280,000 tons, or about 40 per cent of potential capacity. Despite increased output, due to lake movement, slack prices hold firm at recent levels.

Line demand continues poor in the Pittsburgh market. No extended deliveries are being inquired for and producers find it useless to attempt to negotiate such business. The market is simply one of small spot lots, which are closely contested for, but with prices down to a low level there is no general declining tendency in prices. There are reports of some lake coal being loaded on track, awaiting sales. There are no regular negotiations on lake coal.

A slight improvement was noted during the week in market conditions in central Pennsylvania, production gaining a little over April. More orders are being booked than for a number of weeks, but these are going to operators with the lower production cost. The loadings for the week ending May 10 were 11,732 car loads, against 10,864 car loads for the previous week. For the period of May to the 10th, the loadings were 16,978 cars, against 14,133 in April to the same date. Prices show little fluctuation.

The trade at Buffalo continues featureless. Slack coal, which for a time was fairly strong, is now about in line with other sizes. Considerable West Virginia and Kentucky coal is selling here the price being cut to make up for the higher freight.

Dullness Again Enshrouds New England

The market for steam coals in New England continues extremely dull. Prices have not shown the firmness expected a fortnight ago, and in many directions there is an utter lack of buying interest. The staple industries, such as shoes and textiles, are in nowise improved, and reserve stocks are still large enough to preclude purchases of more than scattering amounts.

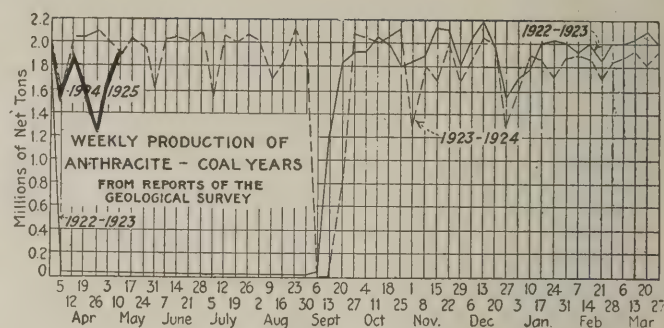
Navy Standard Pocahontas and New River are dragging along at \$4.35@4.60 per gross ton f.o.b. vessel, with no snap to demand. A fair amount of tonnage is moving coastwise on contract, but aside from certain commitments offshore there is little doing for spot shipment. On the whole the range of prices averages 5c. to 10c. less than a week ago, while coals of pool 2 grade have eased off 20c. to 25c.

On cars Boston, Providence, and Portland there is little change; \$5.50 per gross ton appears to be the ruling figure, but occasionally there are rumors of prices 10c. to 15c. less. Practically all the factors have maximum tonnages on their wharves, and some weeks there is an extra push to move coal.

All-rail trade is practically lifeless. Within the tidewater zone there is almost nothing doing via the rail route, and prospects continue decidedly dark.

Seaboard Markets Verge on Stagnation

New York consumers continue to buy on a hand to mouth basis, apparently unmindful of the future. There are some reports, however, that inquiries are increasing and that the present condition means a much stronger market within the next few months. Inactivity prevails at present, however. Demand is hardly heard of and buyers are hard to find. The New York tidewater market is on the verge of stagnation. Prices are maintained at their present level only because of the absence of coal on demurrage and the reluctance of operators to send coal to tidewater unless



it is on order and selling indications are good. Cars at the piers average 1,100 to 1,200 daily. Activity is lacking at Philadelphia, yet confidence is felt that the turn of the tide is not far off. Industrial activity has slowed down considerably as compared with a month ago, and even then there was much complaint of dullness. Many operators are devoting much time to reshaping the wage policy in an effort to get production costs down to meet competition with non-union mines. Spot prices are fairly stable. Tide shipments remain quiet, with very little coal moving outside of some bunkering. The number of cars at tide is small, as no one is taking any kind of a chance by having coal on demurrage.

Baltimore purchasers are merely buying sufficient to keep them in emergency supplies, but there is very little contracting and practically little storing against future needs. The only consolation in this is that when a demand develops, there will undoubtedly be a need for coal by practically all large users. The export movement has shown a disappointing falling off, though inquiry from Mediterranean and South American points would seem to indicate an early resumption.

The Birmingham market continues weak with inquiry and new business at a low ebb for steam coal, consumers picking up tonnage for immediate use in the spot market, with no inclination to stock. Contracting is slow. Practically all the remaining operators who did not make wage reductions last autumn or on April 1 last put new schedules in effect May 16.

Anthracite Market Retains Strength

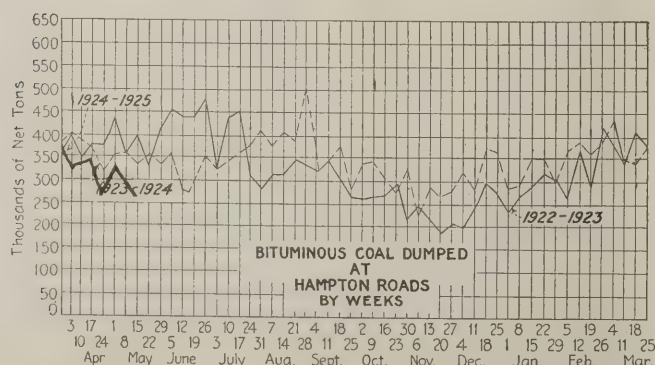
Anthracite demand at New York has not in any way decreased and consumers are just as anxious to have their bins filled as dealers are to fill them. Stove coal leads in strength. Some retail dealers refuse orders for this size alone, but will take orders when other sizes are included. Some quotations for straight independent stove are as high as \$9.75 at the mine, but when taken with other coals the quotations are about 25c. lower. There is plenty of egg and chestnut to be had. Pea coal continues in good demand, considering this market and the better grades of independent product bring full company circular. Consumption has been unusually heavy for this season because of weather conditions and dealers find themselves delivering small orders when they ought to be filling bins. Barley is the strongest of the steam coals with the better grades from independent operations bringing premiums. Buckwheat is easier, while rice maintains its strong position.

A strong demand for stove coal is a notable feature of the Philadelphia market. The situation from the producer's standpoint is better than at this time last month, but there are signs of an easing off. The yards are filling up with all sizes of coal, with most dealers having heavy stocks of nut. The opinion is general that the producing companies will add another 10c. to mine prices, but the thing that is giving the retail trade the most concern is whether their prices shall be advanced.

Output of beehive coke during the week ended May 10 was 177,000 net tons, according to the Geological Survey, compared with a production of 205,000 tons during the previous week.

Car Loadings

	Cars Loaded	Coal Cars
Week ended May 3.....	914,040	127,165
Previous week	878,892	117,572
Same week in 1923	961,617	175,482



Foreign Market And Export News

British Coal Market Stagnant; Miners' Wages Increased

The British coal markets are stagnant on account of the threatened strike of tipplers and trimmers, according to a radioletter to the Department of Commerce from Commercial Attaché Walter S. Tower, London, but a stoppage has been arrested by action of the Ministry of Labor. Prices are slightly firmer, reflecting the Ruhr labor trouble. The freight markets are dull and unchanged.

The recent findings of the official court of inquiry into the coal industry having been favorable to the miners, mine owners and union officials reached an agreement May 15 on higher pay.

The main point of the settlement is that the general minimum wage is to be increased from 20 per cent above the pre-war rate to 33½ per cent above. The standard of profits for owners is to be 15 per cent of the standard wage instead of 17 per cent as at present. The surplus, if any, is to be divided 88 per cent to the men and 12 per cent to the owners, instead of 83 and 17, as at present.

After the meeting A. J. Cook, general secretary of the Miners' Federation, said his Executive Committee would recommend that the men accept the agreement, though he was not satisfied it met with their full requirements.

Production by British collieries during the week ended May 3, a cable to *Coal Age* states, was 5,685,000 tons, according to the official reports. This compares with 4,049,000 tons in the week ended April 26.

Lethargy Grips Hampton Roads; Stocks Low; Prices Hold

Business at Hampton Roads is slow with foreign movement slumping and other lines of trade barely holding their own. The opening of lake shipments promised to boost coastwise trade, but little improvement has been shown. Stocks at the piers are lower than at any time in the year, and a state of

lethargy has settled down on the piers. Prices appear to hold their own, however, having reached what shippers term the rock bottom.

The tone of the market is dull. Contracts are absent, and general activity in the trade has reached a low level. Some of the dullness is attributed to seasonal conditions, and the trade is not exercised over the let-up in movement.

French Market Holds Its Own; Changes Are Insignificant

The situation in the French market is unchanged as far as French coals are concerned, except that production has declined somewhat. The demand for household fuel is practically at a standstill, consumers waiting for the summer rates before placing their orders.

With the sterling rate under 70 fr., British coals are offered at more reasonable prices. If the decline should continue, they may be within hailing distance in price to the French product and even cheaper than indemnity fuels.

Deliveries of indemnity fuels are averaging 42,700 tons daily, the total for April being estimated at 1,200,000 tons. Supplies of coke to the O.R.C.A. are at the rate of about 20,000 tons a day.

The M.I.C.U.M. agreement with the Ruhr operators was extended on April 15 to June 15, but may be terminated within that period if reparation payments are regulated before that date, according to a radio letter from Acting Commercial Attaché Donald L. Breed, Berlin. The main changes from the previous agreement include the fixing of the current coal tax at 1.50 gold marks per metric ton instead of 8 francs as previously, delivery of coal to the Régie at official German price minus 6 per cent and payment of overpaid taxes above \$15,000,000 on back coal taxes amounting to about \$2,000,000 of which \$1,000,000 is to be re-

turned at once. The current reparations coal deliveries amount to 1,650,000 tons monthly for which no payment is made, either by the Allies or by the German Government.

Ruhr Coal Output Near Normal

Coal output in the Ruhr during March is reported to have been 8,254,499 tons. This compares with 7,050,058 tons in February and 6,187,481 tons in January of this year, and 8,939,855 tons in March of 1913. Inasmuch as the output of three French "régie mines" is omitted in the figures for last March it is taken to mean that coal production in the Ruhr is now fully restored.

Export Clearances Week Ended May 17, 1924

FROM HAMPTON ROADS

	Tons
For Argentina:	
Br. Str. Eastgate for Buenos Aires...	6,010
For Brazil:	
Br. Str. Newtonmoor for Rio de Janeiro	5,620
Br. Str. King City for Rio de Janeiro	4,229
Br. Str. Ilvington Court for Rio de Janeiro	6,457
For Canada:	
Br. Str. Maraval for Georgetown	522
Br. Barkentine Maid of England for Charlottetown	588
For Chile:	
Br. Str. Mount Berwyn for Antofagasta	6,934
For Philippines:	
Amer. Str. Elkton for Cavite	6,003
For West Indies:	
Amer. Schr. Edward R. Smith for Nassau	577
Nor. Str. Bur for Fort de France	6,229

FROM BALTIMORE

For Canada:	
Dan. Str. Kirsten Jensen	5,132

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.	May 8	May 15
Cars on hand	1,124	1,126
Tons on hand	71,241	70,178
Tons dumped for week	93,638	96,498
Tonnage waiting	17,000	10,000
Virginian Piers, Sewalls Pt.		
Cars on hand	1,091	1,215
Tons on hand	76,800	84,900
Tons dumped for week	94,824	73,295
Tonnage waiting	8,300	3,000
C. & O. Piers, Newport News:		
Cars on hand	960	633
Tons on hand	45,693	33,125
Tons dumped for week	73,903	63,886
Tonnage waiting	16,450	10,485

Pier and Bunker Prices, Gross Tons

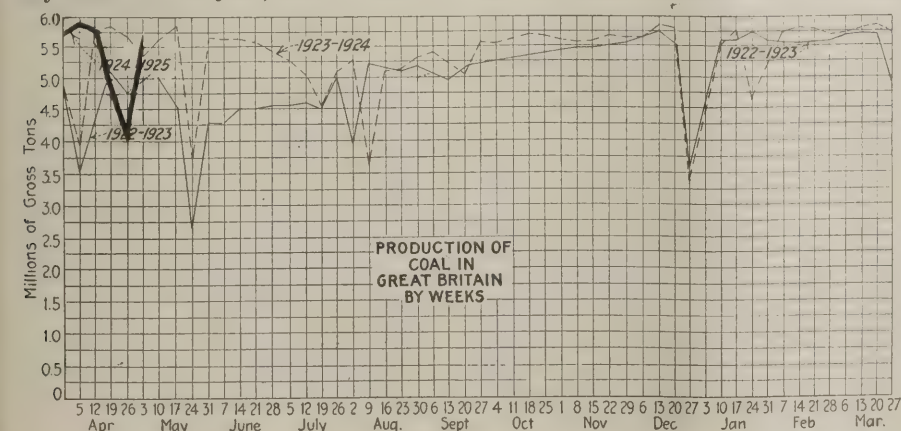
	May 10	May 17†
PIERS		
Pool 9, New York	\$4.75 @ \$5.00	\$4.85 @ \$5.00
Pool 10, New York	4.60 @ 4.85	4.65 @ 4.75
Pool 11, New York	4.40 @ 4.50	4.40 @ 4.50
Pool 9, Philadelphia	4.70 @ 5.05	4.70 @ 5.05
Pool 10, Philadelphia	4.45 @ 4.80	4.45 @ 4.80
Pool 11, Philadelphia	4.30 @ 4.55	4.30 @ 4.55
Pool 1, Hamp. Roads	4.40	4.40
Pool 2, Hamp. Roads	4.25	4.15
Pools 5-6-7 Hamp. Rds.	4.00	4.00 @ 4.15
BUNKERS		
Pool 9, New York	5.05 @ 5.30	5.15 @ 5.30
Pool 10, New York	4.90 @ 5.15	4.95 @ 5.05
Pool 11, New York	4.70 @ 4.80	4.70 @ 4.80
Pool 9, Philadelphia	5.00 @ 5.40	5.00 @ 5.40
Pool 10, Philadelphia	4.75 @ 5.00	4.75 @ 5.00
Pool 11, Philadelphia	4.50 @ 4.80	4.50 @ 4.80
Pool 1, Hamp. Roads	4.50	4.50
Pool 2, Hamp. Roads	4.25	4.25
Pools 5-6-7 Hamp. Rds.	4.15	4.00 @ 4.15

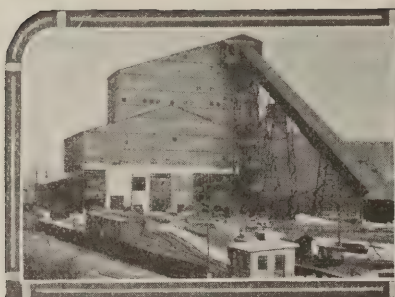
Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to Coal Age

	May 10	May 17†
Cardiff:		
Admiralty, large	27s.6d. @ 28s.6d.	28s. @ 28s.6d.
Steam smalls	18s. @ 18s.6d.	19s.
Newcastle:		
Best steams	26s.	26s.
Best gas	25s.	25s.
Best bunkers	23s.	23s.

† Advances over previous week shown in heavy type; declines in *italics*.





News Items From Field and Trade



ILLINOIS

Progress is being made on the new strip pit of the Equitable Coal & Coke Co., at Du Quoin. The H. H. Hall Construction Co., of East St. Louis, has completed the switch grade from the main line of the Illinois Central R.R. to the site of operations. It is expected that assembly of the huge electric stripping shovel will begin soon. Arthur F. Lee, chief engineer; T. S. Cousins, general superintendent, and Jas. McSherry, assistant superintendent, are the officials in charge of local operations for the company at Du Quoin.

The strip mine of the Hartshorn Coal & Mining Co., located near Elkhville, south of Du Quoin, is now operating full blast. The concern uses a 300-ton electric stripping shovel and all coal mined is put over picking tables and loading booms in a complete steel tippie.

The Jewel Coal & Mining Co., which is operated now by the Sterling-Midland Coal Co., of Chicago, is preparing to re-open its No. 2 shaft at Du Quoin. This mine has been closed for about two months. The company is moving a large coal-crushing machine from its No. 1 mine to No. 2, where it will be installed and put into use immediately. Mine No. 1 of the company has been closed and it is questioned if the mine will ever be opened again. Clarence Bean, formerly of Brazil, Ind., is now in charge of the company's affairs in Du Quoin.

All official business of the defunct Southern Gem Coal Corporation, formerly of Chicago, is now transacted at Pinckneyville, home town of Receiver W. S. Wilson. From the latest announcements, no further progress has been made in reaching a conclusive settlement for the creditors of the concern. Meanwhile, some 2,000 miners in Perry, Williamson and Franklin countries are still awaiting pay for December 1923.

The City of Moline has awarded a contract to the Moline Consumers Co. to furnish coal for the coming year at a maximum price of \$3.35 on Sherman 2-in. screenings and \$6.43 for pure seam 6-in. lump. Approximately 4,500 tons of coal will be used.

Assurance has finally been given that a complete and detailed survey will be made of the Big Muddy River regarding the possibilities of dredging it and making it navigable. According to Congressman E. E. Dennison, the Rivers and Harbors Committee of the House of Representatives recently reported a rivers and harbors omnibus bill which carries the survey as one of its items. The bill is expected to pass.

INDIANA

Contracts for the coal supply for the State of Indiana have been awarded by the State Purchasing Board. The Ogle Coal Co., Indianapolis, received a contract for 67,000 tons of mine-run deep-shaft coal on a bid of \$2.18 a ton f.o.b. mine. The same company got the contract for 20,100 tons of screenings at \$1.75 a ton. The Walter Bledsoe Coal Co., Terre Haute, was awarded contracts as follows: 12,000 tons of mine run, \$2.20; 24,900 tons of egg size, \$2.35; and 26,800 tons of screenings at \$1.75 a ton. The Bledsoe company's mine is close to the state farm and is able to ship with a low freight rate, which brought the total cost below that of competitors. Contracts for 10,000 tons for the State House and three other institutions are yet to be awarded.

W. H. Leland, of Chicago, president of the Leland Coal Co., closed a deal with Jabez Wooley, president of the Warwick Coal Co., for the Polk Patch mine near Boonville, for a consideration of \$500,000. The Leland company now owns nine mines in Indiana, Illinois and Kentucky. The Boonville mine will be opened at once as a strip mine, employing 60 men.

MASSACHUSETTS

The Island Creek Coal Co., in its report for the first quarter of 1924, showed net profits of \$998,231 after depreciation, depletion and federal taxes, equivalent after preferred dividends to \$7.76 a share earned on 118,802 outstanding shares of common stock, par \$1. This compares with \$738,276, or \$5.58 a share earned, in the corresponding period of 1923.

NORTH DAKOTA

Construction work on the new \$125,000 plant to be erected by the Lignite Coal & By-Products Corporation at Richardton, will begin soon, it has been announced by the company. Rev. P. Hoenerback, abbot of St. Mary's monastery at Richardton, is the president of the company.

OHIO

Ohio mines produced 40,726,215 tons of coal in 1923, according to a preliminary report by the division of labor statistics of the Ohio Industrial Commission. The report covers all of the coal-producing counties of the state and is a forerunner of a more complete report to be issued in a few weeks. Of the total output, 2,056,918 tons was pro-

duced by pick mining; 35,830,921 tons by machine mining and 2,878,376 by stripping. Belmont county, as in former years, was the largest producer with 13,272,618 tons by machine mining and 1,368 tons by stripping. Jefferson County was next with 5,239,582 tons by machine mining and 985,653 tons by stripping and Athens County is third with 4,403,932 tons by machine mining and none by stripping.

The Ohio Coal & Iron Co. recently increased its capital stock from \$50,000 to \$75,000, at a meeting at the offices of the company in Dayton. W. F. Grimes is president and E. H. Jaeger is secretary of the concern.

Col. Tom Morgan, former president of the Cincinnati Coal Exchange and until recently in charge of the jobbing department of the Webb Fuel Co., has been appointed by Clinton De Witt, president of the Chesapeake & Virginia Coal Co., as its Western manager. This was the position held by George W. Hill, Jr., until his death recently in Asheville, N. C. E. Makin Jones will be retained as his assistant.

A news item in these columns April 24 stated that the Pittsburgh & Bessemer Coal Co. had been appointed exclusive agent in Ohio and northern territory for the product of the Boone County Coal Corporation, of West Virginia. This was in part incorrect, for while the P. & B. company has been named as agent for the latter concern, it has not been made exclusive agent.

A meeting of idle miners in the Nelsonville section of the Hocking Valley was held at Nelsonville, Ohio, May 15 in protest against the operation of certain mines in that region on a co-operative basis. Most of the miners are out of work and are opposing their more fortunate neighbors who have organized co-operative concerns to operate a few of the smaller mines. The meeting was not called by the miners' officials and therefore did not represent the entire district.

PENNSYLVANIA

The Schuylkill County commissioners have decided to advertise the sale of Schuylkill County coal lands for non-payment of taxes. Ordinarily these advertisements are published only in the country newspapers, but the commissioners intend advertising these lands in New York, Philadelphia, Boston and Chicago papers. Attorneys for the coal companies say the proposed sale is a farce and predict there will be no bidders because the legality of the sale is questioned.

An outlaw strike, affecting all but one of the Lehigh Valley Coal Co. collieries in the Pittston region and throwing 11,200 mine workers idle, went into effect on Friday morning last. The strike order was issued by the general grievance committee. The cause for the strike was said to be the alleged refusal of Thomas Thomas, general manager of the company, to meet with International Board Member Alexander Campbell and District Board Member John Ruane, of the United Mine Workers, to adjust a strike of 800 men at the William A. colliery. Eleven collieries were idle because of the strike.

Harry M. Walker, who for the past eight years has been employed by H. M. Kanarr, mining engineer, Punxsutawney, has resigned his position and purchased the interests of Ned McCartney and will carry on a general engineering practice with headquarters in the offices formerly occupied by Mr. McCartney, rooms 9 and 10, Spirit Building, Punxsutawney.

The Lehigh Valley Coal Co. has established the position of efficiency expert in its mining organization and has assigned Sheldon Jones, formerly superintendent of the company's Lackawanna Division, to the post. He will make his headquarters at Wilkes-Barre. William Reutelhuber succeeds Mr. Jones as division superintendent.

Students taking the course in coal mining engineering at West Virginia University, numbering around twenty, will form a party which will visit the anthracite field during the second week in June. The students will see the mining and preparation of anthracite with all modern improvements used in its preparation. A detailed tour has been outlined which will include Hazleton, Wilkes-Barre, Scranton and Carbondale.

Directors of the Glen Alden Coal Co. on May 13 declared a dividend of \$3 a share on the capital stock of the company, payable June 20 to stockholders of record May 31. In December the company declared a dividend of \$2.50 a share, payable on the 20th of that month, while a year ago the company paid a \$2 dividend.

Edward Lloyd, Sr., 67, of Edwardsville, the oldest employee of the Kings-ton Coal Co. in point of service, has just retired after 57 years in the anthracite mines.

The Wyoming Valley Water Supply Co., which supplies the town and colliery at Centralia as well as the Mt. Carmel mines with water, has extensive improvements under way. The pumping house is being rebuilt and centrifugal pumps will replace the old plunger type.

Seward Button, former chief of the Department of Mines and part owner of the Beaver Valley Coal Co. operations in Scotch Valley, is negotiating for the purchase of the Tip Top Coal Co., controlled by Colonel Henwood, of Scranton. The mines practically adjoin the Beaver Valley colliery. The Henwood interests have been closed down for some time.

There were 151 fatal accidents in the industries of Pennsylvania during April, according to the Department of Labor and Industry Records. Of this total, 57 occurred in the mines. Schuylkill County led with twelve deaths and Lackawanna, also in the anthracite region, had nine. In the bituminous region, Westmoreland County led the list with six deaths, but Fayette and Washington each had five. Other mine fatalities occurred as follows: Anthracite—Luzerne, 5; Northumberland, 1; Carbon, 1; Dauphin, 1. Bituminous—Allegheny, 3; Cambria, 1; Clearfield, 1; Greene, 1; Indiana, 4; Jefferson, 1; Somerset, 1.



William Littlejohn

Elected president of the Rocky Mountain Coal Mining Institute at its last annual meeting. He was born in Scotland, emigrating to the United States in 1907. He became fireboss with the Utah Fuel Co. in 1910, and, after holding several other positions, became general superintendent of the Utah division of that company in 1919, which post he still occupies.

Incessant rains which caused all small streams in Cambria and Clearfield counties to overflow, have flooded many of the mines in the northern Cambria and Philipsburg regions. Approximately half the mines in the district are drift mines and most of these are flooded. Considerable damage will result.

State charters have been issued at Harrisburg to the following coal companies: Tip Top Coal Mining Co., Wilkes-Barre; capital stock, \$101,500; treasurer, Nat D. Stevens, 800 East Main street, Nanticoke; incorporators, Nat D. Stevens, L. M. Chapin, Brookline, Mass., and Philip V. Mattes, Scranton. Gledhill Coal Co., Lykens, \$15,000; treasurer, James H. Gledhill, Lykens; incorporators, James H. Gledhill and Mabel M. Gledhill, Lykens, and Raymond L. Filbert, Lebanon. Hazel Yough Coal Co., Pittsburgh, \$10,000; treasurer, Ralph D. McKee, Bellevue; incorporators, William H. McNaugher and Frederick E. Milligan, Pittsburgh, and Ralph D. McKee, Bellevue. Tunnel Hill Coal Co., Butler, \$30,000; treasurer, J. A. Roberts, 714 West Penn street, Butler; incorporators, A. F. Myers, 542

Mifflin street, Butler; J. A. Roberts, Butler, and Chester C. Martin, Slippery Rock.

VIRGINIA

The Virginia Smokeless Coal Co.'s office at Norfolk will be closed as of May 15, according to an announcement by its manager, T. M. Bailey. Mr. Bailey has resigned the presidency of the Hampton Roads Coal Club.

WASHINGTON

T. F. Kennedy, of Seattle, has been elected president of the Morton Coal & Coke Co., of Centralia, and J. M. Bell was made secretary at the recent stockholders' meeting. It is probable that the company's mine at Centralia will be operated on a lease instead of by the company.

Briquets from the new Amalgam Coal Co.'s Trent process plant now building in Spokane may be offered on the market as early as the middle of July. The plant, built on the unit system for future enlargement, is to be 166x30 ft. on the ground and will be capable of treating between 400 and 500 tons of coal a day. Washed coal from the Corbin mine of the Corbin Coal Co. Inc., in the Crow's Nest Pass field of British Columbia, will be used. George W. Evans is the engineer in charge of construction.

WEST VIRGINIA

The Roderfield Pocahontas Coal Co. has been organized to develop a 600-acre lease at the mouth of Spice Creek, near Roderfield. Officers of the new company are J. W. Strickler, of Welch, president and general manager; O. E. Linkous, of War, vice-president, and R. L. Page of Berwind, secretary-treasurer. This company is capitalized at \$150,000. There are four seams in the acreage, three of which are above water level, the coal ranging from 4½ to 6 ft. thick.

The Tompkins Fuel Co., of Charleston was organized May 5, the charter having been obtained by Harold F. Tompkins, Wm. G. Conley and Clyde B. Johnson, of Charleston; Roger W. Tompkins, of Cedar Grove, and Grant E. Tompkins, of Hughston. The company has taken over a mine at Cedar Grove operating in a 6-ft. seam of Kanawha Splint Coal and also has started work in the by-product mine on the property which has not yet been fully installed. Shaker screen tipples and picking tables will be installed at an early date and the mine will be electrified throughout, and modern machinery installed. The Tompkins interests own the land in fee.

Harold F. Tompkins of Charleston; Roger W. Tompkins, of Cedar Grove, and Grant E. Tompkins, of Hughston, who have been connected with the operation of mines in the Kanawha field for some time, have organized the Tompkins Fuel Co., capitalized at \$100,000. The company will take over a going mine at Cedar Grove, operating a 6 ft. seam of splint coal and also will open a byproduct plant. The property is owned in fee by the new company. It

is proposed to erect a tippie equipped with shaker screen and picking tables and also to electrify the mine throughout and equip it with the most modern machinery.

The Brady-Warner Coal Co. has put its Monon No. 1 mine, in the Monongalia County field, on an open-shop basis, with the 1917 wage scale in effect. Monon No. 1 mine is in the Pittsburgh vein. The new order does not affect the mine at the same place which taps the Sewickley vein, as that mine has not been operated for some time. The company also owns a mine at Osage, where both the Pittsburgh and the Sewickley seams are mined, but no announcement has been made with reference to the latter mines, which have been shut down since the first of the year.

The Elkhorn-Piney Coal Co. has closed its Huntington office and dispensed with the services of the entire force connected with the office there. This company owns mines in Raleigh and Logan counties, W. Va., and at Weeksbarrie, Ky. All mining superintendents in the future will report direct to D. T. MacLeod, vice-president in charge of operation at Milwaukee, Wis.

Development work is now under way on the Faraday tract, formerly the Frick holdings in McDowell County, W. Va., and Tazewell County, Va. The tract comprises about 30,000 acres. Under the direction of Col. James Elwood Jones, vice-president and general manager of the company, two plants are being installed on Dry Fork of Tug River, four miles above Hartwell. About 400 houses are under construction. The mines will be well equipped mechanically throughout so as to eliminate human labor as much as possible.

The Sardinia Coal Co., of Charleston, has been organized to operate on a small scale on Coal River. It is capitalized at \$25,000. Principally interested in the new company are Toney Mamca, Peter Mascele, Toney Dadola, Joe Piredda, John Morria, all of Olcott.

J. C. Pack, of Freeman, was recently elected president and general manager of the Smith Pocahontas Coal Co. Mr. Pack is well known in the Pocahontas and Winding Gulf districts having been connected for several years with the Iroquois Coal Mining Co., operating at Iroquois.

CANADA

The price of American anthracite in Montreal has been reduced from \$17 a ton to \$15.25. A fight for the Montreal market has begun between merchants handling Welsh and Scottish coal and those selling the United States product. It is stated that British interests will this year lay down 300,000 tons of coal, which is half of the city's supplies.

Excellent prospects for Canadian coal mining are foreseen by Charles Fergie, president of the Atlantic Coast Collieries, Ltd. His company recently acquired 17 square miles of coal fields on the west coast of Cape Breton.

The British Empire Steel Corporation is conducting extensive investigations with a view of improving the Sydney Mines coal field, instead of planning to close it out. All coal-mining operations have been curtailed for the present because of the limited demand. Because of the high cost of production the Jubilee mine is temporarily closed. Vice-president J. E. McLurg states that the only mining the corporation can at present do is for shipping, and by closing down the



Clearfield Bituminous Corporation Building, Indiana, Pa.

This company is building a new tippie at Sample Run, about eight miles from Indiana.

Jubilee the Princess and Florence collieries can be operated full time. A survey of the field has been ordered and extensive drilling operations will be begun shortly with a view to lowering the cost at the Jubilee and possibly opening new pits.

A report of the Dominion Bureau of Statistics for January just made public shows an output of coal in Canada of 1,490,000 tons, an increase of 16 per cent over the January average for the preceding five years. There was an increase of 330,000 tons in Alberta; 28,000 tons in British Columbia and 6,000 tons in New Brunswick, but a decrease of 150,000 tons in Nova Scotia and 3,000 tons in Saskatchewan. Imports of coal in January were 1,233,000 tons, a decrease of 343,000 tons compared with December and a decrease of 5 per cent over the five-year average for January.

The National Coal Co., Ltd., has been incorporated by B. E. Bull, James C. Shaw, John A. Shaw and others with a capital of \$50,000 and head office at Toronto.

Some of the smaller collieries of Pictou County, N. S., are obtaining electric power from the hydro-electric power development of Sheet Harbor 60 miles distant and anticipate a considerable decrease in operating costs. New collieries opening up will in future look to this source of power supply.

The Piron process of low-temperature coal distillation, for which big savings in fuel economy are promised, is now installed at the new furnaces of the Ford Motor Co. of Canada, Ltd., Walkerville, Ont. Completion of a 400-ton a day plant there has been made by the Piron Systems' engineers. They are also at work on an installation with an ultimate capacity of 12,000 tons daily, at the River Rouge plant of the Ford company, to be completed during the year. The Ford furnaces are the first commercial adaptation of the process.

Coal Service of Canada, Ltd., has been incorporated with a capital of \$300,000 and head office at Montreal, by Daniel P. Gillmor, Wallace R. Henry and Jean P. Cosselte.

McMaster Coal & Transportation Co., Ltd., of Montreal, capitalized at \$500,000 has recently been incorporated.

Anglo-American Fuel Supply Co., Ltd., of Toronto, has been incorporated with \$50,000 capital, by Roland O. Daly, Charles E. L. Babcock and Harold E. Manning.

Trade Literature

The Treatment of Boiler Feed Water for Highly Overloaded Boilers, David Henderson, of the Dravo-Doyle Co., Pittsburgh, Pa. Distributed by the H. S. B. W. Cochran Corp., Philadelphia, Pa. Pub. No. 1195. Pp. 8; 6x9 in.; illustrated. Contributory causes of priming and foaming are described, together with a statement outlining in what respect water treated at boiling point is best adapted for use in overloaded boilers.

The Osgood Co., Marion, Ohio, has issued the following four-page illustrated circulars: No. 237, covering the use of steam shovel equipment and highway construction; No. 242, the use of steam shovels for sewer and trench excavating work; No. 243 describing the use of steam shovels when converted to clamshell and dragline outfits.

Fumes Encountered in Mining Operations and in the Handling of Explosives, by J. Barab, Hercules Powder Co., Wilmington, Del. Pp. 38; 8x10 in. Copies of this book may be obtained by writing to the advertising department of the above company.

Fourth Standardization Bulletin, by the Standardization Division of the American Mining Congress, Washington, D. C. Pp. 328; 6x9 in.; tables. Proceedings of the fourth national standardization conference held in connection with the twenty-sixth annual convention of the American Mining Congress.

Condulets for Switch and Plug Receptacle Outlets, Crouse-Hinds Co., Syracuse, N. Y. Four-page folder No. 8, covering condulets for various uses.

Twenty-fifth and Twenty-sixth Annual Reports of the Bureau of Labor and Industrial Statistics of Virginia. Part I covers period from Oct. 1, 1921, to Sept. 30, 1922, and Part II from Oct. 1, 1922, to Sept. 30, 1923. Pp. 224; 6x9 in.; tables.

Frogs and Switches, Helmich Foundry-Machine Co., Fairmont, W. Va. Pp. 21; 5x8 in.; illustrated. Catalog No. 5. Describes standard spring split switch, riveted plate frog, switch connections and throws, standard split switch, light rail turnout, etc.

Analyses of Samples of Delivered Coal, by Ned H. Snyder, Bureau of Mines, Washington, D. C. Bulletin 230. Pp. 174; 6x9 in.; tables. Covers samples collected from July 1, 1915, to Jan. 1, 1922, and contains a chapter on Tidewater Pool Classifications.

Production and Briquetting of Carbonized Lignite, by E. J. Babcock and W. W. Odell, Bureau of Mines, Washington, D. C. Bulletin 221. Pp. 82; 6x9 in.; illustrated.

Walter A. Zelnicker Supply Co., St. Louis, Mo., two-page bulletin No. 315 covering locomotives, cars, rails, pilings and tanks.

Traffic News

Provides for Taking Control of Road from Coal Company

After a rehearing the Interstate Commerce Commission has issued a conditional finding that public convenience and necessity will require the construction and operation by the Jefferson & Southwestern of a railroad from Mr. Vernon to Nason, Ill., at which a coal mine is being developed, and for about three miles westerly to a connection with the C. B. & Q., if and when a valid arrangement has been made and approved by the commission under which the connecting railroads will be afforded an opportunity, at any time within five years, jointly or severally to assume control of the new railroad company by purchase of stock or by lease. On March 14, 1923, the commission denied the company a certificate, but with the approval of the Illinois Commerce Commission it has built the line from Mt. Vernon to Nason and is operating as an intrastate carrier.

Must Restore Allowance for Boarding Car Doors

By decision of the U. S. Supreme Court, May 5, dismissing an appeal for want of jurisdiction, the order of the Public Utilities Commission of Colorado directing the Denver & Salt Lake Railroad Co. to resume in its coal tariffs an allowance of 50c. per car to shippers who board the doors of box or stock cars loaded with coal will stand. The company discontinued the allowance and the Bear River Coal Co., the Hayden Bros. Coal Corporation and others appealed to the Public Utilities Commission, which directed that the allowance be continued. The State Supreme Court sustained the order and the railroad appealed to the U. S. Supreme Court. This court found no federal question involved. The evidence showed that in Colorado at times box or stock cars are supplied for coal shipments and that the shippers board the inside of the doors to protect the doors.

Obituary

William Quinn, long identified with the coal industry, died suddenly at Harrisburg, Pa., May 14. With Mrs. Quinn he was driving through to Philadelphia and was stricken with pneumonia. Mr. Quinn was 35 years of age and for several years was sales manager for the Winifrede Coal Co., Cincinnati. During the war he started the General Coal Co., at Huntington, W. Va., but due to heavy taxation by the government and a disastrous lawsuit, this went out of existence about three years ago. He then was identified with the Merrimac Fuel Co. but retired from it prior to its failure and was engaged in the tax-adjustment business at the time of his death.

J. C. Brooks, who because of his 360 lb. was known as "the biggest man in the coal trade," died on May 9 at Greenville, S. C., where he was located as sales agent for the Southern Coal & Coke Co. with selling headquarters in Cincinnati. The body was brought to his old home in Lexington, Ky., where the funeral was held on the 10th. E. C. Mahan, director of the National Coal Association and Nolan Mahan, of Cincinnati, attended the funeral.

James P. Hickey, of Springfield, Ill., died May 8 of heart disease, after one month's illness. He was 45 years old and in 1919, helped organize the Central Illinois Mining Co., of which he became president, and of the Pontiac Coal Mining Co. He also became president of the Prairie State Coal Co., which post he held at the time of his death. Before becoming identified with mining in Illinois he was a member of the sales organization of the Pittsburgh Coal Co.

William L. Kingman, at one time general coal agent of the New York Central R.R., died at his home at Yonkers, N. Y., May 8, in his 83d year. In the early 80's Mr. Kingman became divisional freight agent of that road at Rochester, but with the rapid expansion of the coal trade he was made general coal agent with headquarters in New York City. On his retirement from active service, in 1908, he was industrial agent for the Central.

Coming Meetings

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

West Virginia Coal Mining Institute. Annual meeting June 3 and 4, Elkins, W. Va. Secretary, R. E. Sherwood, Box 1026, Charleston, W. Va.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

Midwest Retail Coal Association. St. Louis, Mo., June 17-18. Secretary F. A. Parker, St. Louis, Mo.

American Society for Testing Materials; annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers, annual convention, June 23-27, Edgewater Beach, Chicago, Ill. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

First International Management Congress, Prague, Czechoslovakia, July 21-24.

World Power Conference, Wembley, London, England, June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

New Equipment

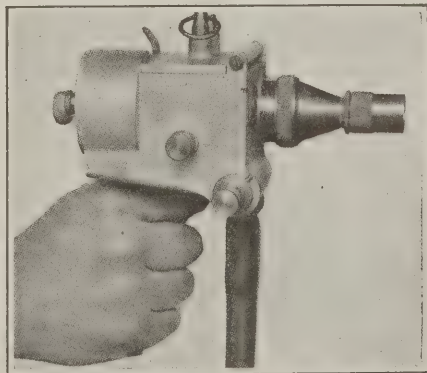
Metal-Spray Gun Prevents All Corrosion

Originally conceived as a means of coating iron and steel with lead to provide protection against atmospheric corrosion, the Schoop metal coating process is now claimed to be perfected so that any of the commercial metals, either in wire or dust form, may be applied to nearly all materials.

It is rapidly becoming an important factor in several industries, and many are taking advantage of its possibilities. Coatings of molten metal may be attached to all or any part of a surface, regardless of its character, size, position or location. Coatings also may be applied to work either before or after fabrication and to any reasonable thickness desired, either for decoration, protection from corrosion and chemical action, for increasing dimension or weight, for altering shapes or for repairing defects in surfaces. Successive coatings of different metals, regardless of their melting temperatures, may readily be applied.

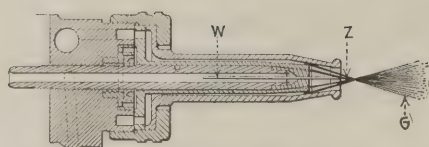
The gun shown in the illustration weighs 3½ lb., is connected to standard acetylene and oxygen cylinders and a supply of compressed air at 50 lb. pressure. In normal operation it consumes approximately 15 cu.ft. of acetylene per hour, 15 cu.ft. of oxygen per hour and 50 cu.ft. of air per min. Metal in the form of standard gage wire is automatically pulled from a reel into the rear of a gear case and fed uniformly and continuously at a rate of from 12 to 24 ft. per min. to the muzzle of the barrel, where it enters a continuous reducing flame zone developed from the gases and air. Here it is melted and blown at a velocity of about 3,000 ft. per sec. in a very fine spray onto the surface being coated.

The mechanism within the gear case consists of an air-driven turbine operating a wire-feeding and straightening device for leading the metal into the



Gun Applies Protective Metal Covering to Surfaces

This device makes its own ammunition from wire. It bombards the surface which is to be coated with minute particles of molten metal. It is especially adapted for shop or field use on any material regardless of its size, character, shape or position.



Nozzle of Metal Gun

The wire, W, is automatically fed into the reducing flame zone Z, at such a speed that the position of the end of the wire is stationary. G is the cone of fine metallic particles which are deposited by impact.

barrel. The wire remains cold and unaltered until it emerges from the muzzle, melting and undergoing transformation into spray at a point of $\frac{3}{4}$ in. from it.

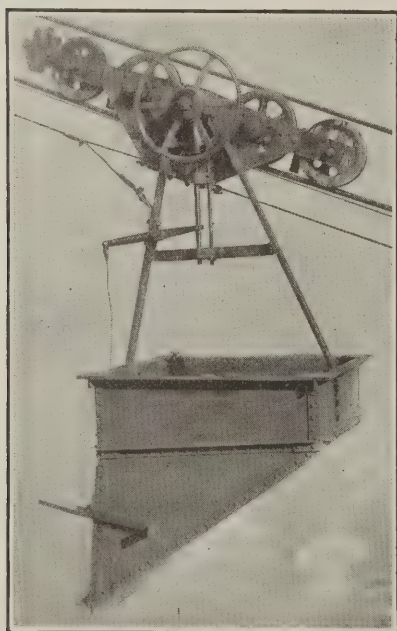
The muzzle is held 3 to 4 in. from the surface to be coated. Its temperature is raised but slightly, making it possible to apply coatings to the most delicate objects.

The spray is essentially an air brush which applies molten metal. The Metals Coating Co. of America, 495 N. Third St. Philadelphia, Pa., are manufacturers of the equipment.

Tram Bucket Dumps Itself At Any Point Desired

Dumping refuse at a distant point from the coal tippie long ago became a serious problem with the Tierney Mining Co. of Stone, Ky. All the available space around the tippie had been filled and the nearest additional dumping ground was a hollow approximately 1,200 ft. away. The company last winter installed a new type of self-dumping bucket tramway made by the Roderick & Bascom Rope Co. which appears to have met all the demands.

The striking feature about the tramway is the provision for automatically dumping the 55-cu.ft., front-door discharge bucket. As shown in the illustration, this bucket is equipped with a set of reducing gears engaging, at one



Bucket for Dumping Mine Rock

At the Tierney Mining Co's plant near Stone, Ky., a two-bucket installation handles 40 tons an hour of mine refuse a distance of 1,150 ft.

end of the train, the shaft of one of the track wheels. The other end of the train, by a worm, operates a perpendicular threaded shaft. The revolution of this shaft moves a trip block up and down. At the outbound end of the bucket's travel this block pushes down the trip lever which opens the bucket door. When the bucket is made to travel in the opposite direction the trip block runs up the shaft again, permitting the bucket door to close and latch for the next load. This trip can be adjusted so that it discharges the bucket at any predetermined location.

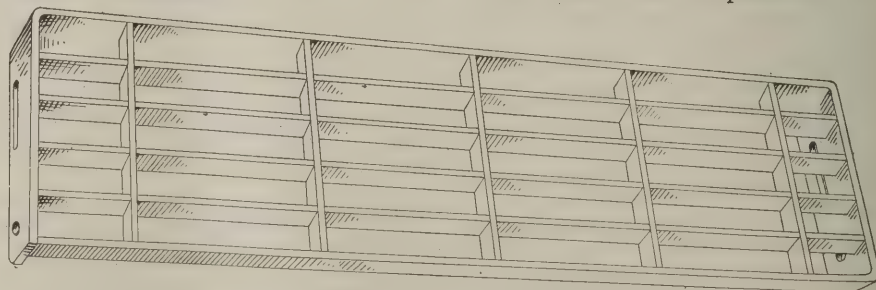
According to General Manager G. C. Wood, of the Tierney Mining Co. this mechanical arrangement operates without causing a shock like that received by the bucket when it is tripped by a clamp on the rope. It makes it unnecessary for a man to make the perilous trip out in the bucket to adjust such a block or to re-track a bucket that has jarred off. With the front-door discharge the load in the bucket is released a little more gradually than with a drop bottom, thus reducing the recoil.

The Tierney installation is a two-bucket tramway operating at a speed of 600 ft. per minute and capable of handling 40 tons per hour. One man operates it from the loading point.

Improved Steel Stair Tread Prevents Dizziness

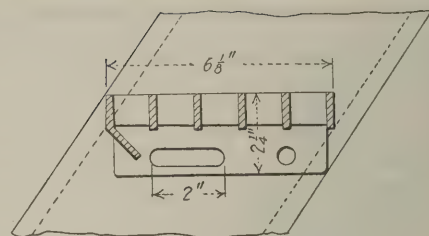
One of the greatest objections to the use of open-grating stair treads has been the fact that men walking down the stairs, especially if they are carrying a load, find it difficult to tell just where the edge of each tread is and in some cases become dizzy. Consequently, heretofore, many designing engineers who could use open-grating treads to great advantage have been forced to use the flat solid type.

To meet just such conditions, the Mitchell-Tappen Co., 15 John St., New York, have developed a tread which has a clearly defined nosing. With this new tread it is not necessary to paint the outer edge or adopt any other makeshift change. The edge is made up of a nosing bar which is bent backward under the edge at an angle of approximately 45 deg. The bending of this nosing bar in no manner tends to clog the openings in the tread as it sheds both dirt and water just as the body of the tread itself does. The effect of this improvement is to produce the appearance of a solid line sharply defining the outer edge of each tread, and therefore lessening the chance of confusion.



Open Grating Tread With Outer Edge Well Defined

To prevent the steps from causing dizziness and to locate definitely the edge of each stair tread, this new step has a wide sloping nose bar.



Cross-section of Tread

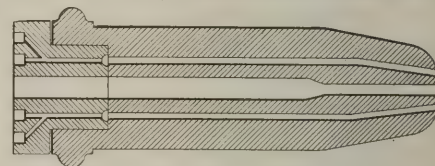
The outer bar is bent to an angle of 45 deg., thus defining the edge of the tread and at the same time permitting the use of open-grating design.

Coal-company engineers will find this new tread suitable for tipples, breakers and washeries, especially in buildings where material and water are likely to lie on the steps and make ascent or descent particularly dangerous.

Metal Cutting Torch

A new cutting tip designed by the Alexander Milburn Co., of Baltimore, Md., marks another advance in the development of the oxyacetylene apparatus.

This tip, according to the manufacturers, has all the advantages of standard tips and many other distinctive features highly desirable for metal cut-



New Gas-Cutting Nozzle

The renewable seat makes it an easy matter to equip the torch with a new tip. This new tip mixes the gases much more efficiently and shortens the time ordinarily required to make a cut.

ting. A better method for mixing the gases and preheating the cutting oxygen, as well as giving added velocity and penetration to the preheating and cutting tip are some of the advantages claimed for it. The tip is provided with a renewable seat which can be replaced at very low cost, making it unnecessary to remachine or throw away the whole outfit. Aside from this, the renewable seat facilitates cleaning and maintenance. It is possible to reface a standard tip in a high speed lathe, but frequently such a lathe is not available where the torch must be used. It is claimed that the savings in time, oxygen, and acetylene effected by this new tip are approximately 18 per cent of the former cost of operation.

COAL AGE

MC-GRAW-HILL COMPANY, INC.
JAMES H. MCGRAW, *President*
E. J. MEHREN, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

Volume 25

NEW YORK, MAY 29, 1924

Number 22

When the Wrench Fell

A STORY has gone the rounds to the effect that an employee of Henry Ford was seeking a job and, being asked why he left his previous place, said he had been "fired." "You see," said he, "I had to perform operation No. 4,560 on every car as it passed. My stunt was to screw a nut on a bolt in the few seconds available. One morning my wrench slipped. I stooped down to pick it up and by the time I had reached it three hundred cars had passed. I had tied up the whole plant, and the foreman fired me."

With all its exaggeration, this story is illustrative of a division of labor such as makes every man dependent on his co-worker in an extremely intimate manner. Not all division of labor works in just that way. The prop cutter, for instance, cuts his timber in the winter and delivers the props for use in the summer. He hauls his load when the snow affords good sledding. He cuts and sleds his product when he has nothing else to do. If he takes a week's holiday the mine is not delayed. It may take six months to realize the effect of the delay and perhaps no inconvenience will be experienced even then.

Similarly, the roadman may be off a few days, without direct effect on the mine operation. But most of the men are so immediately dependent on other men's labors that an idle man is a source of inefficiency throughout the plant. If the machine cutter fails to cut, several loaders are idle, the motorman gets fewer cars to haul, the dumper less cars to dump, the picking-table man less coal to clean, the trimmer less railroad coal to load and trim, and efficiency is destroyed. In consequence, the company may find the cost of coal greatly increased.

Some adjustments may be made, but they are effected on the spur of the moment, and any arrangement made thus speedily usually is both unsatisfactory in operation and slow in execution. Storage of coal may help, but only in a degree, and in most cases no storage is provided. Uncertainty, discouragement and inefficiency destroy all morale. A man who does a poor day's work becomes indifferent and sets his gait to suit the lower output and becomes a relatively unproductive unit even when conditions favor maximum output.

This argument might be used to advocate the steady reporting for duty of every man employed whose health and home conditions permit, and undoubtedly much depends on the reliability of the workman. Present conditions favor such responsibility. But to emphasize that consideration is not the purpose of this editorial.

Equally important is it that the cutting machine shall cut its anticipated quota of coal, that the shot shall be successful and bring down the appropriate tonnage, that the roof shall not be allowed to fall and close a room, that the locomotive shall pull all the coal as soon as loaded, and that the tipples shall always be ready for effective operation, to mention only a few of the links in the chain of production.

Reliability in machines is one of the keys to steady and profitable operation and no mine can succeed that has any uncertainty in the operation of its equipment. Much mine disability never finds its way to reports of the U. S. Geological Survey but does find place, not yearly or weekly but daily and hourly, in cost sheets.

Consequently, machines should be kept in perfect order, if anything in the world can be labeled perfect. To assure this, mere repair will not serve. The repairman should be set to work at inspection. He must know that the mechanical equipment is always in good condition so that slow work and shutdowns may be avoided and every man may do what is expected of him. That is why inspection is displacing repair and the trouble finder is being superseded by the man who forestalls trouble by prompt inspection and early adjustment.

Graham Bright, at the Cincinnati convention, said that steel and electric railway men spent twice as much on inspection as on repair, for in that way the most important item in economical operation is assured. J. F. MacWilliams states that inspection has lightened the work of the repairman and the machine shop. His repairmen were being detailed to inspection duties. No one safely can neglect this moral. Most men are busy correcting what greater wisdom and intelligence would have foreseen and forestalled.

Is It Absurd?

DOWN in Louisiana, or rather extending from Louisiana into Texas, the Magnolia Gas Co., is building a 16-in. steel pipe line to transmit natural gas from Shreveport to Beaumont. When completed this line will be 210 miles long and will carry gas at high pressure. Autogenously welded joints between pipe lengths will assure that the line will be absolutely tight.

Aside from all interest in this undertaking engendered by the difficulties encountered and the means taken to surmount them, this pipe line may quite possibly hold a valuable suggestion for the coal industry. It has long been considered commercially feasible to coke coal in byproduct ovens only at or near centers of population or in the immediate proximity of industrial plants that furnish a ready market for the gas evolved.

May not large high-pressure transmission lines solve the difficulties, heretofore considered at least formidable if not even insurmountable, and permit coal to be coked in byproduct ovens at the mine mouth, the gas to be sold in some distant center of population, coke to be marketed as a high-grade domestic fuel, while the other byproducts which run a long gamut of usefulness be sold at prices which will largely defray the cost of the mining and coking processes?

Take the coal fields of southern Illinois as an example. These lie within about 100 miles of St. Louis and less than 300 miles as the crow flies from Chicago. Burned raw the coals of this region, except when fired in furnaces that are specially constructed, are unusually smoky. Although the smokeless combustion of these

coals is entirely possible, the furnaces employed are practicable only to the industrial user. The domestic consumer, on the other hand, who must content himself with the ordinary stove or house furnace cannot obviate the emission of smoke when burning these high-volatile fuels.

In view of the construction of such pipe lines as that now being built in the Southland, is it any violent stretch of the imagination, any absurd flight of fancy, to picture Chicago within a comparatively short time as a smokeless city, even though it has long been famed as the smokiest locality in the country with the possible exception of Pittsburgh.

The advantages of byproduct coke as a domestic fuel have only recently become known to the average user. Already, however, coke has become a somewhat formidable rival for anthracite and other so-called smokeless domestic fuels. Gas, on the other hand, has long been considered as a most convenient fuel for stationary heating appliances. Manufacturing both of these products from a natural material at best but ill adapted to perfect combustion, and simultaneously releasing a vast variety of useful byproducts ranging all the way from drugs to fertilizers and motor fuel, may at no remote date react not only to the financial advantage of the coal producer, but to the general benefit and convenience of the entire country.

Guiding the Public's Choice

IF YOU find you cannot readily meet a specification, try to have it changed. If you can meet it but don't find it profitable to do so use the same recipe. Of course, it is sometimes well to give the public that for which it clamors, but when the public is not justified in its clamor a little propaganda is excusable.

The anthracite operators found that the public wanted too much large coal. So much indeed that the companies could not sell their fine sizes. The operators tried with some success to give the public what it wanted. They eliminated much needless degradation. They put in chutes that could be kept continuously full. They introduced conveyors and spiral troughs. They arranged in transporting coal to bed lumps on finer coal so as to reduce breakage. They removed the preferable sizes and fine sizes when crushing the larger so that no coal of salable dimensions should be passed through the rolls.

Unfortunately, they still had too much fine coal, and then there were the mountains of undersize coal that had accumulated in the earlier years when no one could burn anything but coarse sizes.

Consequently, do what they would, they could not sell the fine sizes in sufficient volume. Did they fill the valleys with their fruitless lamentations? For a while, it must be confessed that is just what they did. At last, finding that their regrets were vain, they decided none too soon to educate the public to use fine coal. Realizing that those using anthracite for steam purposes were headed uncompromisingly, and with some show of justification, toward bituminous coal and oil, they sought to convert the domestic consumer.

They combined their efforts and started economy shows. Little may have been done to cause people to dispense with equipment already in use, but this, at least, has been accomplished: When new houses are built, or when new furnaces are installed in place of old and worn out equipment, many persons successfully have been induced to put in arrangements for burning

finer sizes. Just how much has been accomplished remains to be seen, but evidence points to the attempt being successful.

Let the Illinois operators take the hint. They may succeed in advancing the day when steam plants and locomotives, even domestic furnaces, will be equipped for burning small sizes and one of their difficulties will be at an end. Why do they not combine to speed that happy day? Why leave it to salesmen who see only the easier way and sell what the consumer is ready to buy, leaving the operator's problems unsolved? Meanwhile every effort should be made to reduce degradation from the face to the railroad car.

Closing Down Mines

WHEN for any reason it is necessary to close down a mine it is likely to prove profitable to do it thoroughly, suspending pumping and ventilation as well as operation. That will mean lifting track and removing wire wherever rising water may reach the one or the other. Pump rooms and underground substations may have to be vacated. Such a complete abandonment will not be safe if rising water might work havoc on neighboring mines.

It seems sometimes that operators are disposed to believe that a mine thus shut down will be greatly injured. But it is well to remember that the mine will never contain more than a certain quantity of water. By ceasing to pump, a back pressure will be placed on the water which will probably reach a certain height and then cease to rise. The water pressure will attain a balance, after which no more water will come in. Consequently the operator who pumps during a shutdown may pump more than the operator who leaves his pumping till resumption.

As for the mine itself it will be preserved rather than destroyed by flooding. It is remarkable how mines, flooded thirty or forty years ago, retain the condition in which they were left. Falls are few partly because the timber is preserved and partly because the water keeps the condition of the roof, as to moisture, constant; it does not become alternately wet and dry. The pressure of the water helps to sustain the drawslate. The mine is watersealed and deterioration ceases.

The only disadvantages are that reopening is slow, that the copper will be restrung with difficulty and may be injured in withdrawing, and there is an expense in withdrawing rail, copper and other equipment. A company which thus proclaims itself out of the market for an extended period may make its creditors nervous. It may be at a disadvantage in defending some action in court, for the creditors may be able to impress some judge or jury that such an action is prejudicial to their interests. But on the whole the total abandonment of a mine is not so harmful as it is generally feared and not as costly as a steady run of pumping and ventilating.

Care must be taken in reopening as gas may collect under pressure, and if it cannot escape by the return as the waters are lowered, it may spread into the intake with unfortunate results. The air in these pockets may be so mixed with carbon dioxide and nitrogen as to be unflammable but if it escapes into the air of the ventilated portion the carbon dioxide and nitrogen may become so diluted by good air that the firedamp will become flammable and an explosion result from an open lamp or an electric spark. However, precautions can be taken against such an untoward event.

Early Coal Stripping Full of Heartbreak—I

The Art Was "Born" at Danville, Ill., Where Hand Work Began in 1866 Followed by the "Land Dredge," Dragline, Shovel-Conveyor and Other Strange and Wondrous Things

BY GRANT HOLMES
Danville, Ill.

IT IS a far cry from today's 300-ton giant electric shovel stripping 60 ft. of cover from a coal seam, back to the primitive hand stripping of 1866 in Danville, Ill. But it is interesting to look back through those years, for modern practice in coal stripping was "born" in Danville, so to speak, and most of the developments that have led from the hand shovel to the 300-tonner have taken place right in Danville territory.

If your mind has any pictorial tendencies you can see the first coal stripping of history—a man shoveling a little rotten coal from an exposed and weathered bed into a wagon. As the coal seam was followed back into the hillside the job of removing the earth from it grew too heavy for the man. So he made a horse do the work with a slip scraper. Then came the wheeled scraper for heavier operations.

At about this stage, coal stripping started in the Danville region in 1866. Kirkland, Blankeney & Graves opened a little pit on Grape Creek. Then followed a few years of slow expansion in the business. Michael Kelley, in 1875 was the next outstanding stripper. He began in Hungry Hollow and in the next decade was the principal operator of the region, with both strip pits and underground operations.

When a man opened a team-and-scraper stripping, he expected to lose money in the summertime and make it back in the winter, as the surface could be stripped only when the ground was not frozen. The truth of the matter is, many lost money and few got it back.

The usual method of exposing the coal was in long pits; first an oblong section along one edge of the field was plowed up, and then the scrapers took off the loose dirt. The piece was plowed again. Thus by alternate plowing and scraping, the bed finally was reached; the overburden being piled in a long mound overlooking the pit. Teams and wagons hauled out the coal during the winter, and the next summer a new block parallel to that just taken out, was stripped, the waste being dumped into the abandoned cut.

Considering the enormous quantity of material to be removed from an acre of coal under 10 to 15 ft. of overburden, small wonder was it that men came to the conclusion that team-and-scraper stripping had no commercial value. Nevertheless, it is of interest that this method is still in use, though only for local coal.

Another firm engaged in this primitive method of stripping was that of J. N. Hodges and A. J. Armil,

who in 1876 and 1877 loaded a lot of coal near Pittsburg, Kansas. Mr. Hodges had been engaged in railroad-track laying and ballasting in Ohio, during the two years previous, and had used a steam shovel in this track work for loading gravel. After a short experience in coal-stripping with teams and scrapers Mr. Hodges and his partner decided that the steam shovel could do the work far better.

In 1877, an Ohio contracting company rented these two men an Otis steam shovel. Unfortunately there are no pictures or description of this machine available—the first machine on record at least in the bituminous-coal stripping business. However, we know that Mr. Otis invented the steam shovel in 1839, and was killed in trying to operate the first one made.

Concerning the work of this pioneer machine, Mr. Hodges says—"We oper-

ated this shovel for about one year very successfully when I sold my interest to engage in other business, but the shovel was operated for about three years when it was returned to the owners. We had land with from 8 ft. to 12 ft. overburden.

"This, with good management, could be handled profitably, but coal at this depth was limited and the boom of this shovel was too short to do deeper work and waste the overburden far enough away to uncover a pit of coal of sufficient width to be handled economically." He also says that this experience proved to him that a larger shovel would be successful, but the manufacturers told him that it was not practical to build such a shovel.

The second stripping outfit which has come to my notice was merely a furtherance of Mr. Hodges' idea. The Consolidated Coal Co. of St. Louis, Mo., extensive land owners, had a strip-coal area which lay in a river bottom, known as Missionfield, near Danville, Ill. Here, the overburden ran up to 35 ft., but in many places, was only 10 ft. to 15 ft. deep. The bed of coal was 6 ft. thick. Contrast this with the lightly buried seam stripped in Kansas by Hodges and Armil! However, the seam they stripped was only 3 ft. thick.

The first requirement to produce coal in the Missionfield was to find some one with sufficient nerve to attempt stripping by contract. Wright & Wallace of LaFayette, Ind., drainage contractors and dredgers, were induced to accept an "ironclad" agreement to uncover a given quantity of coal daily for the Consoli-

THIS IS AN EYE-WITNESS HISTORY

SINCE 1875 Grant Holmes, of Danville, has had his hand and mind on coal stripping. Half a century of it successively as mechanic, boss, operator, advisor to and rescuer of failing strip companies, and finally as an investor and director in many stripping companies in Illinois, Indiana, Kentucky, Ohio and Pennsylvania have given him a background in stripping such as few men have. Probably no one is as well qualified as he to tell the story of coal stripping from its beginnings. So this is his story, although he credits his old-time friend and fellow-stripper, the late Alec Swanberg, with much of the inspiration for it.

dated Co., under the supervision of J. L. Swanberg and their mining engineer, Louis Stockett.

As Hodges and Armil had found, steam shovels had not been developed to a size suitable for stripping economically, for there had been no call for shovels larger than those for railroad excavations, but because dipper dredges were called upon to dig in deep water, they had been developed for longer digging ranges. Being experienced dredgemen, Wright & Wallace relied on the size of the dredge to carry out this contract for stripping, and in 1885 they purchased from the Marion Steam Shovel Co. of Marion, Ohio, a dredge minus the hull.

PUT DREDGE ON WHEELS AND STRIP WITH IT

The owners erected this machine on a wood frame supported by wheels, and a dry-land dredge or stripping machine was the result. Wood was the construction material used throughout in this excavator, even on the boom which was 50 ft. long. A single-cylinder, vertical steam engine furnished power to hoist the $\frac{3}{4}$ -yd. dipper and to swing the boom. Speed and power as measured today were not virtues with this machine, as one small engine took care of all operations.

Four hundred cubic yards of overburden moved in a day was a great record. One should remember in connection with this "astounding" feat, that those were the good old days when mine labor worked ten hours for \$1.50. There was no means of propelling this dredge except by block and tackle; hence, moving the outfit was a slow process, especially on curves, as all wheels were fastened rigidly to the frame.

Because their shovel could dig forward only, a circular path of operation was adopted by Wright & Wallace, as the only means of keeping the machine constantly at work. The whole plan of operation resembled

a flat coil spring—each cut decreased the diameter of the island of unstripped coal around which the machine worked. At one point in each revolution of the field, the shovel left, as best it could, a gap in the waste banks for the haulage way.

The initial circle, or thorough-cut, surrounded about thirty acres, which was one-third of the entire field. Many months were occupied in making this and each succeeding circle, for, although the circumference grew smaller, the curves became sharper, and proportionately hard to turn. When the circles became small, jacks were used to skid the land dredge around the sharp corners.

The widest cut the shovel was able to make in this overburden was only about 20 ft. Limited dumping range prevented placing the wastebanks far enough away to keep the dirt from covering up the face of the coal, and because of this burial of the face, entry cutting was necessary before the miners could load out the coal, all of which was removed from each cut as fast as the strippers uncovered it. One can readily see that if a long time was occupied by the dredge shovel in completing each circle, the face of the coal around the "island" would be exposed to the weather the same length of time, resulting in a heavy percentage of rusty, rotten coal in the output.

The slowness of this shovel, the narrowness of the cut, and the annual flooding of the field by the neighboring river, induced the stripping contractors to place a second shovel in the mine in order to keep their agreement with the Consolidated Coal Co. A general enlargement of the first design, including a $1\frac{1}{4}$ -yd. dipper, characterized this second machine. Naturally, its plan of operation was the same. A short time later, a third stripping machine was purchased, having a $1\frac{1}{2}$ yd. dipper, a 65-ft. boom and two vertical steam



The Great Dry-Land Dredge, the Precursor but Hardly the Progenitor of the Modern Stripping Shovel

Though this machine was the second put into operation by Wright & Wallace, contractors, in the Missionfield at Danville, it was the same type as the first which started work in 1885. It had a 50-ft. boom and a $1\frac{1}{4}$ -yd. dipper both operated by a single-cylinder, vertical steam engine. The great, cumbersome machine rode on wheels fastened rigidly to the underframe. It was moved by block and tackle and could cut only in a wide circular path which determined the method of stripping. It took months to make one cut around a 30-acre tract.

Butler Bros. 1890 Dragline

Machines of this type, originally developed for trenching in Kansas, worked in pairs from the edge of the cut. One uncovered the coal and the other loaded it into railroad cars run directly into the pit. This latter was the first mechanical contrivance for loading stripped coal. The stripping draglines made parallel cuts about 20-ft. wide in the coal and of any length.



engines. Both the stripping and coal ends of the business had now assumed quite respectable proportions with the three dredges operating.

In about three years, however, a snag was struck which seemed to lead on to the many failures that occurred in after years. The coal miners struck in 1888, shutting down the producing part of the operations.

No arrangements had been made in the contract between the strippers and the coal company to take care of such a contingency, therefore, Wright & Wallace continued to operate their machines during the strike. The mine owners were powerless to stop them, and in time, affairs reached such a stage that each shovel had made a complete circle in its respective working. Starting on the next cut, the machines began to cover up the coal stripped on the preceding round. To stop the ruinous work, the coal company had to buy the dredges and the contract from the strippers.

The strikers and the coal men at last settled their difficulties, and work was again resumed. For two years the new owners operated the three machines, but at the end of that time they were greatly discouraged as no money had been made owing to heavy expense and the slow rate of stripping. Hard work had almost worn out the machines, which were not made to stand such strenuous digging, and about 1890, after many fruitless efforts at repairing, the dredges were abandoned.

BUTLER BROS. INSTALL DRAGLINE EXCAVATOR

In Kansas and Missouri, where gravel is scarce, but gumbo, a kind of stiff clay is plentiful, a process called ballast burning had developed. A trench about 8 ft. deep, 100 ft. wide and a quarter of a mile long, was dug in the mud bed. In this, alternate vertical layers of coal and clay were built and the coal was burned, thus baking the clay. Butler Bros., Englishmen, had draglines for doing the ditching in this process. They burned ballast for the Rock Island R.R.

The Consolidated Coal Co., having heard of these dragline machines and their excellent work, started an investigation to determine the adaptability of the drag-

line to stripping. This inquiry ended by Butler Bros. accepting the contract to complete the job of stripping the Consolidated property at Missionfield.

The year 1890 marked a new era in the stripping industry. Butler Bros.—Henry A. and William—started work in Missionfield with three draglines. Each machine was of different bucket capacity, $\frac{3}{4}$ yd., $\frac{1}{2}$ yd. and 1 yd. respectively.

HORIZONTAL BOOM WAS ABOUT 80 FT. LONG

These drag or scraper buckets were simply steel boxes with an open end which had teeth on the bottom edge. A cable, traveling through a sheave wheel on the top of the drag, was an adjustable trolley which not only raised or lowered the bucket, but also provided a guide for its travel. Ropes fastened to each end governed the forward and reverse motions. A fourth cable was a means to trip a latch which let the drag swing, open and down, to dump its load. These various cables were strung through a horizontal boom, some 80 ft. long.

Wire ropes suspended from a vertical frame or gantry held the lower boom in position. Two upright boilers supplied power for a two-cylinder engine geared to three drums. Clutches controlled the starting, stopping and speed of these drums, each of which governed a bucket cable. Gearing from the engine to the truck axles gave the machine self-propulsion in either direction.

Instead of being down in the pit, the drag line worked on top of a bank from one edge, the horizontal boom extending over the cut. When the engineer wished to dig, he either let the bucket run out half the length of the boom, on the incline formed by hoisting the trolley rope high in the air, or he pulled it out by means of the reversing cable. Releasing the trolley, he then "dropped" the bucket into the pit.

The bucket was dragged up the side of the bank on which the machine stood, until full of material. Picking up the load with the trolley, and letting it travel to the end of the boom, the engineer tripped the latch. This allowed the bucket to be dumped. Now, with the exception of pulling the drag half way back, the operation was ready to be repeated. The accuracy and speed



Loading Strip-Pit Coal

The Butler Bros. dragline was the first mechanical contrivance for loading stripped coal. All the draglines, whether for coal or overburden, operated buckets like the one in the illustration on cables from 80-ft. booms. The scraper buckets for removing overburden or loading coal were simply steel boxes with an open end which had teeth on the lower edge. The capacities of these boxes varied from $\frac{3}{4}$ yd. to 1 yd. By their aid skilled operators would load coal into cars at the rate of three buckets per minute.

attained by an experienced engineer was truly remarkable—three complete operations a minute was not unusual.

As the boom did not swing, the whole machine had to be moved frequently to keep the "scraper" supplied with digging material. This required much track laying of an expensive nature, because the soft ground let the machine sink down unless ties were laid as closely together as possible.

Dragline operations laid the coal open in rectangular cuts about 20 ft. wide and a quarter of a mile long. The length of the boom enabled the waste bank to be built far enough away from the coal face to prevent its burial. Entry driving was therefore unnecessary, the miners loading the coal from the "open face." When the end of the cut was reached, the machine was shifted back about 20 ft. from the edge of the bank. It then dug back to the opposite end of the pit, laying open a new strip of coal and depositing the spoil in the cut from which the coal had just been quarried. "Drag-lining" transformed the field into a series of parallel ridges.

The Butlers' machines were first placed at work in the upper bottom of Missionfield, where Wright & Wallace had also operated. The stripping was shallow in the center of this "bottom," and the overburden contained no hard material such as shale or soapstone, consequently the dragline operated with such ease and speed that the Consolidated Coal Co. soon was enjoying an output of over 1,000 tons of coal a day.

The available stripping in this section of the field did not last long, as a large part of the coal had been mined while Wright & Wallace were at work. Increased depth of overburden, the unlooked-for appearance of hard, blue shale above the coal, and a bad flood, forced Butler Bros. to move two of their excavators into what is known as lower Missionfield. The third machine was abandoned.

The overburden in the eastern end of this field was light, therefore, the dragline fairly made the dirt fly from about 40 acres of coal. Here, the machines were

operated in tandem—one stripping, the other loading coal into the railroad gondola cars which ran directly into the pit. This was the first machine coal mining.

However, in the center of the field, shale, soapstone and increased depth of overburden were encountered, retarding the progress of the machine greatly, and it became necessary to drill and blast the hard material so that the bucket could dig it. The profits decreased correspondingly, as Butler Bros.' contract with the coal company was to deliver the coal on board cars, at a certain price per ton. The mine workers became dissatisfied, and struck for an eight hour day and heavy increase in wages. These troubles stopped business, and brought about the abandonment of the first draglines.

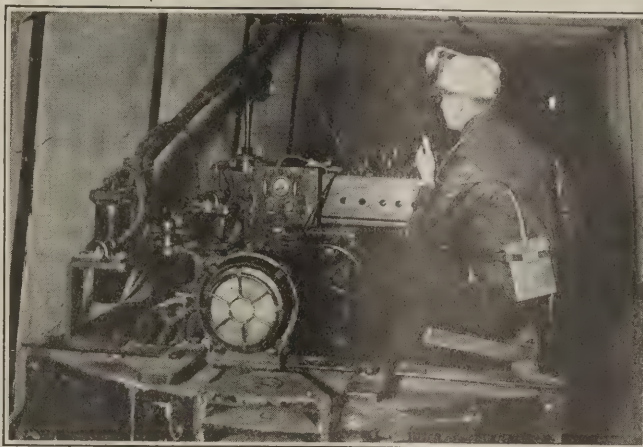
Cement Gun Used for Rock Dusting Mines

RECENT experiments, says Dan Harrington, formerly of the Bureau of Mines, have been made in a New Mexico colliery with a cement gun stationed at the intake end of the main entry. It ejects a stream of dry shale dust into a strong ventilating current. The tests indicate that the shale dust was discharged at the rate of 1 ton per hour. The velocity of the air current in one test was 800 to 1,000 lin.ft. per minute at the intake and about 400 lin.ft. at a point 6,000 ft. distant. The dust cloud at this point was dense 25 minutes after the cement gun was started, and definite evidence of dust settlement was found as far as 9,000 ft. from the gun.

When the air current that passes through the entry being dusted is uniform, the quantity of deposited dust is necessarily greatest near the point where the dust is ejected. To obtain even distribution of dust through an entry, it would be necessary to shift the dusting machine from time to time. In an entry such as that described, of 98 sq.ft. cross section and 6,000 ft. long, to obtain a deposit of, say, 4 lb. per linear foot, at the rate of 1 ton (of 2,000 lb.) an hour, the mechanical distributor would have to operate for 12 hours.—Bulletin 225, Bureau of Mines.

Further Progress Made with Voice Transmission From Underground Workings to Surface

Are Wireless Tests Valuable When They Are Made Between the Mine and High-Powered Stations on the Surface?



Receiving and Sending from Locomotive

Propagation Affected by Earth Strata and Sheet Water—Experiments carried on from Mine Locomotive Successful

BY J. J. JAKOSKY
U. S. Bureau of Mines

RELATIVELY successful underground tests in wireless communication have been conducted in Illinois, Pennsylvania, Arizona, Utah, Idaho, Colorado, Michigan, Wyoming, Kentucky, New York, Connecticut, and in England, Germany, Italy and France. As a result, occasional press notices and illustrations have appeared in many papers. This may lead to the impression that radio communication in mines and tunnels is an established fact and that the method is comparatively simple. As a matter of fact, this is not so.

In practically all these tests the general procedure has been to take underground a receiving set of varying degrees of sensitivity and listen to broadcast music or speeches from high-power broadcasting stations. The results of these experiments are of real value and much interesting information is being obtained. Receiving stations have been placed on trains and communications received while they were passing through tunnels, tubes under rivers or subways. Other tests have been conducted in the Grand Canyon of the Colorado, in submerged submarines, in water wells and caissons, in the new tubes under the Hudson River, etc. Tests have been made in every conceivable part of a mining plant, from the carpeted offices of the officials to the mule barns underground.

TESTS DETERMINE TRANSMISSION FACTORS

These tests are of much interest and are useful when interpreted with reference to the conditions under which they are made, as for instance, in relation to the surface and sheet waters, the geology, mineralogy, and topography of the measures, the presence of metallic conductors, such as electric power and lighting circuits, compressed air and water piping, trolley wires, telephone lines, hoisting cables, headframes, etc.

Practically all these tests, however, have three com-

mon factors. First, reception is from broadcasting stations of a power very much greater than practical for underground sending sets. However, even one-way communication, that is, from the high-powered station on the surface to a receiving set in the mine, would be of value if the entombed miners who survive could be equipped with reliable receiving apparatus to allow them to tune in to some nearby station. The entombed men could be informed of the progress of the rescue parties and that information, though it afforded no physical aid, might prove to be a favorable psychological factor. In some cases even entombed men might be directed to parts of the mine where they could be reached by rescue parties.

NO SUCCESSFUL MINE-TO-SURFACE TESTS

Second, in most of the tests coming to the attention of the U. S. Bureau of Mines, there is no mention of successful transmission from within the mine to the surface. This transmission is of the greatest importance. If a reliable means of voice transference can be placed at the disposal of entombed men, they could inform rescue parties of their exact location, the number of men entombed and living, their names and designation number, and the condition of the air supply. Such information would greatly facilitate rescue operations.

Thirdly, in practically all tests conducted either by the Bureau of Mines or outside experimenters, the data obtained indicates that metallic conductors such as trolley wires, power and lighting circuits, car rails, compressed-air and water piping, hoisting cables, steel frame work, etc., are the controlling factors in underground communication. An early publication of the Bureau called attention to the influence of such conductors upon radio transmission, and later work has greatly emphasized the importance of this feature. Most experimenters have neglected to consider the effects of such metallic conductors or "carriers" for the high-frequency currents. In some tests, however, the apparatus, when moved to other locations within the

NOTE—Headpiece shows set connected to harp on trolley pole. Line-radio communication may be carried on while the locomotive is in operation. Very little interference resulted from sparking of the trolley wheel. All tube sockets were mounted on special cushions to minimize vibration.

mine where such conductors did not exist, gave entirely different results.

In practically every deep underground mine test it has been noted that reception is much better in one place than in another. When the apparatus is moved from one part of a room, into an adjacent working or to another entry on the same level, better signals may be received. In other cases after the change no radio communication can be received.

If the radio waves actually penetrated the earth for any appreciable distance, it does not seem probable that moving the apparatus a few feet would make such a great difference in the result. The effects of line-

present, its sheet distribution, and, to a somewhat less extent, on the type of ore or mineral.

Some formations, such as coal, shale, etc., are insulators when dry. The metals recovered from ores may be excellent conductors but such ores as they exist in the earth are not necessarily so. This is due to the fact that the metallic particles, if existing as such, are separated by the matrix which as a rule is a non-conductor. In most ores the metals do not exist as such but as chemical compounds, which must later be extracted by hydrometallurgical or pyrometallurgical processes.

Coal, which often contains as much as 95 per cent



Portable Mine Apparatus

This receiving set was connected to two short sections of mine rail and picked up signals from a line-radio transmitting set connected to the rails in another section of the mine. Oftentimes, good results can be obtained by connecting the receiving set to the rail and driving a peg in the ground.

radio or so-called "wired wireless" should be considered by experimenters when conducting such tests.

I do not intend to convey the impression that pure radio is the only system of communication. On the contrary, any reliable portable system of voice communication will be satisfactory. The point to be emphasized, however, in connection with such tests is that if line-radio played an important part in carrying the signals in or out of the mine when tests are conducted and while the mine is in good working order—and all trolley wires, power and lighting circuits, etc., are insulated from the ground and with no breaks in such metallic conductors—can the same system of communication be relied upon in cases of disaster? Fire, falls of rock and roof, explosions, mine flooding, etc., will not only ground the electrical circuits but also break the conductors in many places, causing changes in the electrical characteristics of the metallic carriers, which must all be taken into account.

So far, practically all data obtained from tests conducted by the Bureau indicate that the absorption of radio waves in penetrating the earth depends mainly upon the relative conductivity of the strata through which the waves are propagated. The conductivity of the earth depends largely upon the quantity of water

of carbon, is usually an excellent insulator. Practically none of the carbon in coal is existent in the green state but is present as a complex bituminous or pitch-like material, which acts as an insulator. Most of the eastern coals are of such close structure as to contain little free water or moisture. The "combined" water does not add to the electrical conductivity. Many seams, both horizontal and vertical, contain sheet waters and seepages between strata which prevent transmission of signals for any considerable distance. Other minerals such as hematite and certain sulphide ores are conductors even when dry.

In all cases, however, the conductivity of beds of ores and minerals is greatly increased by the presence of water. Mine waters containing relatively large quantities of dissolved salts are good electrolytes. Radio waves are greatly attenuated in penetrating such waters, and in horizontal, uniform strata with numerous sheet waters, only a short penetration of the radio waves may be expected. The thickness and number of such sheet-water formations limit the penetrating power of the radio signals.

Similar effects have been noted in numerous government tests conducted on submarine signalling. It has been found that even the comparatively high-powered

transmitting stations aboard battleships can not be relied upon for continuous communication with submarines when they have submerged to a depth approaching that of the average shallow coal mine in this country.

In mine tests conducted when receiving from surface stations, it has been found that the signal strength is not greatly affected at a short distance underground, but drops off rapidly as soon as a depth is reached approximating that of seepages and the sheet-water formations. This holds true, of course, when there are no metallic conductors present to act as carriers. In mines having electric light and power circuits, such conductors

tained indicated that the range is dependent almost entirely upon the type of conductors present, their electrical constants, etc. The transmitting range of this set in the average coal mine is only a few hundred feet when there are no conductors present, but may be several thousand feet when operating in the vicinity of power and lighting circuits, telephone lines or other metallic carriers.

In another series of tests similar effects were noted when using a loop aerial for transmission. It is not necessary that the metallic conductor be tuned or have a natural period the same as that of the wave. The

Bureau's Experimental Laboratory

This station has been licensed to use any wave length and power. From here the experimenters were kept in touch with all the portable field stations as they were moved about in the mine. Both code and voice transmitting equipment was used.



will carry the signals down from the surface—and often with but slight diminution in intensity.

The extent to which such conductors act as carriers for the high-frequency waves depends upon their electrical characteristics and the wave frequency. If the electrical circuits offer high resistances to the high-frequency currents, there will, of course, be a great loss in signal strength. However, the capacities of machine windings, parallel wiring, etc., are often of sufficient magnitude to offer a relatively low reactance bypass or shunt for the high frequencies.

In a series of recent tests a 10-watt telephone transmitting set was mounted upon an electric locomotive, and the outfit connected to the harp of the locomotive trolley pole. A portable receiving set, consisting of a detector and two steps of audio-frequency, was used on the surface and connected to a 50-ft. single-wire antenna. The mine was operated by a shaft about 400 ft. deep. There was no difficulty in picking up signals from the underground moving locomotive station as long as the receiving antenna was placed in the vicinity of any electrical conductor extending into the mine. The signals were picked up readily when the receiving antenna was near the trolley wires, power and lighting circuits, telephone lines, and hoisting cables, the relative magnitude of the signals from the different carriers being in the order named.

In a series of tests conducted to determine the transmission range underground, a portable 10-watt transmitter was mounted on a storage-battery locomotive. A short three-wire antenna mounted on the top of the locomotive was used for transmitting. The data ob-

wave is propagated or guided by such conductors which function "aperiodically."

The effects of line-radio are particularly noticeable when using a loop antenna for reception. In almost every case where the receiver is placed at a sufficient distance underground to be shielded, it has been found that the loop antenna, when near metallic carriers, functions best when placed in more than one direction regardless of the true direction of the transmitting station. Moving the set to another location in the vicinity often results in the loop pointing in a different direction. A study of near-by conductors shows the reasons for such changes in the directional properties of the loop. When using a capacity-type antenna, such as a wire stretched along the mine entry, this loss of directional properties as a rule cannot be noticed.

The variation in electrical characteristics of underground mine-power distributing systems indicates that certain optimum frequencies exist for each mine. The higher the frequency used the more efficient the radiation and the less loss in signal strength, when carrying across gaps due to metallic breaks, etc., in the conductors. On the other hand, the attenuation of the high frequencies when traveling along metallic conductors or directly through the earth is much greater than for the longer wave-lengths. The optimum frequency to be used in each case will depend upon the electrical constants of the underground metallic conductors, distances to be covered and type of communication desired.

It would, of course, be admirable if adequate provision could be made for the placing of mine communication rescue sets underground and have them ready for



Testing with Loop Aerial

Practically all metallic conductors have a tendency to warp the signals and destroy the directional properties of the loop. This portable set was used in many places in the mine to study the effects of water, pipes, rails and mine cars.

use in cases of emergency. However, the capital invested in idle equipment while waiting for something to happen offers a serious obstacle—especially as the real usefulness of the apparatus for rescue operations has not yet been determined.

A direct service for the apparatus must be found in the everyday operation of a mine. Because radio can operate effectively and efficiently when the radiated energy can be guided by metallic conductors, it may be possible to use a simple low-power portable line-radio set. The installation of a line-radio telephone set is simple, it being necessary only to lay a wire 25 to 50 ft. long on the ground or stretch it along the wall or roof and in a direction approximately parallel to carriers, or to couple the set directly to such conductors by the use of suitable capacities or inductances. As far as actual installation of apparatus is concerned, the line-radio is simpler and can be installed in shorter time than the present underground mine telephone with its connecting wires.

The line-radio apparatus itself, however, is more complicated than the present simple mine telephone. After the line-radio apparatus has been developed to the point where its use for mine communication can be safely recommended, its final adoption will depend upon the operating conditions prevailing in each mine. The line-radio apparatus alone will necessarily have a higher upkeep and maintenance expense, but to offset this will be, not only the almost total elimination of telephone line and wire maintenance, but also one less wire to be given space in the mine haulageways and entries. This holds true of course when the line-radio utilizes power or lighting circuits already in place.

It has been found that practically any conductor insulated sufficiently for the economic transmission of power or lighting current will act efficiently as a carrier for the high frequency current. The conductor acts in a double capacity, the high-frequency current being superimposed upon the low-frequency or direct-current power without any interference to the power supply and with only slight interference to the carrier-current communication if proper coupling and filtering systems are used. No interference to telephone circuits is noted

by superimposing the high-frequency carrier on the telephone line. Much recent experimental and commercial work on line-radio and carrier-current communications has established its feasibility.

If the apparatus can be made sufficiently practicable to be used as a mine communication apparatus, it will prove advantageous for the following reasons:

(1) Men would soon become acquainted with the operation and care of the apparatus. In case of a disaster such knowledge would be of far more value than any short course or training which might be given men for the operation of other rescue apparatus.

(2) Maintenance and inspection service will be justified for other reasons besides the purely humanitarian viewpoint of safety.

(3) Purchase of sets, maintenance and apparatus costs can be charged to operating rather than to safety—and there is always more money available for the former.

(4) Breaks in the metallic conductors do not completely stop communication, as with a break in the lines connecting the present mine telephones. Short breaks in the carriers such as opening of switches, etc., are not as a rule directly noticeable in operation. Severe disasters which might cause one or more breaks will not completely destroy the conductors, and communication could probably be established despite them.

A LITTLE VOLUME ON MINE VENTILATION.—To Thomas Bryson, a mining engineer and certificated colliery manager of the Mining College of Wigan, England, the industry is indebted for a book entitled "Theory and Practice of Mine Ventilation." It is a thoroughly practical publication and is especially strong on the subject of mine fans. The public is accustomed to books which lay emphasis on distribution of air; this book lays the right stress on the ventilator. It treats of main fans and boosters but does not fail to deal with the basic principles of air distribution and measurement. The book measures 4½x7½ in., has 255 pp. and is distributed in the United States by Longmans, Green & Co., 55 Fifth Ave., New York City, the price being \$3.

Using Rock Dust in Shotholes to Lessen Violence And Increase Lump Coal

Explosive Is Laid Loose in Shothole and Above It Cartridges of Rock Dust Are Placed—The Dust Is Compressed, Reducing the Violence of the Blast—Flame of the Shot Is Extinguished by Shower of Dust

BY J. H. HORLICK, JR.

A FEW expert blasters have long used "cushioned" blasting and its advantages have been rather widely recognized, if not practiced, by shotfirers. Dr. Alfred Stettbacher, of Zurich, Switzerland, has described* a special method of rock-dust stemming introduced into the coal mines of the Ruhr district of Germany since the war by which it is claimed that the percentage of lump coal has been increased as much as 50 per cent with a reduction in explosives' consumption of from 20 to 40 per cent.

The use of rock-dust stemming has been demonstrated by the experiments of the Hercules Powder Co. to increase the convenience and safety to such an extent that there seems to be no reason why this method, or some modification of it, should not be adopted generally.

Former methods of obtaining the cushioned effect by air-spacing have involved refinements in tamping the charge which are difficult to perform in actual practice. With rock dust as stemming, the maximum cushioned effect is obtained, and the tamping operation is even simpler than in present practice. The procedure, in brief, consists in placing one or more cartridges of finely-ground rock dust in the hole after the reduced explosives charge has been loaded. The explosives cartridges should not be slit or tamped, and the long cartridges of rock-dust stemming are merely shoved into the hole without tamping.

DUST STEMMING QUENCHES FLAME

It was found in the Ruhr mines that the explosion compresses the rock dust and wedges it tightly in the mouth of the hole so that none of the gases can escape until they have done their work in bringing down the coal. If, by any chance, a blownout shot occurs, the rock-dust stemming helps to quench the flame. It is, therefore, a safety precaution, whereas coal dust frequently used for stemming is a real danger, and clay, though not a menace, has no flame-quenching properties. The compression of the rock-dust stemming by forming a long pressure chamber provides a greater area against which the gases can expand. In the following tests slight modifications were made in the method described by Stettbacher.

On the test in an Illinois coal mine, the explosive used was black powder. Here the coal is undercut 6 ft. and the bottom holes drilled just above a blue band which occurs in the coal seam about 3 ft. from the bottom. Usually a high percentage of screenings is produced by shooting these bottom or "snubbing" holes. In the method generally followed, an average of 30 in. of "F" blasting powder is used and tamped solidly. On our test shots with the cushioned method the charge

was reduced to 20 in. of "C" blasting powder in cartridges of equal diameter to those used by the miners. After placing the 20 in. of powder in the hole without tamping it, cartridges of limestone dust about $\frac{1}{4}$ or $\frac{1}{2}$ in. less in diameter than the borehole were inserted. This gave an air space above the entire length of the stemming. There was also an air space of 2 in. left between the powder charge and the first cartridge of rock dust. The end of the last cartridge of stemming was mashed so that it fitted snugly in the collar of the hole. The shots made by this method with about one-third of the usual powder charge brought down the coal satisfactorily with appreciably less screenings than generally obtained.

LESS SMOKE AND WELL-SPREAD ROCK DUST

On other tests in the Pittsburgh, Pa., district, more complete records were kept. In Mine No. 1, the coal is approximately 5 ft. high with about 10 in. of slate above it. All of the coal is undercut and is blasted by two rib holes; shooting the tight rib first with 2½ to 3 cartridges of a permissible explosive 1¼x8 in. in diameter. The other butt shot is fired after the coal broken by the first one is removed. Ordinarily 2 to 2½ cartridges are used for the butt shots. The holes are 1½ in. diameter and 6 ft. deep; the portion not occupied by the charge is tamped with moist clay stemming. In the tests tabulated below the finely ground limestone stemming was placed in the hole in two cartridges.

Clark Patent Tubing, 1½ in. diameter, was used as a container for the dust and was cut to bring the end of the stemming 6 in. from the collar of the hole. The remainder of the hole was then firmly tamped with moist clay. After blasting with this method there was much less smoke than usual, and limestone dust was found distributed in the rooms, 50 ft. and more from the face.

At Mine No. 2 lump coal is not the principal consideration but it is important that all slate and other impurities occurring in a band of "bone" in the middle of the seam be separated from the coal. Any method

Table I—Test at Mine No. 1, Near Pittsburgh, Pa.*

Kind of Shot	No. of Cartridges Ordinarily Used	No. of Cartridges Used on Test	Remarks
Tight	2½	2½	Broken down in excellent lump coal
Butt	2	1½	Good shot and good lump coal
Butt	2½	1½	Good shot and good lump coal
Butt	2	1½	Seemed to be shot rather heavy, but it appeared to produce practically no slack
Tight	2½	2½	Excellent shot in all respects
Tight	2½	2½	Broke coal half way across room. All coal in large size with practically no slack
Tight	2½	2	Hole was rather low. Some top coal hung and remainder appeared overshot

*NOTE—Article entitled "Increasing Lump Coal Production by Cushioned Blasting" read before American Mining Congress. *The Explosives Engineer*, September, 1923.

*NOTE—A slow permissible explosive was used. The "spreading" effect, typical of black powder, was readily apparent.

that produces less pulverization of this slate helps materially in attaining good separation. Shotholes are 1½ in. in diameter. The usual practice here is to drill one cut-hole in the center and near the top of the seam (which is 6½ to 7 ft. high) and to load it with four cartridges of a 1½x8 in. permissible explosive. After removing the coal produced by this shot, a rib hole is fired with a charge of 2½ to 3 cartridges, and then a second rib hole containing 2½ cartridges. The total charge for a complete cut, therefore, usually is 9 to 9½ cartridges.

With the cushioned method, using rock-dust stemming the charges were reduced from 20 to 30 per cent and it was quite apparent to the mine officials that the slate was brought down in larger pieces. The explosives charge was placed in the back of the hole and cartridges of shale dust were placed in the hole to within 6 to 10 in. of the collar. Neither the charge nor the rock-dust stemming was tamped. The small space at the collar of the hole was firmly tamped with moist clay. The results of each shot are shown in Table II.

A slow permissible explosive was used. In shots Nos. 1, 2, 3, and 4, in which the charges ordinarily used were

tamped by the cushioned rock-dust method, the coal was badly shattered, showing the necessity for a reduced charge when using this method. On most of the shots a "spreading" effect similar to that produced by black powder was quite apparent. Each shot dispersed some shale dust in the room, a safety precaution in itself, and there was much less smoke at the face than usually remains after blasting. On the last ten shots, 1½ in. tubing was used to contain the rock-dust stemming; on the other shots the diameter of the tubing was 1¼ in.

The difficulty of comparing results obtained in one mine with those in another, because of the many variables which occur in Nature, is well known. But even though the tests described have not been on large tonnages and have not extended over long enough periods to make them absolutely conclusive, the better results obtained by the cushioned rock-dust method were obvious in each instance.

You may feel that the increased percentage of lump coal obtained on the tests I have described is the result of the reduced explosives charges and is to be expected no matter what the method of tamping. However, it was apparent to all the experienced men who witnessed the demonstrations that the improved results could not have been accomplished merely by using less powder; for when the quantity of explosives usually necessary to pull down the coal without any overloading, was tamped by the cushioned rock-dust method, the condition of the blasted coal clearly indicated an overload. The explosives' charges used in our tests were less than could be relied upon to pull the coal with non-compressible tamping.

It was also observed that with the cushioned rock-dust method, the desirable "spreading" effect heretofore considerable attainable only with black powder was obtained with permissible explosives; and black powder when cushioned with rock-dust gave better results than larger charges tamped in the usual manner.

Laws of Britain Regulate Handling of Lamp

British regulations dated July 10, 1913, require among other things that no person shall place a safety lamp on its bottom unless it is necessary to do so for the safe performance of any particular work or unless authorized by the manager. In all cases when the person is at work it shall be placed at least 2 ft. from the swing of the pick, hammer or other tool. Should any person find himself in the presence of inflammable gas he shall not throw away his lamp or attempt to blow it out, but shall shelter it, hold the lamp near the floor, avoid jerking it, and take it steadily into fresh air. If the gas fires in the lamp where he cannot take it into fresh air, he shall smother out the light or extinguish it in water. No person shall when trying or examining for the presence of gas with a safety lamp raise the lamp higher than may be necessary to allow the presence of gas to be detected.

Every person using a safety lamp shall examine the same externally and assure himself that it is locked and in good order before entering the mine, and shall from time to time while in the mine examine the lamp to see that it is in safe working order; and he shall, when he has completed his shift, return the lamp to the lamproom. If the lamp is injured while in his possession he shall at once carefully extinguish the light.

Table II—Test in Mine No. 2, Near Pittsburgh, Pa.

Number	Location of Hole	Distance from Rib in Inches	Distance from Roof in Inches	Depth of Hole in Inches	No. of Cartridges ordinarily Used.	No. of Cartridges Used in This Test	Inches Rock-Dust Stemming	Includes clay Stemming	Remarks
1	R Rib 1	13	12	70	2½	2½	44	6	Coal badly shattered.
2	L Rib 2	20	18	65	2½	2½	40	8	Coal badly shattered.
3	Center	69	37	69	3½	3½	30	30	Coal badly shattered.
4	L Rib	65	65	65	2½	2½	40	9	Coal badly shattered.
5	Cut	68	30	71	4	3½	40	6	Shot was very good.
6	L Rib 2	11	11	66	2	1½	42	2	All lump coal produced. Some hung up.
7	Cut	72	29	72	4	3	42	10	Bone brought down in large pieces. Unusually good lump.
8	L Rib 1	13	12	72	3	2	..	..	Excellent lump coal produced; left about 1 ft. back tight.
9	R Rib 2	22	12	68	2½	2½	42	8	Curly coal and tight—hard to shoot. Used 2½ cartridges. Good lump produced. Some hung up a little.
10	R Rib 1	12	18	72	2½	2	48	..	Excellent lump coal produced. Good shot.
11	Cut	84	26	69	4	3	40	10	Results excellent. Shotfirer stated better than with 4 cartridges ordinarily.
12	L Rib 1	16	12	70	3	2½	40	10	Results very good. Some fines but good lump.
13	Center	67	20	68	4	3	3½	6	Appeared to be overshot.
14	R Rib 1	18	12	72	2½	2	48 in.	6	Fair lump but appeared slightly over loaded.
15	Center	11	18	72	4	3	48	4	An exceptionally good shot.
16	Center	..	22	72	4	3	48	4	Good lump. Bone came out large and easy to remove.
17	L Rib	20	18	72	2½	2	..	10	Burden was heavy. Results good and good lump.
18	L Rib 2	12	16	72	2	1½	..	6	Very good lump. Later reported that back was tight.
19	Center	..	..	72	4	3	..	4	Pulled coal well and produced good lump.
20	Center	..	..	72	4	3	..	6	Excellent results.
21	R Rib 1	18	18	72	2½	2	..	6	Results good.
22	Center	..	15	72	4	3	..	6	Broke clear to ribs in some places. Good lump coal.
23	R Rib 1	..	..	72	2	1½	..	6	Seemed to be a very tight shot. Results good.
24	L Rib 2	..	..	..	2	1½	..	..	Fairly tight. Broke well with good lump coal. Began using larger tamping shells.
25	Center	..	..	72	4	3	..	6	Results very good.
26	L Rib 1	..	..	72	2	1½	..	24	Pulled very well.
27	R Rib 2	..	..	72	2	1½	..	4	Pulled very well.
28	Centre	..	..	72	4	4	..	42	Material smashed too fine. Considerable fine bone was produced which will be extremely difficult to eliminate.
29	L Rib 1	..	..	72	2½	2	..	8	Pulled well and good lump produced.
30	Center	..	..	72	4	3	..	6	Seemed to be shot hard. Coal broken, but not too fine.
31	R Rib 1	..	..	..	2½	2	..	6	Appeared to be somewhat overshot
32	R Rib 2	..	..	..	3	2	..	4	Very heavy burden. Results good and good lump coal.
33	L Rib 1	..	..	..	3½	2½	..	..	Very heavy burden. Results as good as could be expected.

Mine Inspectors' Institute Advocates Legislation Requiring Closed Lights and Permissibles

Miners to Be Searched for Liquors, Matches, Etc.—Benwood Explosion Exhibits Danger of So-Called Non-Gaseous Mine—Electric Lights Declared Efficient—Inspectors Favor Air Chambers in Shotholes

BY ALPHONSE F. BROSKY
Assistant Editor, *Coal Age*
Pittsburgh, Pa.

THAT the time has arrived for a general and uniform amendment and addition to the mining laws of the United States was the unanimous conclusion of the Mine Inspectors' Institute at its meeting, May 14, 15 and 16. These sessions were held while the National Coal Association and the American Mining Congress busied themselves with their alternate sessions. The members met in the Hotel Sinton, in Cincinnati, Ohio. Chief among the resolutions of the institute was one advocating legislation prohibiting the use of open lights in all bituminous coal mines large enough to ship coal by rail or water and in all other mines which, in the judgment of the district state inspectors, should be equipped with electric cap lamps. In order that dangerous gases may be discovered when they accumulate, the resolution contained a recommendation that approved flame safety lamps, bearing the approval plate of the U. S. Bureau of Mines, be used, where necessary in conjunction with electric cap lamps.

The resolution also provides that the operator search or cause to be searched any person entering or about to enter any mine in order to prevent such person from taking or carrying therein any intoxicating liquors, matches, pipes, cigars, cigarettes, or any device for making lights or fire not authorized or approved.

The adoption of the clauses set forth in the above resolution met at first with some opposition. Inspector Flynn, Alabama, believes that open lights are safe in mines not classed as gaseous, providing certain other safety measures are taken, but his statement did not remain undisputed for long; Robert M. Lambie, chief of the Department of Mines of West Virginia, briefly recounted the causes which he and others believe caused the Benwood explosion. It was another case where a small accumulation of gas ignited by an open light caused the death of many men. Coal dust, of course, played an important part.

"The approved electric cap lamps must go into every mine of the country," said Frank Hillman, of Alabama, who was backed by Inspector Cunningham, of Somerset

County, Pennsylvania, and others in his contention; and after an extended argument in which all joined, it was agreed that the Institute should not be satisfied with a compromise.

Later in the week, on Thursday morning to be exact, Dr. J. J. Rutledge, chief of the Maryland Department of

Mines, read a paper on "Closed Lights in All Coal Mines." He said that the new and improved electric cap lamps give as much light as a carbide lamp and a much better light than the flame safety lamp. Where the electric cap lamps are being introduced no difficulty is being experienced. No one can say when a mine is gaseous or non-gaseous, which is reason enough that all mines should be considered gaseous. Gas may accumulate unexpectedly by the opening of a clay slip, breaking through to old workings, or by allowing a door to remain open that should be shut.

The efficiency of a miner is greatly increased by the

use of an electric cap lamp. One operator in a southwestern state reports that this equipment actually increases the efficiency of a worker by an amount equivalent to 50 minutes in an eight-hour shift.

A resolution was passed requiring the use of none other than permissible explosives for blasting coal in any bituminous mine and limiting the quantity allowed in any one hole to the specifications approved by the U. S. Bureau of Mines. Certified shotfirers shall be required to inspect, charge, tamp and electrically fire all shots, first having tested the place to be shot for gas by means of an approved flame safety lamp. It is the opinion of the Institute as expressed in a resolution that detonators should be handled by none other than shotfirers. Clay or other incombustible material should be required by law in the tamping of shot holes.

And here is a surprising announcement made by the Institute: "It is the consensus of opinion of this committee (standardization committee) that the use of air chambers in drill holes results in an improved grade of coal and in the more efficient use of explosives." No further reference is made to this method of shooting by which excellent results have been obtained, notably

MINE INSPECTORS DEMAND:

- Electric cap lamps in all mines
- Flame safety lamps where necessary
- Searching of all miners for liquors, pipes, cigars, cigarettes, etc.
- Exclusive use of permissible explosives
- Shotfirers to fire all shots electrically
- Detonators to be handled exclusively by shotfirers
- Depth of no solid shot shall exceed 4 ft.
- Haulageways and aircourses shall be rockdusted unless moisture content is raised to 30 per cent.
- Rock-dust barriers shall be installed at mouths of aircourses and entries
- Cutter bars must be sprayed
- Superintendents must be held equally responsible with foremen for any accidents that may occur.

in the experiments made in the Naomi mine of the Hillman Coal & Coke Co. and conducted by Research Fellow Nelson of the U. S. Bureau of Mines and the Carnegie Institute of Technology. The Institute concedes the greater efficiency of this method but does not openly and directly approve of it. It is my opinion that the time is near at hand when this method of shooting will be permitted by law in many states.

A resolution was passed relative to solid shooting. It reads: "Coal that is mined or sheared is not classed as solid shooting. No coal shall be shot off the solid where other methods are adaptable; no hole shall be drilled deeper than the shearing or mining, and where coal cannot be mined or sheared, the maximum depth of the shot shall not exceed 4 ft."

Mine inspectors all over the country are behind the movement to establish rock dusting as a standard practice in all bituminous mines. They feel that only by the adoption of this measure, not neglecting others equally important, will the number of deaths due to explosion be reduced to the lowest possible level. Though a few of the inspectors are not yet convinced that coal dust is an important agent in explosions sweeping every part of a mine, and some are not yet assured of the effectiveness of rock dust to check coal dust explosions, the majority voice their opinion as follows:

SHOULD ROCK DUST ROADWAYS UP TO ROOM NECKS

"All haulageways, aircourses and productive entries shall be rock-dusted from the mine opening to the room necks. Rock-dust barriers shall be installed at the mouths of all aircourses and productive entries. In addition to rock dusting on all entries and aircourses, water lines of sufficient size shall furnish water at sufficient pressure for wetting down coal dust that may rise and accumulate in and about the working faces. Whenever, by analysis, the dust on a roadway or aircourse shows a content of incombustible material lower than that determined as necessary to render the coal dust inert, the section in question shall be fenced off, or the mine closed, until sufficient inert material has been added to allow of safe operation.

"Those mines, in which rock dusting is not done in the manner described in the preceding paragraph shall be equipped with efficient sprinkling apparatus by means of which the moisture content of floor material shall be made 30 per cent of the volume, the consistency being made such that a handful of dust will compress in a closed hand to a compact mass. The prescribed degree of wetting applies to all parts of a mine."

The resolution relative to wetting, as outlined in the above paragraph, destroys the value of the resolution on rock dusting. Active exponents of rock dusting are not in sympathy with any such weakling and contradictory resolutions. The recommendation covering sprinkling was adopted only to satisfy those who are not sure as to the effectiveness of rock dust. No other meaning can be placed on this action.

Another resolution involving sprinkling—however, in this case a good one—requires that: "Coal-cutting and loading machines shall not be operated in bituminous mines unless water is applied in such manner as to prevent the raising of a cloud of fine dust while the machine is in operation. All motors used in such machines shall bear the approval plate of the U. S. Bureau of Mines."

Section 7 of the resolutions provides that "accumulated gas shall not be permitted to exist after discovery in any mine longer than may be necessary to remove the accumulation," and that the latter "shall not be removed in such a manner as to endanger the lives of the men in the mines."

Section 8 provides that "In order to insure an uninterrupted circulation of air throughout the mine workings, it is recommended that all aircourses be securely and amply timbered and kept free of obstructions. Non-flammable material shall be used in the construction of all permanent stoppings, overcasts and undercasts."

The committee borrowed from the English laws in formulating its ninth resolution which reads: "Superintendents shall be held equally responsible with mine foremen for the enforcement of safety in and about mines. All mine officials shall be required to pass an examination and possess a certificate of competency issued by the various state departments of mines."

Section 10 contains resolutions involving qualifications and tenure of office of state mine inspectors. It reads: "Since state mine inspectors are charged with the general protection of life and property in mining, it is recommended that they be men who possess experience, technical knowledge and character, and that they shall hold office free from political influence. Their competency shall be judged by a merit system. It is further recommended that such mine inspectors shall be at least thirty years of age and shall have had at least ten years of practical experience in coal mines."

The newly elected officers of the institute are James Dalrymple, chief, Department of Mines, Denver, Colo., president; Frank Hillman, safety engineer, Woodward Iron Co., Mulga, Ala., first vice-president; E. J. Hoey, state mine inspector, Christopher, Ill. second vice-president; William Boncer, mine inspector, department of labor and industry, Richmond, Va., third vice-president; G. B. Butterfield, general manager, the Associated Companies, Hartford, Conn., secretary; J. H. Griftner, chief inspector, the Associated Companies, Champaign, Ill., assistant secretary; J. J. Rutledge, chief mine engineer, Bureau of Mines, State of Maryland, Baltimore, Md., treasurer.

Right Kind of Rock Dust Is Harmless

Rock dust properly used in coal mines to prevent coal dust explosions is not a hazard to the health of the miners, according to Dr. R. R. Sayers, Chief Surgeon of the U. S. Bureau of Mines. It is true that dust produced in metal-mining operations is often the cause of minor's consumption, but this is because of the peculiar character of that kind of dust, according to Dr. Sayers. In drilling operations a dust is often produced that is very irritating to the lungs, and the continual breathing of this dusty air produces a bad effect. In coal mines, the rock dust used for limiting explosions does not remain in the air to be breathed, but settles on the sides and bottom of the workings. In addition, dust that is not irritating is used for this purpose. Limestone dust made from limestone that is free from silica is best for this purpose, but shale dust, clay dust, and other dust can be used. Dr. Sayers suggests that a mining company about to introduce rock dusting into its mine should submit a sample of the dust to the Bureau of Mines to be analyzed.

Problem of Fitting Loading Machine to Physical Conditions of Mine and Coal Seam

Discussion at Cincinnati Meeting—Selection of Machine to Meet Physical Conditions—What to Do When Rock Laminations Are Encountered—Does the Machine Break Up the Coal?

Selecting a Machine to Suit A Particular Mine

PROMISCUOUS choice of a loading machine without regard to the conditions under which it must be operated was unsparingly condemned by R. A. Walter, consulting engineer, New York City, in a short address before the session on "Correlation of Mechanical Loading with Haulage and Mining Systems" at the Cincinnati conference of the American Mining Congress.

At present several hundred coal loading machines are in daily use, more than half of which are operating successfully. Of the remainder, many could be made to operate more satisfactorily were suitable mining methods employed. Loss through purchase of those entirely unsuited to local conditions, could have been avoided if careful preliminary analysis had been made of the conditions.

No machine loader can be universally applied nor does any mine present conditions permitting the successful operation of all the loading devices of proved merit. Given a suitable mine environment these devices will function efficiently, and practically every mine presents conditions permitting the successful operation of at least one of them. The right machine in a mine will undoubtedly cut costs, but purchase of unsuitable equipment is a sheer waste of money.

WHERE FACTORS FAVOR SURVIVAL

There are certain factors at each mine which affect machine loader operation. Each loader in a varying degree possesses qualities which enable it to operate where one or several of these factors persist. Analysis of mine conditions and careful co-ordination with equipment will therefore eliminate much of the guesswork heretofore incidental to mechanical loading.

A study of the following list of some of the more common influencing factors will quickly indicate the reason for many mechanical loading failures and may show how they might have been avoided:

Old or New Mine	Haulage
Available capital	Drainage
Floor	Ventilation
Roof	Power
Coal:	Machinery
Pitch of Seam	Labor:
Height	Attitude
Structure	Supply
Preparation	Type
Mining:	Housing
System	Local Management
Laws	
Surface Protection	

These are only the most obvious fac-

tors. There are many more—some vitally important. All have a bearing upon successful operation. None may be ignored without lowering efficiency. To ignore some of them will cause absolute failure. Mechanical coal loading can of course be installed more economically and with less inconvenience at a new than at a going mine.

Some types of loading appliances can be adapted to a going mine at a cost well within the limits justified by the

working room between face and props, others but little. Some machines will load only up to some specified width of working face, and others will load any width but consume so large a proportion of time in moving as to impair their efficiency unless the face is at least a certain minimum number of feet wide.

There are almost as many different roof conditions as there are mines. Each requires different treatment with which the loading machine must co-



A Gathering and Loading Machine in Operation

Adoption of mechanical loading has been beset with many obstacles one of the chief of which was the ponderous size and large cost of the machines used. An expensive machine must be kept busy a large percentage of the time or the overhead eats up the profit. Most of the difficulties in the path of machine loading have now disappeared.

possible saving in operating costs. Others cannot be economically applied. Generally production can be increased far more economically by installing suitable mechanical loading than by increasing the hand-loading capacity.

A factor too frequently overlooked by those experimenting with loading equipment, is the floor or pavement. Examination of loading equipment quickly indicates that some machines cannot operate successfully on a soft bottom. A shelly floor presents an entirely different problem from one that is smooth and hard. Rolly or irregular bottom eliminates other machines.

The roof receives more attention but is seldom studied with sufficient care. Certain machines by their action make bad roof worse. Others practically make a bad roof almost good. Some machines advance more rapidly than others. Some require much space for

ordinate. Compulsory timbering to within a few feet of the face restricts selection but need not necessarily make machine loading impossible. A good roof permitting wide untimbered working face widens the possible choice but does not by itself indicate that every machine within this range will function satisfactorily.

Contrary to the general impression there are mechanical appliances which can be effectively applied to pitching seams. Manifestly these will change as the pitch of the seam varies. On some pitches within certain limitations of thickness none now developed will promote efficiency but in the majority of cases investigation will show that some one or various machines can be advantageously employed.

Floor and roof conditions may indicate equipment which is barred by the height of the seam. As the coal de-

creases in thickness the selection of suitable loading equipment becomes more limited but coal only 19 in. thick is being mined with mechanical aids.

Seam structure and coal preparation are closely interallied insofar as they effect mechanical loading. Presence of bands of impurities in the seam either restricts the choice of loading devices, lowers their efficiency, or calls for auxiliary cleaning equipment. Ordinarily the miner picks out these free impurities and throws them into the gob. Theoretically he loads only clean coal into the mine car. Perfection of separation so attained in practice is an important factor in machine selection.

Operating sufficiently rapidly to attain normal efficiency, some loading devices will not permit any but the most casual separation of impurities inside the mine. Others permit a better separation than is obtained with hand loading. In some instances coal and impurities can be loaded together with an appropriate machine loader the cleaning being accomplished at the tippie by suitable equipment. In others the cost of this cleaning will either offset the economies effected by mechanical loading, or the cleaning will be unsatisfactory and the coal prove unmarketable.

IMPORTANCE OF COAL FRACTURE

Another important factor to be considered is coal fracture. Coal breaks into lumps of various size. Some are slabs, others blocks, or the lumps may lack regular shape altogether. Each fracture presents its own loading problem and a machine which establishes a big tonnage record in one coal may fail entirely in another.

Market sizes and classifications, and the use for which the coal is intended all have a bearing on the machine to be used. In some instances there is no objection to shooting the coal into slack. In others it is important that the coal be blocky and slack be held at the minimum. Many machine failures can be traced to ignorance of their inability to load coal of a certain size. Much coal is shot only sufficiently heavily to crack it, after which in hand loading it is dug down with a pick and then loaded. Designers of mechanical loaders have spared neither thought nor effort to construct a machine which will first dig and then load such coal. Some attain creditable results, others are as yet in an experimental stage.

With some loading equipment efficient operation can be attained only if all the coal is removed, which brings into our problem a new factor—surface protection. Where it is necessary to hold the surface this frequently determines the mining system. In other instances the mining laws are the determining factor.

It is evident that both must be taken into consideration in planning a mining system. Then follows a further compromise between the system so evolved and that under which the loaders suited to seam conditions will best operate.

In a new mine the selection of suitable loading equipment and a mining system which will not conflict with laws, or interfere with surface protection is comparatively simple. In a going mine it is more difficult. In many

instances the mining system used eliminates from efficient operation all but a few loading machines. In others some machines will load coal rapidly and well, though the efficiency attained through rapid loading is more than counterbalanced through losses inherent to the system but which do not effect hand loading.

Though machine loading simplifies and contracts the haulage system a continuous car supply to the loading machine is a prerequisite for efficient and rapid loading. It is quite easy to supply cars to some loading appliances and difficult to supply them to others. Gage of track and height and size of mine car must not be overlooked for they influence machine design, clearances and speed of operation. Inability to supply mine cars to the machine loader indicates an inexcusable haulage condition and is not a legitimate reason for postponing a trial of mechanical loading.

Like haulage, drainage and ventilation are greatly simplified. The concentration of work attained with mechanical loading permits a reduction in volume of water and air handled per ton of coal mined. The reduction is enormous as machine loading requires only from one-third to one-sixth the working territory required by hand loading for equivalent tonnage. In some mines presenting particularly difficult drainage and ventilation these factors may be the determining influence in the matter of machine selection.

As loading machines replace human effort with mechanical energy it is only natural to think that additional power must be supplied. In practice this need not be done. Places are loaded out so rapidly and regularly that cutting machines operate far more continuously than with hand loading, making the flow of coal more regular. There is no such prolonged afternoon drag on power as is found in hand-loading mines where for several hours each day each cutting machine and locomotive is continually on the line with controller wide open. Peak loads are not so high. Power need not be distributed over so wide an area. Less copper is needed and the more regular power consumption will show a saving over hand loading.

PRESENT POWER PLANT ADEQUATE

In many mines where the power plant is the factor limiting production, certain loading devices will permit a decided tonnage increase without additional power plant. Before selecting loading equipment careful analysis should be made of its effect upon the power consumption of haulage and cutting auxiliaries for the power consumed by the loaders is but a comparatively insignificant part of the total power used.

At going mines auxiliary machinery may have properties which will go well with one type of loader, but be entirely inappropriate to others. This should be borne in mind and a careful analysis made to ascertain whether it is advisable to install loaders permitting its use, or to purchase other loaders and replace present auxiliary equipment with that more suitable to the type of loader selected.

Whether labor is receptive or antagonistic to machine loading has an important bearing. A shortage of labor indicates the desirability of mechanical loading. The type of labor available will limit, and may determine, the matter of machine loading and the selection of equipment.

At mines presenting conditions favorable to machine loading, where operators must furnish houses for their employees, properly selected loading equipment will obviate erection of houses for the labor which the machinery displaces. At a going mine it permits increased production without any increase in houses or in labor personnel.

One of the most important factors in determining the possibilities of mechanical loading is the attitude of the local management. Given reasonably good mine conditions and the sincere co-operation of the operating officials, mechanical loading is almost uniformly successful. Lacking this co-operation and with the best mining conditions failure is quite possible.

RAISES MINE TO FACTORY LEVEL

Mechanical coal loading places coal mines on a more efficient plane somewhat approximating that of factory operation. Through heretofore unprecedented concentration of labor it promotes safety and supervision and makes possible large reductions in operating costs. In return for these advantages it demands a higher grade of labor, better supervision and more thorough engineering.

Before installing any particular loader or loading device every influencing mine factor should be ascertained and analyzed. Next the characteristics of each available coal-loading device should be determined. A process of comparison and elimination will show which equipment may be expected to operate satisfactorily after which a mining method, suitable to equipment and coal seam, must be planned. Such a preliminary investigation may consume much time but only in this way lies any reasonable assurance of success.

What Shall We Do With the Refuse in the Coal

MANY mines are perched on hillsides and the tipples are located in narrow valleys occupied by streams, railroads and houses. Serious problems will be confronted, said Thomas F. Downing, Jr., general manager of the Logan County Coal Corporation, at the Cincinnati Conference, May 14, if the laminated impurities in the coal are loaded by loading machines and brought to the tippie to be removed at the picking table. Remembering that mines thus located on hillsides dump their coal quite frequently near the level of the seam and lower the coal to the tippie by rope-and-button conveyor, Mr. Downing, suggested that it would be possible and convenient to clean the coal before sending it down the hill. Then the coal could be dumped on the hillside where more space or at least more height is available.

Mr. Downing said also that if the small sizes of coal had to be washed because of indiscriminate loading by

machinery it might be necessary to spend 10c. to 30c. a ton to remove what had been mixed in with the coal by the loader. Again referring to the disposal of the waste after segregation Mr. Downing said that he knew of one mine where \$70,000 had been expended recently in the erection of a plant merely for the transference of slate.

He also referred to the difficulty of operating loading machines where posts must be set near the face in order to keep dirt out of the coal. In selecting a machine, one that will need the least room will in many cases be preferable. He added that he believed the mechanical loader was coming and even the oldest of those present would see the loader firmly established. We shall be willing before long, said he, to invest money in coal as liberally as is customary in France. He said he had seen one tippie in that country six times as large as he had ever seen in the United States.

In the discussion, D. J. Carroll, chief engineer of the Chicago, Wilmington & Franklin Coal Co., said that the loading machines of his company were working in new mines where mine run was the only coal shipped so he could say nothing as to sizes. The men at the picking tables are well able to take care of all the refuse in the coal that passes before them. The only lamination in the coal is 1½ in. of rock about 2 ft. above the floor. He believes, without having any figures to substantiate his statement, that the breakage was greater than with hand loading.

BREAKAGE NOT DUE TO LOADING

Mr. Downing said that in a case he had noted the breakage was not due to the loading itself but to the heavy blasting that was necessary to prepare the coal for loading. In one case the prepared sizes were reduced 30 per cent and the machine had to be taken out. David Ingle, president of the Ayrshire Coal Co., declared that he believed the machines did not break the coal up as much as the hand loaders. In a mine thus operated, he had no control over the shooting; in the mine that he had equipped with mechanical loaders he had such control. He said he did not have much impurity in his coal and that what there was gave him no more trouble than when the coal was loaded by hand.

J. F. Joy, of the Joy Machine Co., said that in some mines the percentage of slack was increased owing to heavier shooting. In other cases that percentage had decreased, particularly in the Indiana coal fields, which he thought might be favorably circumstanced for the use of mechanical loaders. One manufacturer is placing twenty-five loading machines a month in that state. Any one who had a mine that would not permit him to use a loader had better exchange it for one that would. Operators that are satisfied with loading machines are keeping quiet and those that were not, were quite willing to air their views. He had said that 200 machines had been installed. There were actually more than that number, for there were cases where they had been purchased inadvisedly. This was not always due to the conditions but sometimes to lack of co-operation, failure to study the problem and antago-

nism from the men operating the machine and delivering cars to it. Often the hand loaders got cars that should go to the machine. At other times judgment is not used in keeping out impurities. However, there are enough mines in the United States that can use machines for loading with advantage. The man who wishes to be a coal operator should get one of these mines.

Mr. Whaley, of the Myers-Whaley Co., said his loader had a smooth action and picked up the coal with a slow motion and with about the same drop as when loading by hand. The breakage, therefore, was no greater than in hand loading. The coal, moreover, need not be shot any more heavily than in hand work, for the shots should be no heavier than would roll out the coal. The machine could handle lumps larger than two men could lift.

It is necessary to shake the entire face and loosen it so that the machine can pull down the rest of the face without loss of time. Mr. Whaley did not believe that machine loading would drive any operators out of the mines, but he felt assured that the efficiency of the whole industry would be greatly increased.

A. P. Cameron said he had tried a modified type of the Whaley loader and some Joy machines which are doing excellent work. There are, however, conditions that no loading machine can meet. There are some fields that do not want small coal. The Westmoreland Coal Co. pays the miner only for lump coal. It has 300 men loading this lump. The small coal is kept down to 30 per cent. No loading machine could produce coal with such a small percentage of screenings. Time studies made of the work show that the miners at the mine load only one-third of the time they are in their places. The other two-thirds is consumed in doing work other than loading. Much as the Westmoreland Coal Co. is interested in loading machines it has not found any machine applicable to its conditions.

Machines That Will Drive One-Hundred Feet Daily

Carl Scholz discussed mechanical loaders for rapid entry driving. He said that operators were trying to outdo each other, each striving to get the largest mine in the world. Aside from this operators are seeking large tonnages so as to meet the interest on the large investment they are obliged to make. The higher the wage paid and the greater the interest to be met, the more important it is to develop the mine rapidly. Taxes never stop and the more coal produced the more output over which to distribute these taxes.

With this in mind and with a purpose of increasing safety Mr. Scholz began a study of entry driving. He found that every loading machine assisted in speeding the driving of entries. He had averaged 1,600 ft. per entry per month with two machines working in parallel headings. Conditions must be studied, for the conditions are not similar in any two mines. Mr. Scholz said he had good results with the Jeffrey heading machine. By working three shifts he had actually driven 100 ft. in 24 hours.

There are two types of entry drivers, and the McKinlay machine makes a third. The disadvantage of the Jeffrey machine is in its size. To use it the roof must be good, for it is not possible to timber closer to the face than 40 ft. The coal loaded must be clean and with the Jeffrey machine this can be attained. As it uses no explosives the coal is obtained in large sizes, being five times that obtained with hand loading, an advantage that cannot be overestimated. The elimination of explosives also assists in keeping a sound roof. Unfortunately in one of the mines where the large machine was used the roof was not sound. In consequence the machine had to be withdrawn.

Another big item with the Jeffrey machine is its cost. A machine can be purchased for \$25,000. It takes several months to build. In the Glen Rogers mine the machines had to be withdrawn because of the presence of gas. No machines now are being operated except Joy loaders and they are giving satisfactory results. This machine gives better coal with undercut faces than with overcut. Mr. Scholz added that the mine had no drawslate. In answer to an inquiry he said that longwall could not be successfully operated in this country. With coal selling at \$1.50 a ton the operator could not afford to pay 75c. for backfilling.

W. M. Drake read his paper on "How to Obtain Maximum Tonnage with Loading Machines" which appeared in the issue of May 8, pp. 689-694.

Ingle Describes Mine in Which He Loads by Machine

At the session of May 15 David Ingle, president of the Ayrshire Coal Co., addressed the meeting on "Room-and-Pillar Mining with Mechanical Loaders." Other details regarding his system of operation and conditions of working have appeared in the issue of *Coal Age*, Jan. 31, pp. 163-166. He said his loading-machine mine was in the No. 5 seam of southern Indiana which is 5 ft. thick. This seam has a rectangular cleavage and is quite open. Sometimes in shooting the coal, the gases from the powder will blow out at the back of the cut and at other times the coal falls in a mass after being undercut, thus making loading difficult.

The seam is clean, running 1 per cent sulphur and 6 per cent ash. Most of the impurities come from the roof, which is a grey shale and rather tender. In places 6 in. of this rock falls down with the coal when it is shot and this material has to be cleaned before loading. The mine has a cover of between 30 and 70 ft. It makes much water and this with a soft fire-clay bottom presents a condition of much difficulty.

The mine had been operated for some time and then closed. The room-and-pillar method had been used in this prior operation, and it was continued when the mine was reopened. The cars as loaded by the loading machine hold 3,200 lb. The machines were started in rooms already turned. They are driven on 30-ft. centers and only about 4 ft. to 8 ft. of pillar is left between rooms.



News Of the Industry



Unusual Situation in Coal Trade Brought About by Hoover's "Buy Now" Scheme

Commerce Secretary's Advice Not in Accord with Those Hoping for Runaway Market Prices—Shrinking Stockpiles Near Lowest Safe Point—Baffling Prospect Looms

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

An unusual situation in the coal trade is revealed by the reaction to Secretary Hoover's advice to buy now. Many of the producers of coal are not at all enthusiastic about Mr. Hoover's message and wish that he had kept his mouth shut. The operators who hold this opinion believe they will be better off at the end of next winter if the consumers are allowed to go ahead, just as they are doing, and use up their stocks. This will mean that they will come rushing into the market next autumn, with the probability that the operators who can afford to wait will profit much more than if buying had been spread evenly over the summer.

A few consumers already have recognized that the hand they can play to greatest advantage is not to draw on stocks now but to continue buying their current requirements in the existing easy market and then use their stocks when prices go up in the autumn or winter. Much interest is being manifested in the result of Secretary Hoover's letter. The more generally held view is that most consumers will not be able to resist the temptation of coasting on their stocks. Some think, however, that the consumers have been convinced that storage is greatly in their interest and that buying will begin as soon as stocks have been reduced to forty or fifty million tons. The only figures on storage which are available at the moment are those covering railroad fuel. It is significant that between March 15 and April 15 nearly 1,000,000 tons was taken out of railroad storage.

Stockpiles Diminish Steadily

On April 1 the aggregate coal in storage was 65,000,000 tons. Consumption is thought to be running around 9,000,000 tons a week. Judging from the probable consumption in excess of production, stocks now are around the 50,000,000-ton mark, the figure usually regarded as supplying a safe margin of storage. Some insist that a reserve of 40,000,000 tons is ample. With 2,000,000 tons a week coming out of storage, only a few weeks more need elapse until the country's stockpiles will have reached that low figure.

While there can be little question that Secretary Hoover's advice is in the interest of the consumer and the transportation agencies, if followed it will have the effect of keeping alive many of the high-cost mines—an incidental result which Mr. Hoover must regret. On the other hand, if the country continues to go to the stockpile for its fuel, and the paralysis of April and May be extended for four months more, the credit of all but the stronger companies will have been broken.

The consumer who holds on to a reasonable reserve apparently has no chance to lose. Coal is almost certain to increase in price next autumn. The difference between that increased price and the current price is almost certain to be more than the carrying cost on the coal in storage. If the coal in storage has cost, including transportation, \$6 per ton, the interest charges for six months would be 18c. a ton, an amount certain to be exceeded if there be even a slight car shortage.

To anyone passing around among the coal specialists and others who are watching the market it is apparent that they sense something puzzling and baffling in the present situation. Somehow coal has entered on new times. The situation is more difficult of analysis than in the past.

No one ventures to predict what the ultimate results of the three-year wage agreement will be. No one will even hazard a guess as to how much of the market usually considered as belonging to the union fields will have passed into the control of the non-union producers. No one will attempt to answer what is to become of the mines that are being shut down. Are they to be allowed to cave in and be abandoned? What is to become of constantly growing surplus of union labor? All the union operators now have attached their signatures to the three-year agreement. Competition grows in intensity with each passing week. Major forces are at work on the far-flung coal industry, but even those possessed of unusual vision are frank in the admission of their inability to answer the questions which are on many lips.

No Cut While Contract Runs, Says Lewis

John L. Lewis, International president of the United Mine Workers, declared May 20, at the biennial convention of the Illinois district union, at Peoria, that coal operators who were predicting the necessity of modifying the miners' three-year wage contract, were mistaken. "There will be no modification of that scale now or at any time until the term expires," he said.

"Lower wages would not bring more work," President Lewis said, "and there is no hope for immediate relief. Depression in the industry will continue until the enormous reserves piled up against a possible strike are exhausted. Those reserves approximated 75,000,000 tons.

"They are burning up that reserve now, and no difference what rate we have as long as the reserve continues, people will not burn more coal than they require. If we had taken a \$5 rate (a reduction from \$7.50) at Jacksonville, non-union rates would have gone still lower, and present conditions continued."

Shipping Board Opens More Bids at New York

Bids were opened last week by the U. S. Shipping Board at New York for furnishing and delivering alongside vessels operated by the Board from New York harbor two separate lots of bituminous coal with a minimum 14,500 B.t.u.

The first batch of bids, opened on May 19, called for 1,500 gross tons of coal. The bidders and prices were: Seiler Coal Co., \$5.48; H. B. W. Haff, \$5.31; Imperial Coal Corporation, \$5.42; Willard, Sutherland & Co., \$5.68; E. Russell Norton, \$5.49; W. A. Marshall & Co., \$5.85, and Steamship Fuel Co., \$5.09.

On May 23 the following bids were received for furnishing and delivering 5,000 gross tons of coal. Steamship Fuel Co., \$5.19; Seiler Coal Co., \$5.13; H. B. W. Haff, \$5.41; Coleman & Co., \$5.51; E. Russell Norton, \$5.61, and W. A. Marshall & Co., \$5.90.

Announcement has been made that the bids received on May 12 for furnishing the board with a maximum of 18,000 gross tons monthly for one year have been rejected and new proposals will be received on June 2.

Keen Competition Marks Bidding for Supplying Navy with Coal

Bids opened by the Navy Department May 22 for supplying 768,600 gross tons of coal for the use of ships and shore stations during the fiscal year beginning July 1, next, showed unusually keen competition, nearly one hundred companies submitting quotations. The department probably will award contracts this week.

Tenders were asked on 330,000 tons of steaming coal for ships and 538,600 tons of bituminous or semi-bituminous run of mine for navy yards and shore stations, practically every item being competed for by a number of firms. Following are the bids submitted on the more important items.

Three hundred thousand tons steaming coal, for delivery at Hampton Roads—W. C. Atwater & Co., \$4.76; Castner, Curran & Bullitt, \$4.72; Consolidation Coal Co., \$4.75; Crozier Pocahontas Coal Co., \$4.76, delivered over twelve months' period; \$4.48 over six months' period; Smokeless Fuel Co., \$4.74; Sugar Creek Coal Sales Co., \$2.50; Fayette Smokeless Fuel Co., \$4.984; Haster & Co., \$4.83 over six-month period; \$5.01 over twelve-month period; Leckie Coal Co., Inc., \$4.65 over six-month period; \$4.73 over twelve-month period; C. H. Mead Coal Co., \$5.04; Pocahontas Fuel Co., Inc., \$4.58.

Thirty thousand tons run of mine for delivery at Boston—W. C. Atwater & Co., \$5.89, F. A. S. contractor's barges; Brinker Coal Co., \$5.94; Castner, Curran & Bullitt, \$5.89; Dexter & Carpenter, \$6.56 for delivery over six months, \$6.62 over twelve months; Eastern Fuel Co., \$7.02; Steamship Fuel Corporation, \$6.85; David E. Williams & Co., \$6.56 over six months, \$6.70 over twelve months. Fidelity Coal Mining Co., \$6.72; W. A. Marshall & Co., \$7.30; Metropolitan Coal Co., Boston, \$6.73; New England Coal & Coke Co., \$6.55 to \$6.70; Pittsburgh & Shawmut Coal Co., \$6.70; Pocahontas Fuel Co., Inc., \$6.13; Quemahoning Coal Co., \$7.55; Maritime Coaling Co., \$6.20; Seiler Coal Co., \$6.26.

Bids Plentiful at New York

Fifty-four thousand five hundred tons run of mine, for delivery at New York—W. H. Bradford Co., \$5.07 to \$5.27; Davis Coal & Coke Co., \$5.28 to \$5.45; Dexter & Carpenter, \$5.20 to \$5.44; Eastern Fuel Co., \$4.86 to \$5.81; Emmons Coal Mining Co., \$4.84 to \$5.09; S. Smith Coal Co., \$5.72 to \$5.99; Steamship Fuel Corporation, \$4.70 to \$5.05; Titan Fuel Corporation, \$4.79 to \$4.99; West Virginia Co., \$5.01 to \$5.39; Fidelity Coal Mining Co., \$5.01 to \$5.42; H. B. W. Haff, \$5.89; Hillman Coal & Coke Co., \$5.62 to \$5.83; W. C. Huber & Co., \$4.86 to \$5.17; Johnstown Coal & Coke Co., \$4.97; W. A. Marshall & Co., \$5.47 to \$5.67; Maryland Coal & Coke Co., \$5.09 to \$5.27 at Navy Yard; Quemahoning Coal Co., \$5.27 to \$5.40; Seiler Coal Co., \$4.89 to \$5.18.

Thirty thousand tons run of mine, for delivery at Philadelphia Navy Yard—W. H. Bradford Co., \$5.09 to \$5.37; Campbell Coal & Coke Co., \$4.80 to \$5;

Campbell, Peacock & Kimball, \$5.12 to \$5.27; Cosgrove & Co., \$5 to \$5.03; Davis Coal & Coke Co., \$5.03 to \$5.17; Dexter & Carpenter, \$4.98; Eastern Furnace Co., \$5.39 to \$5.59; Emmons Coal Mining Co., \$4.83 to \$4.98; Southport Coal Mining Co., \$5 to \$5.17; Steamship Fuel Corporation, \$5.01 to \$5.45; J. Tatnall, Lee & Co., \$4.94; Walcore Coal Co., \$4.87 to \$5.05; Weston, Dodson & Co., Inc., \$5.39; West Virginia Coal & Coke Co., \$4.53. David E. Williams & Co., \$4.96; Fidelity Coal Mining Co., \$4.97 to \$5.09; Hillman Coal & Coke Co., \$5.22 to \$5.37; W. M. Hollenbach, \$4.39 to \$4.53; W. C. Huber & Co., \$4.64 to \$4.84; Logan Coal Co., \$5.29 to \$5.48; W. A. Marshall & Co., \$5.25 to \$6.10; Maryland Coal & Coke Co., \$4.53 to \$4.65; Morrisdale Coal Co., \$4.54 to \$4.69; Quemahoning Coal Co., \$4.70 to \$4.88; Seiler Coal Co., \$4.69; Seaboard Fuel Corp., \$4.72 to \$4.87.

Thirty-five thousand one hundred tons run of mine, for delivery at Annapolis—Cumberland Coal Co., \$5.52 to \$5.72; Davis Coal & Coke Co., \$5.39 to \$5.558; Dexter & Carpenter, \$5.88 to \$6.11; Eastern Fuel Co., \$5.93; Steamship Fuel Corp., \$5.47 to \$6.94; West Virginia Coal & Coke Co., \$5.20 in cars; Fidelity Coal Mining Co., \$5.31 to \$5.61; Hall Bros. & Co., \$5.14 to \$5.44; Hillman Coal & Coke Co., \$6 to \$6.15; W. C. Huber & Co., \$5 to \$5.19; Johnstown Coal & Coke Co., \$5.46 to \$5.66; Quemahoning Coal Co., \$5.35 to \$5.49.

Fifty thousand tons run of mine for delivery at Washington, D. C.—W. C.



C. E. Bockus

Newly elected treasurer of the National Coal Association, in which office he succeeds S. Pemberton Hutchinson, the new president. Mr. Bockus also is president of the Clinchfield Coal Corporation, Dante, Va.

Atwater & Co., \$2.24; C. G. Blake, \$5.19; Brinker Coal Co., \$4.56; Chesapeake & Virginia Coal Co., \$2.21; Cumberland Coal Co., \$5.42; Davis Coal & Coke Co., \$5.28; Dexter & Carpenter, \$5.25; Eastern Coal & Export Corporation, \$5.36; Eastern Fuel Co., \$5.64; Emmons Coal Mining Co., \$4.96; L. A. Sneed Co., \$4.90; Steamship Fuel Corporation, \$5.47; White Oak Coal Co., \$5.30; David E. Williams & Co., \$5.18; Fayette Smokeless Fuel Co., \$4.99; W. C. Huber & Co., \$4.79; Johnstown Coal & Coke Co., \$5.08; Leckie Coal Co., Inc., \$4.97; Lick Run Coal & Coke Co., \$4.96; Logan Coal Co., \$5.51; W. A. Marshall & Co., \$5.27; A. T. Massey Coal Co., Inc., \$2.35 f.o.b. mines; New River Coal Co., \$2.52 f.o.b. mines; Quemahoning Coal Co., \$5.19; Seiler Coal Co., \$4.98.

Figures Close for Indian Head

Twenty-eight thousand tons run of mine for delivery at Norfolk, Va.—Md.—W. H. Bradford Co., \$5.52; Brinker Coal Co., \$5.49; Cosgrove & Co., \$5.63; Davis Coal Company, \$6.05; Dexter - Carpenter Company, \$5.82; Eastern Fuel Co., \$6.41; Emmons Coal Mining Co., \$5.61; South Port Coal Mining Co., \$5.82; Steamship Fuel Corporation, \$6.04; Weston, Dodson & Co., Inc., \$5.97; David E. Williams & Co., \$5.75; Seaboard Fuel Corporation, \$5.54; Fidelity Coal Mining Company, \$5.78; Hall Bros. & Co., \$5.71; Johnstown Coal & Coke Co., \$5.93; Logan Coal Co., \$6.08; W. A. Marshall & Co., \$6.06. Maryland Coal & Coke Co., \$5.98; Seiler Coal Co., \$5.77; Fayette Smokeless Fuel Co., \$5.16; Fort Dearborn Coal Co., \$5.35.

Twenty-five thousand tons run of mine, for delivery at Norfolk, Va.—W. C. Atwater & Co., \$2.24; Black Diamond Coal Mining Co., \$6.78; C. G. Blake, \$5.32; Chesapeake & Virginia Coal Co., \$2.22; Crozier Pocahontas Coal Co., \$5.18; Dexter & Carpenter, \$4.81; Eastern Coal & Export Corporation, \$5.18; L. A. Sneed Co., \$5.03; W. H. Brown Coal Co., \$5.37.

Hoover Urges Rail Mergers To Lower Coal Rates

Consolidation of railway properties as provided for in a bill introduced by Senator Cummins, Iowa, was indorsed by Secretary Hoover May 21 before the Senate Committee on Interstate Commerce.

Mr. Hoover said the plan would result in more equitable rates, as the rate structure could be reorganized without disturbing the present earning levels of the roads. It would permit relief in lower rates to agriculture and coal, he believed, by imposing a heavier burden on finished goods.

The most important preliminary to railway consolidation, Secretary Hoover declared, is the passage of such a law as that proposed by Senator Cummins, as the chief essential now is affirmative action by Congress. He suggested that neither the Interstate Commerce Commission nor Congress should do anything final in that direction, however, until the public had had opportunity thoroughly to consider and discuss whatever consolidation plan the commission may recommend.

West Virginia Institute To Discuss Stray Current, Shooting and Explosions

Methods of preventing the occurrence of stray current in coal mines will be described by E. E. Jones, superintendent, E. E. White Coal Co., Glen White, W. Va., at the meeting, June 17 and 18, of the West Virginia Coal Mining Institute, which will be held at Elkins, W. Va. Other notable addresses will be one by Charles M. Means, consulting engineer, Pittsburgh, Pa., on "Grounding of Electric Coal-Mining Machinery"; Engineering and Accident Prevention," by Newell G. Alford, mining engineer, Pittsburgh, Pa.; "Abuse of Explosives," by Arthur La Motte, E. I. DuPont de Nemours & Co., Wilmington, Del.; "Explosion Hazards in Coal Mines," by J. W. Paul, mining engineer, U. S. Bureau of Mines, Pittsburgh, Pa.; "Rock Dust as a Preventive of Coal-Dust Explosions," by Captain E. Steidle, supervisor, co-operative mining courses, Carnegie Institute of Technology, Pittsburgh, Pa., and "The Value of the Local Mining Institute" by Bruce S. Davis, chief engineer, Logan County Coal Corporation, Lunda, W. Va. J. J. Rutledge will lead the discussion of Mr. Means' paper. On the night of June 17 a banquet will be held, and during the course of the meetings, a visit will be made to the mine of the West Virginia Coal & Coke Co., where the "V" system of mining and conveyor haulage is in operation.

Urges Economy by Railroads In Use of Fuel Coal

Greater economy in the use of fuel coal by the railroads of the country was urged by R. H. Aishton, president of the American Railway Association, in an address before the International Rail Fuel Association, in Chicago, May 26.

"In 1923, when the railroads carried the largest freight traffic in their history," said Mr. Aishton, "it required 160.2 lb. of coal turned into steam to move one gross ton of freight a thousand miles or a thousand gross tons one mile. This was 2.8 lb. less in 1922 and 1.8 lb. less than in 1921.

"If the railroads used 1 lb. less of coal per ton hauled this year than was used in 1923 and moved the same ton mileage as in 1923, it would mean a total saving of \$3,165,000 in the fuel bill of the carriers in 1924 on the basis of the prevailing price of coal.

"In the last decade every known appliance for effecting economy has been installed on new locomotives, and to a very large extent on locomotives as they go through the shops, and while I won't undertake to say what the total expenditure has been, in the matter of superheaters alone it runs up over \$150,000,000 of capital expenditures, to say nothing of all the appliances that promote economy both in labor saving and in consumption of fuel.

"I think what we must immediately attack is the problem as it is, the tools as they are in our hands today, and by the application of knowledge, initiative and a desire to bring about accomplishment get an immediate result."

Will Idle Miners Get Aid?

In many union fields which have signed up their operators on the Jacksonville basis, appeals are being made to International headquarters for aid for the workless. The most recent appeal is from the miners of Kansas, who "won" from their employers on May 3. Having done the bidding of International President Lewis, they found that practically none of the mines was able to run, so their victory was hollow. On May 18 they petitioned Lewis for financial aid. Locals in the Pittsburgh (Kan.) district are voting on a proposal that every man who works five days a month be assessed \$1 a week to aid the others. About 2,000 in that region are working while 7,000 are jobless. The problem of aid for the workless is a live one in Illinois, where tremendous pressure is brought on state officials to break down the District 12 rule against issuing such aid.

Illinois Miners Vote Against Out-of-Work Benefits

Extending their biennial convention into its third week, Illinois miners deprived their president of the appointive power and decided by a vote of 369 to 130 that the finances of the district are in no condition to permit payment of out-of-work benefits. The resolution turning down the proposal for benefits reads as follows: "Owing to the large number of members now idle, we are unable to devise any means of raising finances that would make possible the payment of out-of-work benefits and therefore decide against paying same."

Approval of the three-year wage agreement reached at Jacksonville, Fla., was obtained over a strong minority opposition, which insisted that the shorter work day would solve the district's unemployment problem. President Frank Farrington denounced the 6-hour work day as impractical at this time. "The 6-hour work day," he said, "would stop every mine in the Central Competitive Field if it effectively replaced the 8-hour day at the same wages."

Earlier in the convention a resolution was adopted instructing the legislative department to co-operate with the American Federation of Labor in getting a federal law providing for unemployment compensation "out of industry."

Two proposals for old-age pensions also were offered. The first would tax every member \$2.25 a month and pay every miner who is 60 or over and who has worked 15 years continuously \$25 a month. The second plan would pay the same to miners 65 or over who have worked 20 years continuously, and would tax the members \$1 a month. It was reported that there are more than 4,301 miners over 60 in Illinois. Assessments would start July 1, 1924, and payment of the pension begun July 1, 1925.

Walsh Wants More Inspectors At Same Outlay

At a conference in Wilkes-Barre, Pa., last week twenty-one mine inspectors from various sections of the anthracite field discussed a proposition submitted by Joseph J. Walsh, Secretary of Mines, calling for reorganization of the State Inspection Bureau which would provide twenty additional inspectors without increased expense.

The reorganization plan calls for the division of the state into a smaller number of inspection districts, the reduction of salaries of some of the present inspectors, and appointment of twenty additional men. While the plan was received with favor by the mine inspectors, no action was taken. It will be presented to the bituminous inspectors before it is put into effect.

At present Mr. Walsh has fifty-five inspectors in the anthracite and bituminous fields, each presiding over an inspection district. With a smaller number of districts, each district would be in charge of a chief district inspector, and working under him would be a senior and a junior inspector.

The inspectors went on record as favoring legislation to compel the firing of blasts in the mines by electric batteries instead of fuses and squibs, as a safety measure.

The following anthracite inspectors attended the conference sessions: August McDade, of Taylor; Frank Kettle, of Nanticoke; S. J. Phillips, of Scranton; P. J. Moore, of Carbondale; M. J. Brennan, of Pottsville; C. J. Price, of Lykens; P. J. Friel, of Shamokin; J. J. Corgan, of Kingston; J. J. Stickler, of Hazelton; I. M. Davies, of Lansford; J. C. Reese, of Scranton; Evan Evans, of Coal Dale; L. M. Evans, of Scranton; B. I. Evans, of Mt. Carmel; D. J. Roderick, of Hazelton; William Reid, of Centralia; T. J. Williams, of Kingston; Archibald B. Lamb, of Shenandoah; P. J. Fenton, of Mahanoy City; D. T. Williams, of Scranton, and E. C. Curtis, of Kingston.

Ruhr Coal Miners Reject Proposed Mediation

The four German miners' unions have voted to reject arbitration proposals recently made in Berlin as a means for settling the dispute that resulted in a lockout at the coal mines in the Ruhr. The rejection was voted because the proposals failed to provide pay for overtime. The belief is that the operators will favor the arbitration proposals rendered through the mediation of Minister of Labor Brauns, and that the lockout will continue.

While the miners agreed to accept the covering schedule regulating wages they are holding out for recognition of their demands for overtime. They assert that they are willing to work in order to enable Germany to carry out the obligations imposed by the "Micum" accord and accuse the operators of arbitrarily keeping them from work.

The miners' unions warn members against yielding to Communistic propaganda, which is declared to be attempting to incite lawlessness throughout the Ruhr Basin.

J. G. Bradley Foresees Readjustment of Three-Year Wage Agreement

Alternative, He Thinks, Is Production Only During Maximum Demand by Mines Affected—Sees Investigation of Freight Differentials as Effort to Combat Non-Union Competition

Pleading the cause of the non-union operator and at the same time branding Governor Gifford Pinchot, of Pennsylvania, a political coward, J. C. Bradley, president of the Elk River Coal Co. and former president of the National Coal Association, aroused the members of the National Association of Manufacturers to a high pitch of enthusiasm May 21 at the annual convention of the association in New York City.

Touching upon the overdevelopment "which has been very much emphasized by union leaders and by the Coal Commission," Mr. Bradley said it is to the interest of the miners' leaders to get as many men on the union rolls as is possible and hold them there. Unionization of the coal industry or any other industry, if intelligently conducted, he said, would be to the great advantage of those industries, "but I have never seen it intelligently done."

Stating that the public has been led to believe that the coal industry is controlled by a few men who fixed the price and struck the profits in their pockets, Mr. Bradley declared there are more coal mines and coal-mining companies today on the verge of bankruptcy than have ever been known in any industry in this country.

Urges Competitive Wage Scale

Mr. Bradley contended that the best way to reach the right wage scale is by open competition within the labor market, saying that if "you pay too little, men won't come and work for you; if you pay too much, you can't stand competition. We are not only not guaranteed, but we are not even given that open competition in a large part of this industry today. We see two-thirds of the producing territory tied up to a rate of wages which has shut down those plants. Most of the coal which is coming to the market today is from the non-union fields.

"And this wage agreement which we have seen heralded by the political crowd as being a settlement for three years is by no means a settlement. What working man would agree to a settlement which would shut him out of work for three years? Either the coal fields of those northern states are going to produce coal only in the time of maximum demand, or else the miners in that section of the country are going to demand a readjustment of this agreement."

Telling the manufacturers that the only assurance they have of getting coal at a reasonable price above the cost of production is the non-union fields, Mr. Bradley continued:

"You can't get hard coal, you can't get your domestic fuel except at a price which is fixed by the United Mine Workers and the anthracite operators

and the Governor of Pennsylvania. And you have got to remember the political commission that you are paying to the Governor of Pennsylvania.

"When he made that award, it was so against the facts that the only deduction that could be drawn was that he was giving a subsidy to the organized hard-coal miner."

Stating that if the non-union operator is able to co-operate with his men on one side, whereas the union operator can't, the chances are that he will be able to co-operate with the consumer rather than the union operator.

Referring to the application before the Interstate Commerce Commission to change the freight differentials between the union district north of the Ohio River and the non-union districts to the south, Mr. Bradley said the reason for the application was that the union operator in his struggle with organized labor has failed.

Jacksonville Scale "Uneconomic"

"He has signed a wage scale which is uneconomic," he declared, "which is higher than he ought to have signed. He forgot that he was a quasi-trustee for his consumer; that he should have protected him and refused to sign that agreement. And now, having thoroughly messed the thing up, he is going to the Interstate Commerce Commission asking that freight rates be so readjusted that those who declined to sign—who didn't haul down their flag, who stood out for the open shop and free competition—shall have any advantage therefrom taken away from them."

"This particular case only asks for a readjustment in regard to rates on lake coal, but it is the entering wedge. When the principle in that case is established, when that differential has been widened so that the coal from the Central Competitive Field can get to the consumer at an advantage over their competitors in the non-union fields, then the same thing will be asked on every other rate north of the Ohio River."

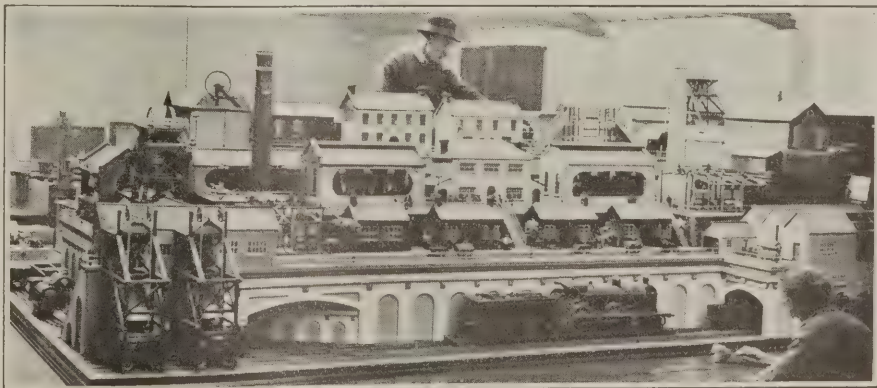
Here's a Wet Mine!

The normal product of a coal mine in most states is coal, but you can't always tell about Oklahoma. That was the state in which an oil well produced ordinary, useless "wind gas" which turned out to be priceless helium. So there is less surprise in the news that a handful of investigators for the Volstead department of the state government got to prying around a coal mine near Scales, May 18, and found the mine was yielding quite a volume of beer. The officers arrested Sam Courtney, owner, and charged that he had beer down the shaft and was loading it out through the office. The officers' report showed not a single "no bill" on track.

Much Talk of Hazard Mergers

At least two consolidations of mine groups in the Hazard field of Kentucky are now discussed vaguely. One, aimed to effect the merger of about twenty-five mines, is making slow progress while the six or seven mine owners talk of valuations and stock distributions in the proposed consolidation and while the fate of the three Jewett, Bigelow & Brooks mines and the three Maynard mines, now in the hands of receivers, is decided. The six may be purchased by any one of several interests now bargaining for them, and may thus be brought into a merger if a merger is possible after a purchase is made.

The other consolidation is reported in indefinite language by P. B. Ver Planck, of Chicago. Mr. Ver Planck says that a large Chicago coal consumer has already reached an agreement with the owners of fifteen Hazard mines within a radius of 14 miles to buy the group and will complete the deal within the next forty-five days. Thus he says this interest will acquire the heart of the No. 4 Hazard seam and will re-equip most of the mines, install mechanical loaders where it is practicable, and otherwise rehabilitate the properties. A selling agency to handle part of the output on a commercial basis is already in existence.



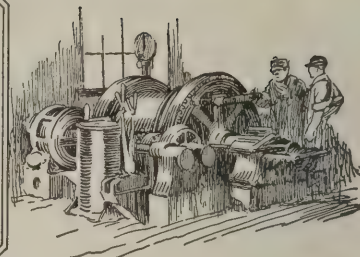
Wide World Photos

Coal-Mine Model at Wembley Exposition

This working of the Treherbert Colliery, which forms a part of the British Empire Exhibition, took twenty years to construct. It is the work of Mr. and Mrs. William Phelps, who are shown in the illustration.



Practical Pointers For Electrical And Mechanical Men



Waste Saturating Tank For Mine Service

The most common method of lubricating the bearings of locomotives and mine-car journals is by means of oil and waste. To get the best results, the waste should be well saturated before it is packed in the oil wells. This is done by soaking the waste for a certain definite time in oil and then setting it aside to drain.

The materials used for this work should be a clean, long-fibre wool waste and a good reliable grade of neutral mineral car oil. Such waste will absorb about four times its weight of mineral oil.

SOAK WASTE FOR 24 HOURS

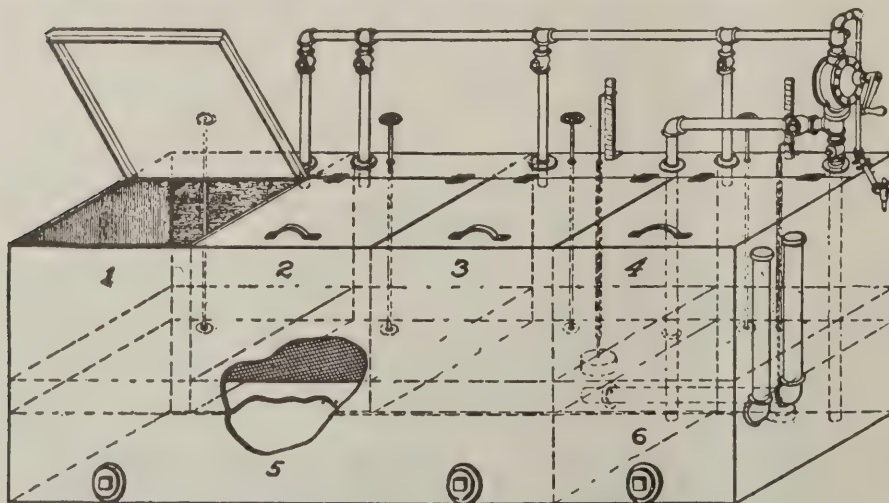
The waste is placed in a closed can or tank of oil and left to soak for at least twenty-four hours. During this process, some companies apply heat, thus reducing the time required to saturate the waste. The waste is then lifted out of the oil and placed on a screen or grid and drained until all excess oil has dripped off. This draining takes about twenty-four hours, after which the saturated waste is placed in closed cans ready to be packed in the oil wells.

A very convenient and efficient tank, designed for doing this work, is shown in the figure. The dry waste is placed in sections 1, 2 and 3, and the fresh oil in section 5. By means of the pump on top of the tank, the oil from section 5 is lifted into chambers 1, 2 and 3, which are filled with waste. After the waste has thoroughly soaked for

twenty-four hours, the oil is drained back into tank 5, and used again. About twenty-four hours after the oil is drained off, the waste is ready for use. Chambers 4 and 6 are used to re-saturate old waste. The oil used for this purpose is kept separate from the new oil. Large clean-out plugs are provided for both oil chambers, which are also fitted with float gages to indicate the amount of oil in them.

A very simple and cheap tank can be made with one or more chambers, having a screen or grid shelf about half way down on which waste is placed to drain after being saturated. The dry waste is placed in a wire basket and immersed in the oil contained in the lower half of the tank. When thoroughly soaked, the basket is lifted onto the shelf and the oil drains off.

One large company has in operation a very successful tank which supplies waste for 1,600 cars. Their system consists of two tanks, approximately three feet wide, four feet long and two feet deep, with drain boards on both ends. New waste in one tank is used for armature bearings and old waste in the other is for use in axle bearings and journal boxes. The tanks are of double wall construction, a hot water jacket being used to keep the oil at an even temperature of approximately 120 deg. F. Each tank holds about 75 gallons of oil and 110 pounds of waste. The waste is left in the tanks three hours, after which it is removed and left upon the drain board several hours until ready to be placed in containers for transportation to one of the repair shops or lubricating centers.



Tank Where Wool Waste Can Be Thoroughly Saturated

Oil is pumped from compartment 5 into compartments 1, 2 and 3, and there it is poured over the waste. The excess oil is drained off through the screen at the bottom of the upper compartments. Sections 4 and 6 are used for re-saturating old waste. Steam coils may be used to make the oil flow more freely and thus increase the saturating capacity or effectiveness of the tank.

Instrument Records Abnormal Voltage Surges

Because of the high frequency of abnormal voltage surges, it has always been very difficult to obtain detailed information concerning them. Ordinarily, the cause of such surges is unknown and, as a result, information regarding such sudden impulses is rather limited, leading to questionable conclusions about their cause, effect and remedy.

To record such abnormal voltage surges on transmission lines the Klydonograph has recently been developed by J. F. Peters, of the Westinghouse Electric & Mfg. Co. This instrument makes a graphic record of voltage surges of extremely short duration, indicating at the same time the polarity, magnitude, and steepness of the waves.

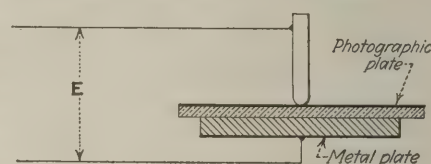


Fig. 1—Diagram of Klydonograph

This instrument consists of a photographic plate which, when developed, shows the shape of the high voltage surge impressed on the instrument.

The principle of operation depends upon a discovery made in 1777 by Dr. Lichtenberg, who found that if he discharged a condenser, such as a Leyden jar, across a spark gap onto a terminal in contact with an insulating plate placed between the terminal and a ground plate, and then removed the terminal and sprinkled powder over the plate, the small grains of powder would arrange themselves in a peculiar appearing figure. Later, it was found that by using a sensitized photographic plate, the emulsion in contact with the terminal showed the same peculiar figure when developed.

The new instrument in its simplest form is indicated in Fig. 1. If a voltage is impressed between the terminal and the ground plate, as at *E*, figures will appear on the photographic plate that give pertinent information concerning the nature of the voltage impressed. If, for instance, the voltage is in the form of a surge that is unidirectional, with a sheer front or a tapered front, the figure on the photographic plate will differentiate between the tapered front and the abrupt front, and it will also indicate whether the surge was of positive or negative polarity. The size of the figure also gives the magnitude of the surges, although the positive and negative figures have quite

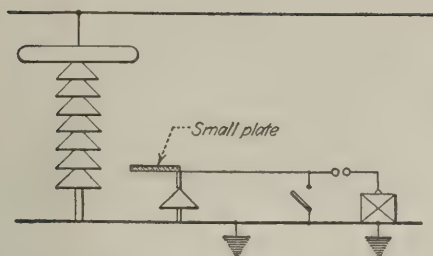


Fig. 2—Instrument Operated by Clock

When equipped with a clock, this device shows the exact time of any line disturbance.

different proportions. Usually the figures for the positive surge are considerably larger than those for the negative surge of the same magnitude.

For practical use, the instrument is made continuously operative and is capable of recording the exact time of the occurrence of any disturbance. Fig. 2 shows an instrument suitable for such applications. This device makes use of a 10 x 12 in. plate in a special plate holder. The moving parts are driven by a clock that makes one complete revolution in 24 hr. The device is practically a zero-current instrument and therefore can be connected to the line electrostatically. This makes it possible to use the instrument on high voltage lines without introducing the hazard of an insulation breakdown.

Fig. 3 shows the connection used to measure the steepness of the voltage wave. A counterpoise is run underneath or alongside the transmission line for 1,000 or 2,000 ft. with the far end connected direct to ground and the near end grounded through a high impedance. The Klydonograph is then connected between this balancing wire and the ground.

MEASURES STEEPNESS OF WAVE

The voltage induced in the counterpoise is a measure of the steepness of the current wave, and since the current wave and the voltage wave have exactly the same shape, it gives a measure of the steepness of the surge front. By comparing simultaneous readings of the instruments, one connected to the line through the electrostatic potentiometer and the other to the counterpoise, the following information concerning the surge may be obtained: Magnitude, polarity, steepness of front, and the direction in which the surge is traveling on the transmission line.

Magnitude and polarity are obtained directly from the first mentioned instru-

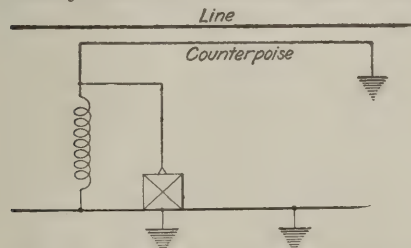


Fig. 3—How Instrument Is Connected to Measure Steepness of Surge

The counterpoise, run parallel to the transmission line, operates the instrument. In this way, it is possible to get the characteristics of the surge wave without connecting any recording devices directly to the line wires.

ment, steepness of front directly from the second, and from the relative polarity of the two figures, the direction in which the surge is traveling may be obtained. If the polarity of the two figures is the same, the surge is of the same polarity and is traveling in the direction fixed by the manner in which the recorders are connected to the system.

If the figures are of different polarity, the surge is of the polarity indicated by the recorder connected to the potentiometer and is traveling in the opposite direction from the one previously mentioned.

Quick Repair to Important Fan Motor Starter

Many accidents and delays due to the breakdown of electrical equipment are really far less serious than those which happen to mechanical apparatus. The reason why a small electrical failure creates an impression in the mind of the operator that something very serious has happened is mainly due to a lack of knowledge of electricity. If the men at the mines would try to understand their work a little bit better, I am sure that many a so-called serious delay will seem like nothing out of the ordinary.

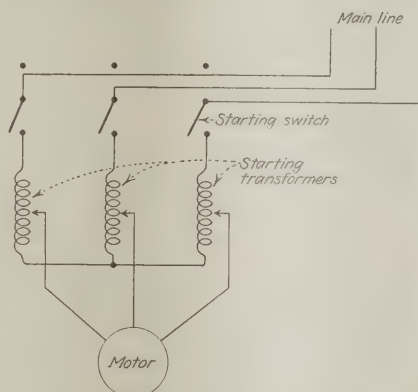


Fig. 1—Transformer Connections to Motor

When the starting panel was destroyed it was impossible to make a quick repair to the transformers and get the fan motor going again.

However, it is interesting to see how quickly some electricians work and here is an example showing how simple and easy it was for one to solve what appeared to be a very perplexing problem to the mine foreman.

The starting panel connected to the alternating-current fan motor driving the only fan at one of our mines was damaged. The starting transformers were completely destroyed and the motor had stopped.

It was still early in the day when the mine foreman learned that the fan had stopped. The miners had been at their places for a few hours and all the company day men had gone inside the mine and were at work. To shut down the mines for the remainder of the day would have meant a loss of tonnage and nearly a total loss of the overhead charges for the day, because the men had started work and would have had to be paid for nearly a full day.

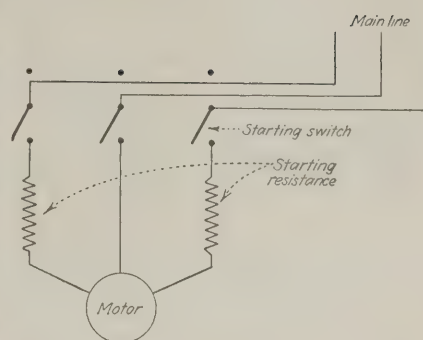


Fig. 2—Starting Resistance in Circuit

Several banks of locomotive resistance were placed in the circuit. In this way the starting voltage for the motor was sufficiently reduced to prevent a high inrush current and the motor was started just as smoothly as with the usual starting transformers.

Soon after the electrician arrived he saw that it was impossible to repair the starting transformers which were connected as shown in Fig. 1. All three transformers had been badly burned by the heavy current.

The power supply to the fan motor was 440 volts. The electrician quickly reasoned that he could soon have the motor running if some means could be provided to reduce the line voltage sufficiently to provide a reasonably low starting current. I suppose he said to himself, "the transformers reduced the line voltage, therefore resistance in the circuit will do the same thing."

RESISTANCE USED FOR TRANSFORMERS

No 440-volt resistance was available but the electrician knew that 250-volt locomotive resistance was rated high enough to stand 440-volts, so he quickly gathered several banks of locomotive resistance together and connected them into the starting circuit of the fan motor as shown in Fig. 2.

By closing a double-pole starting and running switch, first in the starting position and then in the running position, the fan motor was started and the fan kept running the remainder of the day.

There was nothing unusual about this scheme but it only goes to show how many an idle day may be avoided by a little intelligent consideration of a simple electric problem.

ELECTRICAL ENGINEER.

Pack Locomotive Armature Bearings Regularly

Even the ordinary type of motor bearing requires efficient lubrication. The waste, preferably wool, is first soaked in a good grade of car oil for about 24 hr., and then allowed to drain, after which it is packed firmly in the axle cap up to and around the bearing window. The axle cap is then filled up to within an inch of the top with waste packed comparatively loose. It is considered good practice to repack these bearings every three months, putting new waste close to the axle. All old waste should be removed about once every year and the bearings repacked with new waste.

Discussion

"Doctoring a Sick Industry"

Some Retailers Probably Adulterate Good Coal but the Practice Is Not Only Improper but Fatal to Successful Business—Sickness of Industry Due to Poor Quality and Bad Merchandising

BY H. B. BLAUVETT
Hackensack Coal & Lumber Co.,
Hackensack, N. J.

UPON reading *Coal Age's* editorial criticism in March 13, page 377, of my anthracite article which recently appeared in the *Printer's Ink*, I thought that "the pot was simply going to call the kettle black" and, having so passed the buck from producer to retailer, let it go at that. Not so. There is real meat in that criticism and I feel that it is intended in the right spirit.

First, there is no battle on between wholesalers and retailers. Our interests are, or should be one: we both want to sell as much coal as possible at a fair profit—with repeat sales! Bad coal qualities make the latter impossible, so we are both interested in the very best quality of coal obtainable.

SNOW BIRD RETAILERS TROUBLE TRADE

Coal Age raises a good point. There are undoubtedly "snowbird retailers" as there are "snowbird producers," and probably they have indulged in the dishonest practice of mixing the "abominable, unburnable stuff" with good coal. Again reputable producers have common cause with reputable retailers, for are not both interested in cleaning up the industry and putting it on a basis of honest competition where they will not be at a disadvantage.

Let no mind draw a distinct line of cleavage between producer and retailer. Their interests are identical. Each is a direct necessity of the other. Any good producer knows that a live, reputable outlet for his coal is more to be desired than much, very much, pure gold, in fact he is not to be bought.

The solution of the "snowbird retailer" is so simple that his occurrence is not a cause of serious worry. Let the reputable producer make it possible for the reputable retailers to obtain good coal and the "snowbird" will not be able to continue adulterating his good coal if he wishes to stay in business. The public is quicker to discover bad qualities in coal than anything else. The honest retailers try to stand behind their coal and most of them take out unsatisfactory coal immediately upon complaint thereon replacing it with new well-screened coal at no charge. This costs money. The "snowbird" could not afford to keep doing it

and if he didn't do it his customers would drop him and go elsewhere.

Such news spreads quickly, and retail trade invariably flocks to the retailer who has the best coal. Make it possible then for the reputable retailer to get good coal, and you will put the "snowbird retailer" out of business. We are heartily in favor of any move to promote quality in coal, in fact, disinterested public inspectors at the retailer's yard sound good to us. A careful reading of the report of the "Coal Commission" will show the quality phase to have been more abused by the "snowbird" producers than the retailers. It is common knowledge in the trade that some producers do adulterate good coal with the unburnable stuff. Unquestionably many reliable retailers took "the unburnable stuff" last year because they had to get something. The pressure of the public was heavy, and the need was pathetic.

PRODUCER CANNOT RETAIL HIS COAL

The thought of the producer retailing his own coal is possible but not probable. Let him try the heart-breaking detail of the retail business. A ton here, a ton there, the large coal contracts cut down to the bone, and bad credits with slow collections on top of that. It's a slow and, unless times are particularly favorable, not an especially profitable game. Compared with the results derivable from corresponding effort centered on his producing problems, the operator could not afford to spend his time fooling with retailing.

Coal Age aptly hits the nail on the head when it says that popular outcry and legislation would never permit this consolidation. Nor is such a step advisable. The retail end is a distinct business in itself and must be run as such—the continual effort must be to "keep the people pleased," a difficult and sometimes thankless task.

A word more. The last paragraph of the *Coal Age* editorial is the kernel of the whole nut. We agree: Advertising will pay (if not, why then the full-page ads in *Coal Age*?) but advertising is useless unless truthfully used and those used truths are backed up with quality in the advertising article. The causes of "sickness" in the hard coal industry are still two (excluding labor), (1) a poor quality. (2) bad merchandising—including lack of public education through advertising. With proper advertisements, egg and pea can be merchandised and this without breaking down the former to stove

and nut as *Coal Age* tells us on page 407 is being done with egg coal to make its merchandising possible. With advertising, buckwheat can be sold to the general public by teaching the consumer how to burn it. As to the costs of advertising, if the buckwheat market could be slightly stiffened it would be easy to pay the charges.

ADVERTISING A TWO-EDGED SWORD

Advertising is a two-edged sword; if strikes make it impossible to ship good coal tell the public so that they will be prepared and know the producers are not at fault. The coal industry has nothing to conceal. Tell all the facts and the public mind will be fair.

If the "companies" can't get together, let them advertise individually. The Philadelphia & Reading and the Lehigh Coal & Navigation Companies have already begun. Let the others follow their good lead. The solution of the hard-coal industry is to produce good coal and sell it all—steam sizes included—with steady educational advertising.

I must say a word in personal defense. You overlook the fact that "What's wrong? Too many mines. Too many miners. Too much seasonal variation in consumption. Too much railway politics," was plainly labelled a quotation from *Collier's Weekly*. Though there seems good sound truth in it I disclaim being the originator of the ideas contained therein.

Second, I am no expert, and make no claims as such. An expert is an unhealthy proposition; he usually says (as did *Coal Age*) "Believe this expert; he knows." The minute a man claims "he knows" it means that he thinks he is too wise to learn. Let us hope that the hard-coal industry is not too wise or self satisfied to learn. The fact still remains that it is an industry characterized by bad merchandising. Let's do our best to clean it up by turning out a good quality of coal and advertising that fact. My plea is for the honest producers and the honest retailers to get together in a common cause and put the coal business back on a sound honorable basis, for no business can survive unless founded upon honesty.

Lehigh University, Not Illinois

At the bottom of page 606 of the April 24 number of *Coal Age*, the information regarding Prof. A. C. Callen is somewhat misleading. Professor Callen's "Alma Mater" is Lehigh University, as he graduated from the course in Mining Engineering in June, 1909, receiving the degree of E.M., and the degree of M.S. in 1911.

Professor Callen went to the University of Illinois some years later and was associated with the late Prof. H. H. Stock, (also a Lehigh E.M. but of the class of 1888), up until the time of going to the University of West Virginia in 1917.

Here at Lehigh, we feel very proud of Professor Callen, and congratulate the University of Illinois upon the selection which has been made for the Deanship of the School of Mines.

HOWARD ECKFELDT.
Prof. of Mining Engineering.
Bethlehem, Pa.

Note—E. Blauvett, president Hackensack Coal & Lumber Co., writes that H. B. Blauvett was leaving for England when he received the editorial "Doctoring a Sick Industry." He took it with him and answered it while abroad. This accounts for the delay in making reply.



Production And the Market



Inertia Still Pervades Bituminous-Coal Markets; Anthracite Trade Notably Active

The revival in industry promised as the result of surveys in the industrial centers of the country is not yet in sight—at least visible evidence of it is still lacking. If the prophesied upturn bears any relation in size and strength to the so-called breathing spell preceding its inception it ought to be a sizable movement, for except during a labor disturbance the present period of depression surpasses anything of the kind in recent years in the coal trade. Save for a few temporary spurts due to cool weather the prolonged condition of dormance in the markets continues unabated. Running time at the mines shows no appreciable improvement anywhere, production in the southern Ohio field—an extreme example—holding around 10 per cent of capacity. Shipments to tidewater continue to shrink and the demand for lake tonnage is lagging considerably behind that of last year at this time. One of the few bright spots in the trade during April, the export movement at Baltimore, has practically faded out of the picture. May began auspiciously, but after the 2d there was a lapse of seven days before the next cargo cleared, and since the 12th the bottom of the export trade apparently has dropped out completely.

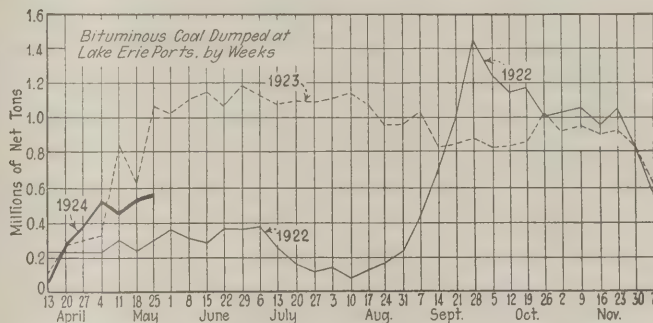
Navy Bids Bring Out Keen Rivalry

The Navy Department's call for bids on supplying 330,000 gross tons of steaming coal for ships and 438,600 tons of coal for navy yards and other shore stations brought out the keenest kind of competition. Nearly one hundred companies submitted tenders, most of them making offers on a number of schedules. The award of contracts, which is expected to take place this week, may provide the needed impetus to start the market in motion.

Coal Age Index of spot prices of bituminous coal declined 3 points during the week ended May 26, registering 167, the corresponding price being \$2.02.

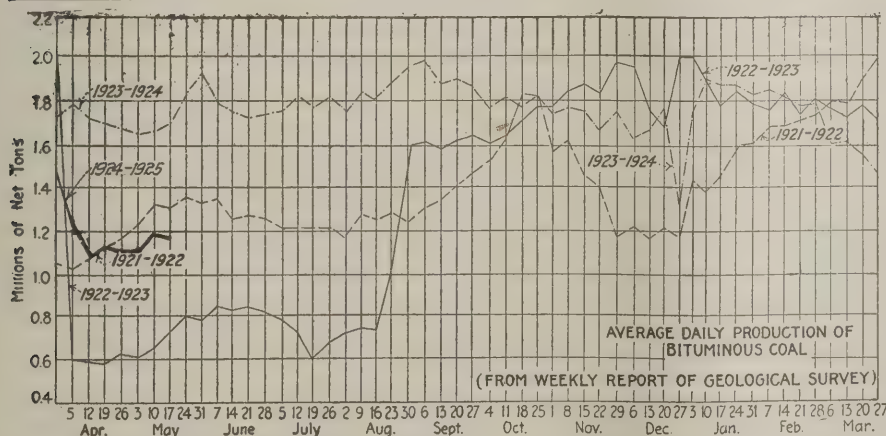
Dumpings at Hampton Roads for all accounts during the week ended May 22 totaled 241,490 net tons, as compared with 261,732 tons dumped during the preceding week. Coal dumped at Lake Erie ports during the week ended May 24, according to the Ore & Coal Exchange, were as follows: Cargo, 529,883 net tons; fuel, 35,478 tons. The totals for the previous week were 523,499 tons of cargo coal and 35,697 tons of fuel coal.

Production of bituminous coal declined slightly during the week ended May 17, according to the Geological



Survey, the output being 7,074,000 net tons, compared with 7,121,000 net tons produced during the previous week. The output of anthracite was 1,895,000 net tons, a falling off of 29,000 tons from the figures for the week ended May 10.

Intermittent labor troubles at large company operations have made it difficult for dealers to obtain as much company anthracite as they desire, with the result that the demand for independent coal is strong and prices are holding firm. The call for stove is still notably strong, playing its part in the activity for egg and chestnut. Production is picking up, and the market is expected to ease up somewhat.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
May 3.....	10,061,000	6,832,000
May 10 (a).....	10,175,000	7,125,000
May 17 (b).....	10,270,000	7,074,000
Daily average.....	1,712,000	1,179,000
Cal. yr. to date (c).....	207,542,000	183,360,000
Daily av. to date.....	1,764,000	1,561,000

ANTHRACITE

May 3.....	2,021,000	1,616,000
May 10.....	1,903,000	1,924,000
May 17.....	2,045,000	1,895,000
Cal. yr. to date.....	39,563,000	35,068,000

COKE

May 10 (a).....	401,000	178,000
May 17 (b).....	411,000	182,000
Cal. yr. to date (c).....	7,584,000	5,248,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Midwest Buys Some Lump

Unseasonably cold and raw weather throughout the Middle West caused a slight pick-up in the domestic business of that section last week. Many a coal bin that had been swept clean suddenly required another ton, with the result that the leading domestic coals got a dribble of much-appreciated business. A little hard coal moved readily along with the small stocking trade the retailers have been having and the call for smokeless picked up noticeably in view of the shortage of supply that happened to be on hand. Good Pocahontas even rose 15 to 25c. for a day or two as a result of the situation. Midwestern lump and egg also felt the cold a bit.

Generally speaking, however, the dullness of the whole Midwest industry continued. Contracting that was expected soon after May 1 has not yet materialized. Railroads have been signing up some small business at low prices, but industry has been notably backward. Prophecies of late summer industrial improvement have not moved purchasing agents to action yet.

The running time of Midwest mines was improved by a slim margin during the past week, partly because everybody was keen to get all the benefit they could out of the

cool weather and partly because a handful of mines have been opened "for better or for worse" in a determined effort to get business at any price rather than to stay down. Most of these operations have been able to get screenings business, but little else. Crushers have been working more than usual. Good Franklin County screenings move at \$1.90 and weaker grades from the same county bring \$1.75. Central Illinois sells for \$1.50@1.75 and Standard district fines move at less than that.

The St. Louis market is as low as it have ever been. There is no demand worthy of note for anything. In fact anthracite business is duller than most observers thought it could ever get. About the only thing that sells to householders is local coke. Big buyers of steam coal, both city and country, are taking some screenings, but the volume is not great. Wagonload steam business is dead along with domestic. The trade is now looking forward to some sort of improvement immediately after June 1.

Kentucky Drones Along

Things are quite dull in Kentucky. There is a little business from various scattered industries and prospects of some business from retailers, who are taking some stocking orders for future delivery. There has been just a little

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
	Market Quoted	May 28 1923	May 12 1924	May 19 1924	May 26 1924		Market Quoted	May 28 1923	May 12 1924
Smokeless lump	Columbus...	\$6.25	\$3.40	\$3.45	\$3.35@3.65	Franklin, Ill. lump	Chicago...	\$3.80	\$2.75
Smokeless mine run	Columbus...	4.15	2.25	2.25	2.20@2.40	Franklin, Ill. mine run	Chicago...	3.10	2.35
Smokeless screenings	Columbus...	3.60	1.85	1.85	1.75@2.00	Franklin, Ill. screenings	Chicago...	1.80	2.15
Smokeless lump	Chicago...	6.10	3.10	3.10	3.00@3.25	Central, Ill. lump	Chicago...	2.60	2.60
Smokeless mine run	Chicago...	4.10	2.00	2.00	1.75@2.00	Central, Ill. mine run	Chicago...	2.10	2.10
Smokeless lump	Cincinnati...	6.25	3.50	3.50	3.50@3.75	Central, Ill. screenings	Chicago...	1.85	1.90
Smokeless mine run	Cincinnati...	4.25	1.85	1.85	1.75@2.00	Ind. 4th Vein lump	Chicago...	3.35	2.85
Smokeless screenings	Cincinnati...	4.25	1.75	1.75	1.50@1.75	Ind. 4th Vein mine run	Chicago...	2.85	2.35
*Smokeless mine run	Boston...	6.35	4.40	4.45	4.35@4.50	Ind. 4th Vein screenings	Chicago...	1.85	1.95
Clearfield mine run	Boston...	2.35	1.95	2.00	1.60@1.85	Ind. 5th Vein lump	Chicago...	2.85	2.35
Cambria mine run	Boston...	3.05	2.35	2.50	2.25@2.75	Ind. 5th Vein mine run	Chicago...	2.10	2.10
Somerset mine run	Boston...	2.60	2.10	2.25	1.85@2.60	Ind. 5th Vein screenings	Chicago...	1.55	1.80
Pool 1 (Navy Standard)	New York...	3.75	2.85	2.75	2.50@2.85	Mt. Olive lump	St. Louis...	...	2.85
Pool 1 (Navy Standard)	Philadelphia...	3.75	3.00	3.00	2.75@3.25	Mt. Olive mine run	St. Louis...	...	2.50
Pool 1 (Navy Standard)	Baltimore...	...	...	...	...	Mt. Olive screenings	St. Louis...	...	2.00
Pool 9 (Super. Low Vol.)	New York...	2.90	2.20	2.20	2.00@2.40	Standard lump	St. Louis...	2.25	2.15
Pool 9 (Super. Low Vol.)	Philadelphia...	2.85	2.20	2.20	2.00@2.45	Standard mine run	St. Louis...	1.80	1.95
Pool 9 (Super. Low Vol.)	Baltimore...	2.55	1.80	1.85	1.80@1.95	Standard screenings	St. Louis...	1.50	1.80
Pool 10 (H.Gr. Low Vol.)	New York...	2.45	1.90	1.85	1.75@2.00	West Ky. lump	Louisville...	2.30	2.35
Pool 10 (H.Gr. Low Vol.)	Philadelphia...	2.35	1.85	1.85	1.70@2.00	West Ky. mine run	Louisville...	1.80	1.65
Pool 10 (H.Gr. Low Vol.)	Baltimore...	2.15	1.65	1.65	1.65@1.75	West Ky. screenings	Louisville...	1.35	1.60
Pool 11 (Low Vol.)	New York...	2.05	1.60	1.60	1.50@1.75	West Ky. lump	Chicago...	2.35	2.25
Pool 11 (Low Vol.)	Philadelphia...	2.00	1.50	1.50	1.30@1.70	West Ky. mine run	Chicago...	1.35	1.60
Pool 11 (Low Vol.)	Baltimore...	1.95	1.55	1.55	1.50@1.65				
High-Volatile, Eastern						South and Southwest			
Pool 54-64 (Gas and St.)	New York...	2.00	1.50	1.50	1.40@1.65	Big Seam lump	Birmingham...	2.70	2.80
Pool 54-64 (Gas and St.)	Philadelphia...	2.05	1.55	1.55	1.45@1.70	Big Seam mine run	Birmingham...	2.05	2.00
Pool 54-64 (Gas and St.)	Baltimore...	1.75	1.45	1.45	1.40@1.55	Big Seam (washed)	Birmingham...	2.35	2.20
Pittsburgh sc'd gas	Pittsburgh...	2.85	2.40	2.40	2.30@2.50	S. E. Ky. lump	Chicago...	3.75	2.25
Pittsburgh gas mine run	Pittsburgh...	...	2.10	2.10	2.00@2.25	S. E. Ky. mine run	Chicago...	2.35	1.60
Pittsburgh mine run (St.)	Pittsburgh...	2.25	1.85	1.85	1.75@2.00	S. E. Ky. lump	Louisville...	3.75	2.15
Pittsburgh slack (Gas)	Pittsburgh...	1.65	1.35	1.35	1.30@1.40	S. E. Ky. mine run	Louisville...	2.25	1.50
Kanawha lump	Columbus...	2.75	...	...	...	S. E. Ky. screenings	Louisville...	1.65	1.10
Kanawha mine run	Columbus...	2.05	...	...	...	S. E. Ky. lump	Cincinnati...	3.75	2.35
Kanawha screenings	Columbus...	1.75	...	...	...	S. E. Ky. mine run	Cincinnati...	1.80	1.35
W. Va. lump	Cincinnati...	4.00	2.15	2.10	2.00@2.50	S. E. Ky. screenings	Cincinnati...	1.55	1.05
W. Va. gas mine run	Cincinnati...	1.85	1.40	1.35	1.25@1.50	Kansas lump	Kansas City...	3.85	4.50
W. Va. steam mine run	Cincinnati...	1.85	1.40	1.35	1.25@1.50	Kansas mine run	Kansas City...	3.25	3.50
W. Va. screenings	Cincinnati...	1.50	1.05	1.05	.75@1.00	Kansas screenings	Kansas City...	2.60	2.50
Hocking lump	Columbus...	2.55	2.45	2.40	2.25@2.60				
Hocking mine run	Columbus...	1.90	1.60	1.60	1.50@1.75				
Hocking screenings	Columbus...	1.35	1.35	1.40	1.30@1.45				
Pitts. No. 8 lump	Cleveland...	2.95	2.40	2.40	2.10@2.75				
Pitts. No. 8 mine run	Cleveland...	2.15	1.90	1.85	3.85@1.90				
Pitts. No. 8 screenings	Cleveland...	1.50	1.50	1.45	1.20@1.30				

* Gross tons, f.o.b. vessel, Hampton Roads.

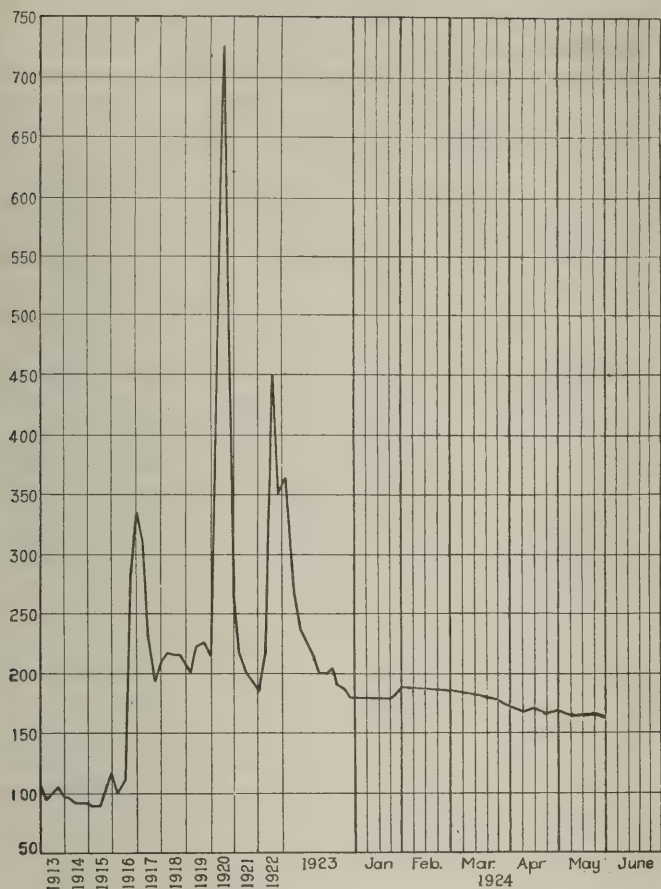
† Advances over previous week shown in heavy type, declines in italics.

‡ Strike on.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	May 28, 1923		May 19, 1924		May 26, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken	New York		\$2.34		\$7.75@8.35	\$8.50@9.00	\$8.00@8.75		\$8.00@8.75
Broken	Philadelphia		2.39		7.90@8.10		8.60@8.75		8.60@8.75
Egg	New York		2.34	\$8.50@11.00	8.00@8.35	9.00@9.25	8.35@8.75	9.00@9.25	8.35@8.75
Egg	Philadelphia		2.39	9.25@9.50	8.10@8.35	8.35@9.50	8.70@8.75	8.35@9.50	8.70@8.75
Egg	Chicago*		5.06	12.00@12.50	7.20@8.25	7.68@7.77	7.73@7.81	7.68@7.77	7.73@7.81
Stove	New York		2.34	8.50@11.00	8.00@8.35	9.00@9.50	8.35@9.00	9.00@9.50	8.35@9.00
Stove	Philadelphia		2.39	9.25@9.50	8.15@8.35	8.70@9.60	8.75@8.95	8.70@9.60	8.75@8.95
Stove	Chicago*		5.06	12.00@12.50	7.35@8.25	8.03@8.17	7.94@8.14	8.03@8.17	7.94@8.14
Chestnut	New York		2.34	8.50@11.00	8.00@8.35	8.75@9.25	8.35@8.85	9.00@9.25	8.35@8.85
Chestnut	Philadelphia		2.39	9.25@9.50	8.15@8.35	8.75@8.85	8.70@9.60	8.75@8.85	8.70@9.60
Chestnut	Chicago*		5.06	12.00@12.50	7.35@8.35	7.90@8.03	7.81@7.99	7.90@8.03	7.81@7.99
Range	New York		2.34		8.30		8.60		8.60
Pea	New York		2.22	6.30@7.50	6.00@6.30	5.50@6.00	5.50@6.00	5.50@6.00	5.50@6.00
Pea	Philadelphia		2.14	7.00@7.25	6.15@6.20	5.75@6.25	5.75@6.00	5.75@6.25	5.75@6.00
Pea	Chicago*		4.79	7.00@8.00	5.49@6.03	5.36	5.36@5.91	5.36	5.36@5.91
Buckwheat No. 1	New York		2.22	2.75@3.50	3.50@4.15	2.35@3.00	3.00@3.15	2.25@2.75	3.00@3.15
Buckwheat No. 1	Philadelphia		2.14	2.75@3.50	3.50	2.50@3.00	3.00	2.50@3.00	3.00
Rice	New York		2.22	2.25@2.50	2.50	1.90@2.25	2.00@2.25	1.90@2.25	2.00@2.25
Rice	Philadelphia		2.14	1.75@2.50	2.50	2.00@2.25	2.25	2.00@2.25	2.25
Barley	New York		2.22	1.00@1.50	1.50	1.50@1.75	1.50	1.50@1.75	1.50
Barley	Philadelphia		2.14	1.15@1.50	1.50	1.50	1.50	1.50	1.50
Birdseye	New York		2.22		1.60		1.60	1.50	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Index	1924		1923	
	May 26	May 19	May 12	May 28
Weighted average price	167	169	169	217
	\$2.02	\$2.05	\$2.05	\$2.63

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

coal moving to domestic consumers and steam plants as a result of several cold days this month. Steam heat in office buildings on May 20 in Louisville is most unusual. However, immediate coal appears to be coming from yard cleaning rather than orders placed with mines.

Railroad consumption is reported fair and there is the usual run of small orders, representing coal moving to industries, utilities, etc., but Lake and Northern buying hasn't opened much as yet. Lower quotations are to be had on western Kentucky, but eastern Kentucky is firm, although some Hazard screenings are quoted as low as 95c., after a period of \$1 or better. Practically no screenings are offered out of the western Kentucky market, but price hasn't advanced, due to the fact that it is now at the mine-run level. Western Kentucky prices range from \$1.65 for mine run to \$2.35 for 6 x 14-in. egg.

Southern West Virginia mines in both high and low volatile territory are increasing production to some extent. Supply appears to be somewhat in excess of demand, though little distress coal is reported. There is a comparatively light demand at tidewater and yet prices there remain about the same on smokeless owing to the fact that smokeless mines are sending more coal to the lakes. High volatile splint lump is still hard to move.

Price Cutting in Northwest Eliminated

A drop in the price of screenings in Youghiogheny and Hocking, which are off to \$3.75 each, and a general tendency to eliminate the cutting reported a week ago featured the market at the Head-of-the-Lakes last week. There is little or nothing doing in either hard or soft coals, however. The price cut in screenings is an equalizing movement and

should not be construed as a possibility of further reductions. Many of the companies are bidding on large lots of coal for the independent mining companies, and in these cases the prices are off list. In one case it is known that 5,000 tons of Youghiogheny lump went for \$5.50, which is 50c. below list.

Receipts at Duluth were lighter last week. Only 18 cargoes entered the harbor. One was of hard coal. Docks are trying to clean old stocks before going into new coal and it is expected that shipments will gradually fall off until about midsummer. The Steel Corporation is bringing up very little because of its stock augmented by the large purchase from the defunct Superior Coal & Dock Co. Total Duluth-Superior receipts thus far this season are 451,660, tons of soft coal and 108,930 of anthracite.

In spite of the cold snap, trade is dull throughout the Northwest, even in small-lot business. Steam-coal buying in Minneapolis is markedly slow with big buyers sitting back with no money to spend. Prices are wabbly, especially on rail coal from Illinois. Lump from there is offered all the way from \$2.50 to \$3 with little trade going on. Contracting is slow indeed.

Milwaukee trade is as slow as that of the rest of the country. The few buyers that are in the market are taking coal piecemeal. Manufacturers are buying slowly because their business is dragging. Country trade, both domestic and steam, is extremely sluggish. Anthracite receipts at Milwaukee for the season to date are 108,362 tons, which is up to standard, but soft-coal receipts total only 226,199 tons, which is 40 per cent less than last year.

West Is Still Sluggish

There is little activity in the Southwestern district. Few mines are working. The majority of these are shovel mines, capable of supplying the present industrial demand with slack and crushed mine run at \$2.50@2.75 a ton. No operators have announced storage prices on Kansas coal, and some say there probably will be no reduction of the present quotations of \$4.50 for lump, \$4 for nut, \$3.50 for mine run and \$2.50 for screenings.

A reduction of 50c. a ton on Arkansas semi-anthracite lump from winter quotations will become effective in June, when reduced freight rates to Missouri River points take effect. There is practically no work in Arkansas now.

The Colorado market continues slow with very little if any demand for other than domestic sizes. Mines worked an average of 19 hours last week and the weekly reports from the operators show that 35 per cent of the working time lost was attributed to "no market." There has been some talk as to a slight advancement in prices, but as yet there has been no change.

Utah operators are low in spirit because practically the entire demand for fuel has dissolved except for a dribble of domestic coal and a little steam coal for the smelters and cement plants. Prices are unsettled. Retailers are trying to get a reduction at the mines so as to make a lower stocking price to their trade. Lump is now \$3.50 and operators feel that that ought to be rock bottom. Mine tracks are burdened with "no bills."

Tone Improves at Cincinnati

A much better tone pervades the Cincinnati market than for some time, the feeling being that the worst is past. Lake business is again hitting its accustomed groove about this time of year, when the free movement from the lake ports sets in. Logan County operators are getting the best of the business, more through the fact that they have been able, through low cost of production, to undersell southeastern Kentucky producers.

The coal trade at Columbus shows little change from last week. Steam business is rather quiet, although there are signs of some improvement in the demand, as some larger consumers are nearing the point where they will be forced to replenish supplies. Utilities are buying to a certain extent and some business from iron and steel concerns also is being booked. Contracting is still quiet, as a large number of users are content to buy from the open market rather than to enter an agreement. Most of the contracting reported is simply the renewing of formal contracts. With output reduced there is not so much distress coal on the market and consequently prices are more steady. Domestic trade is still dull. Some Pocahontas and smokeless varieties are moving and there also is a limited demand

for splints. Lake trade shows little strength as far as Ohio coals are concerned. A considerable tonnage is being loaded at the lower lake ports but this is produced largely in West Virginia and Kentucky.

Market conditions at Cleveland are exceedingly poor, inquiries being scarce. Industry is lagging, fuel consumption is correspondingly curtailed, and these conditions, coupled with the inroads being made by non-union fields have produced a depression not experienced in this field in a decade. Little contracting is being done, steam buyers looking to the open market for fuel supplies so far as the immediate future is concerned.

There is no noticeable improvement in the Pittsburgh coal market. Late production reports for the rail mines of the district show 20 to 21 per cent operation, against 18 to 19 per cent early in April. The increase probably is due to some shipments of lake coal by lake shippers who control mines in the district. Line consumption of coal has decreased considerably. Steel-mill operations continue to decline. There is talk among operators of union miners making overtures for reduced wages so as to develop some business, but little credence is placed in such gossip.

Demand at Buffalo is pretty light. There seems to be too much coal, in spite of the sharp cut in production, and too many people selling it.

General Inertia in New England

The market for steam coal in New England drags along with no sign of improvement. Shutdowns are the rule in the textile and shoe industries, and other lines share what appears to be a general depression. In no direction is there buying of any moment, and even public institutions in some instances are purchasing only sparing amounts, hoping that during June and July they may be able to obtain lower quotations than now prevail.

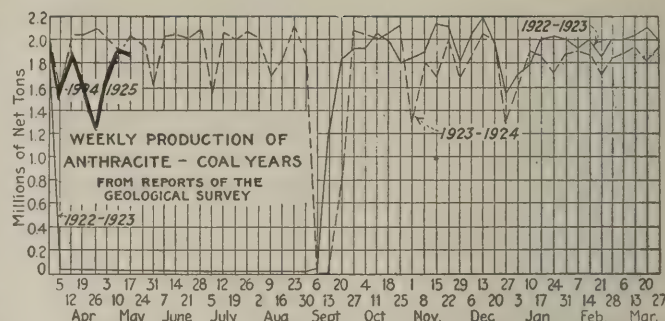
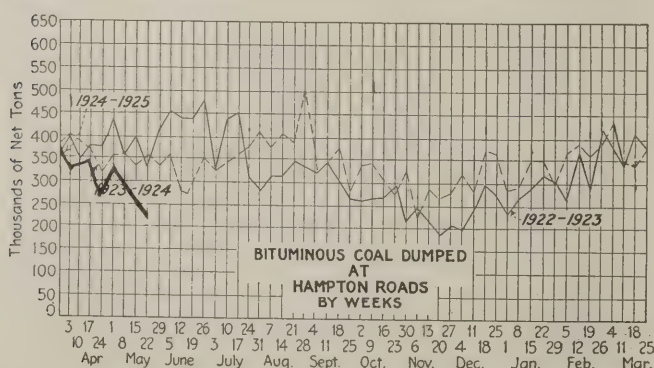
The price level f.o.b. vessel at Hampton Roads varies from \$4.35 to \$4.50 for No. 1 Navy Standard, but next grades have been reported sold at \$4@4.10. Accumulations are not large, but they are sufficient to keep prices below the \$2 per gross ton contract basis. Fair tonnages are moving off shore and along the coast on seasonal arrangements, but for spot business there is next to nothing doing. Factors at this end who rehandle at their own wharves are exerting steady pressure on buyers in order to make room for weekly arrivals, but no one is enthusiastic over results.

For inland delivery prices on cars at Boston, Providence and Portland follow very closely the fluctuating market at Norfolk and Newport News, marine freights, discharging and insurance aggregating about \$1.15. In other words the on-car figure is now about \$5.50 for lots in excess of a few hundred tons, while for anything approaching a comprehensive order the trade has shown a willingness to accept offers down to \$5.35.

All-rail from central Pennsylvania the movement east of the Connecticut River continues extremely light. The same applies to shipments via the Philadelphia and New York piers. Even gas coals are being dumped in relatively small tonnages, and there is a great dearth of orders for coal of any grade at any of the piers.

Atlantic Seaboard Consumers Indifferent

Nothing has developed to change the status of the market at New York. Buyers continue indifferent to inducements offered to encourage restocking while transportation is good. Prospects, however, are bright and there is confidence in the immediate future of business. Most of the



coal available to the spot buyer is non-union product. Quotations for coal at tidewater remain steady despite lower receipts and the clearing away of distress tonnage. Cars on hand dwindled to less than 1,000 cars one day during the past week, but a few days later had nearly reached the 1,500 mark. The average was around 1,200 cars.

The market at Philadelphia continues inactive, consumers buying the minimum. It looks as if buying is to be left until coal is absolutely needed. Prices may be said to be holding firm, but only because the bottom has long since been touched. Business at tide is negligible.

The trade at Baltimore continues to plug along at a slow and unsatisfactory pace. Price variations are not extensive at present, for there is not enough active demand to bring up quotations sharply even for specialized coals and quick delivery. Consumers are buying in small lots for immediate needs only and there is practically no storing of moment. The export movement apparently has collapsed.

Business is coming in very slowly at Birmingham and is of comparatively small volume in aggregate. Consumers not having contracts are buying fuel needs in very competitive spot market.

Anthracite Market Retains Much Strength

Demand for the domestic sizes of anthracite at New York remains sufficient to absorb all sizes; the call for stove coal has been mainly instrumental in keeping egg and chestnut active. Chestnut continues to be more plentiful than either egg or stove and could be gotten from some shippers below the average quotation of \$9. Egg is nearly as strong as stove, but the demand is a trifle easier and would drop off considerably if the demand for stove became easier. The market for independent coals remains strong largely because of the inability of retail dealers to obtain sufficient company coal to supply the wants of their customers. This is due in large part to labor troubles. However, production is slowly recovering and with more company coal arriving in the New York market an easier situation is looked for. There has been a let-up in the demand for the buckwheat coals. No. 1 buckwheat is considerably easier and only the better grades are bringing top prices. Rice and barley are firmer, while birdseye is moving steadily. Unreasonable weather at Philadelphia has kept the market fairly active. Orders, however, are dropping off. The industrial situation is so unsatisfactory that workers are getting less money on account of curtailed working time.

Coke Output Slightly Higher

Coke prices are lower as a result of several important operators reducing wages to the 1917 scale, a cut of about 33½ per cent. The remaining independents will reduce soon. They have had hopes that the Frick company also would reduce, but this seems improbable. After seven weeks of steady decline, the output of beehive coke recovered slightly during the week ended May 17, when, according to the Geological Survey, 182,000 net tons was produced, as compared with 178,000 tons during the preceding week.

Car Loadings, Surplusages and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended May 10.....	909,187	136,046
Previous week.....	914,040	127,165
Same week in 1923.....	974,741	175,088

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
May 7, 1924.....	324,779	180,888		
Previous week.....	329,489	193,061		
Same date in 1923.....	13,556	3,195	28,316	16,67

Foreign Market And Export News

British Markets Quiet and Irregular; Inquiry Indicates Better Outlook

The Welsh coal market is quiet and irregular, though the drop in prices has resulted in stronger inquiry for shipment during the next month or six weeks. This slight fillip is, however, somewhat discounted by the delay in shipping as a result of recent stormy weather. The foreign demand is very slow in recovery and the industry as a whole is still in a state of depression occasioned by the slump and the fear of a stoppage.

The downward trend of prices has been to a large extent arrested by the improved inquiry, though some operators are still offering concessions to effect immediate clearances. There has been some slight inquiry from South America, but buyers maintain a hand-to-mouth business. The Egyptian Government and the Sudan railways have ordered Monmouthshire large 100,000 metric tons at 38s. 4½d. and 50,000 tons at 38s. 2d. c.i.f. Alexandria.

The Newcastle market probably is as depressed as it has ever been, though, as in Wales, the demand has improved slightly on account of the lower prices. The Amsterdam gas works is inquiring for 10,000 tons of gas coals, and the Danish State Railway is in the market for 30,000 tons of steams for July to December shipment.

Production by British collieries during the week ended May 10, a cable to *Coal Age* states, was 5,220,000 tons, according to the official reports. This compares with 5,685,000 tons during the week ended May 3.

Business and Prices Slump at Hampton Roads

Business at Hampton Roads continues on the decline, with demand slumping and production at mines serving this port falling to a low level. Prices have slipped in keeping with the general trend of business. Lake shipments have begun to pick up, but the

majority of shippers have contracted direct from the mines or are moving coal from their own mines for the lake trade. Coastwise business is improving somewhat, but foreign movement and bunkers show little life.

The tone of the market is extremely dull. Shippers are disappointed over the situation, having expected better business. Buyers, apparently, are not willing to come into the market for more than their immediate needs.

French Markets Quieter in Tone In Sympathy with Iron Trade

The French coal market is beginning to feel the influence of the quietness of the iron and steel industry. Not that the French mines are complaining of lack of business, but the demand is less urgent. The demand for house coals has improved somewhat since the beginning of the month.

The summer prices for British anthracites and Ruhr briquets have been established for May only, but for other grades the June rates will be 4 fr. higher than those of May; July, 5 fr. above those of June, and August, 6 fr. above those of July.

Imports from Cardiff have declined noticeably during the past week, in spite of a decrease in the prices at the shipping docks.

Rolling stock has been supplied regularly to the mines, and freight is lower at 22.50 and 22 fr.

Deliveries of indemnity fuels are now averaging 42,700 tons daily. By an agreement just signed by France, Belgium and transport firms for regulating shipments of indemnity fuels by the Rhine, 500,000 tons monthly will be shipped through Strasburg and 350,000 tons through Rotterdam and Belgium.

French coal and lignite production in March totaled 3,772,734 metric tons, against 3,648,878 tons in February. In these two months there were 26 and 25 working days respectively, the daily

average output being 145,100 and 145,955 tons.

During April the O.R.C.A. was supplied with 592,332 tons of coke, or nearly 20,000 tons daily. From April 28 until the lockout the deliveries fell off to about 12,400 tons a day.

United States Domestic Coal Exports During April

	(In Gross Tons)	1923	1924
Anthracite.....		421,922	245,483
Value.....		\$4,500,531	\$2,679,072
Bituminous.....		1,384,879	942,638
Value.....		\$8,674,885	\$4,651,903
Coke.....		201,788	45,382
Value.....		\$2,405,744	\$324,527

Export Clearances, Week Ended May 24, 1924

FROM BALTIMORE

For Porto Rico:	Tons
Am. Str. Gov. John Lind.....	403

FROM HAMPTON ROADS

For Brazil:	
Br. Str. Whitegate for Rio de Janeiro.....	6,199
Br. Str. Saint Dunstan for Rio de Janeiro.....	6,843
Amer. Str. Robin Hood for Rio de Janeiro.....	8,599
Br. Str. Hindustan for Rio de Janeiro.....	6,809
For Canada:	
Nor. Str. Lorentz W. Hansen for Gaspe.....	2,445
Swed. Str. Freja for Halifax.....	1,506
For Cuba:	
Br. Str. Havenside for Havana.....	3,290
For France:	
Br. Str. Hughli for Marseilles.....	5,526
For Italy:	
Ital. Str. Pollenzo for Civita Vecchia.....	8,468
For Uruguay:	
Br. Str. Shannonmede for Montevideo.....	5,995
For West Indies:	
Nor. Str. Mathilda for Fort de France.....	5,487

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	May 17	May 24†
Cars on hand.....	1,126	1,459
Tons on hand.....	70,178	86,910
Tons dumped for week.....	96,498	82,737
Tonnage waiting.....	10,000	30,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,215	1,375
Tons on hand.....	84,900	98,950
Tons dumped for week.....	73,295	78,034
Tonnage waiting.....	3,000	10,697
C. & O. Piers, Newport News:		
Cars on hand.....	633	1,356
Tons on hand.....	33,125	67,580
Tons dumped for week.....	63,886	54,855
Tonnage waiting.....	10,485	8,200

Pier and Bunker Prices, Gross Tons

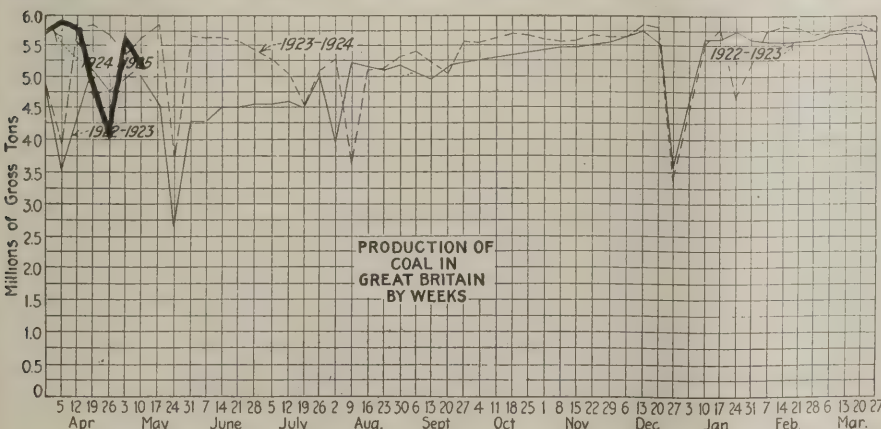
	PIERS	May 17	May 24†
Pool 9, New York.....	\$4.85@	5.00	\$5.85@5.00
Pool 10, New York.....	4.65@	4.75	4.60@ 4.75
Pool 11, New York.....	4.40@	4.50	4.40@ 4.50
Pool 9, Philadelphia.....	4.70@	5.05	4.70@ 5.05
Pool 10, Philadelphia.....	4.45@	4.80	4.45@ 4.80
Pool 11, Philadelphia.....	4.30@	4.55	4.30@ 4.55
Pool 1, Hamp. Roads.....	4.40		4.35@ 4.40
Pool 2, Hamp. Roads.....	4.15		4.20@ 4.25
Pools 5-6-7 Hamp. Rds....	4.00@	4.15	4.00@ 4.10
	BUNKERS	May 17	May 24†
Pool 9, New York.....	5.15@	5.30	5.15@ 5.30
Pool 10, New York.....	4.95@	5.05	4.90@ 5.05
Pool 11, New York.....	4.70@	4.80	4.70@ 4.80
Pool 9, Philadelphia.....	5.00@	5.40	5.00@ 5.40
Pool 10, Philadelphia.....	4.75@	5.00	4.75@ 5.00
Pool 11, Philadelphia.....	4.50@	4.80	4.50@ 4.80
Pool 1, Hamp. Roads.....	4.50		4.35@ 4.40
Pool 2, Hamp. Roads.....	4.25		4.20@ 4.25
Pools 5-6-7 Hamp. Rds....	4.00@	4.15	4.00@ 4.10

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to Coal Age

Cardiff:	May 17	May 24†
Admiralty, large.....	26s@ 28s.6d.	28s.
Steam smalls.....	19s.	18s. @ 19s.
Newcastle:		
Best steams.....	26s.	26s.
Best gas.....	25s.	23s.6d. 24s.
Best bunkers.....	23s.	23s.

† Advances over previous week shown in heavy type; declines in *italics*.





News Items From Field and Trade



ALABAMA

The Rainbow Coal Mining Co., Montgomery, has filed articles of incorporation with the Secretary of State. The company will engage in general mining business, having an authorized capital stock of \$100,000, with \$80,000 paid in. Incorporators are Homer F. Baird, Q. M. Selzer and Leonard B. Baird.

The Cahaba Domestic Coal Co., Inc., has filed papers in Birmingham, with capital stock given at \$3,000. The company was incorporated by Eudora, E. J. and E. R. Blackwood, Birmingham, and will engage in coal mining, etc.

Several independent coal companies, including the De Bardeleben and Pratt Consolidated, have reduced wages of miners.

COLORADO

During April Colorado mines produced 722,424 tons of coal, this being a decrease of 24,693 tons from April, 1923. The total number of men employed in and about the mines in April of this year was 12,943.

KENTUCKY

The John P. Gorman Coal Co., Lexington, has purchased the property of the Hazard Elkhorn Coal Co., at Sandlick, in Letcher County. The company on May 1 bought the Elk Creek Coal Co. property at Blackey, in Letcher County. The Gorman interests have announced that they planned to materially enlarge the capacity of the Hazard-Elkhorn plant.

According to word reaching Williamson, W. Va., from the Pond Creek mining section of Kentucky, the mines operated by the Henry Ford interests have been closed down and will remain inactive until organizers representing the United Mine Workers leave the field. The mines are operated on an open-shop basis, the scale paid being equal to that fixed by the union. Unsuccessful efforts were made to organize the Pond Creek section about the time the union sought to organize Mingo County miners. Organizers affiliated with the miners' union appeared in the Pond Creek section several weeks ago.

MINNESOTA

The Colorado Coal Corporation, of Minneapolis, has filed articles of incorporation, capital \$50,000. The incorporators, who are all of Minneapolis, are William J. Hughes, David and Rudolph Christie and Matthias J. Schoeffer.

OHIO

The Southern Ohio Coal Exchange reports for the week ended May 10 an output of 69,975 tons from 439 mines having a full-time capacity of 644,122 tons. This leaves a shortage of 574,147 tons. Labor shortage was responsible for a loss of 1,700 tons; strikes, 7,250 tons; mine disability, 2,110 tons and "no market" 562,011 tons. During the same week the eastern Ohio field ordered 9,930 cars and loaded 7,878 cars.

Suit has been brought by the Martin Ebersbach Coal Co. and the Peacock Coal Co. against the Great Lakes Coal Co. and the New Pittsburgh Coal Co. to collect \$450,000 alleged due on the sale of certain coal properties to the defendant companies in 1920.

C. H. Winefordner has purchased an interest in the Beverly Coal & Coke Co., a jobbing concern in the Atlas Building, Columbus, and has assumed with R. B. Beverly a part of the active management.

Noah F. Andrews has been appointed a deputy mine inspector by the Ohio Division of Mines and assigned to Hocking County. He resides in Logan.

OKLAHOMA

All union coal miners of the McAlister area and at Wilburton, Pittsburg County, are idle and the mines not in operation pending settlement of new wage contracts. Approximately 2,500 miners are idle in this district. Representatives of the miners and operators are in conference now and it is expected that new wage contracts will be signed in a few days.

PENNSYLVANIA

James L. Cooney, general manager of the Scranton Coal Co., was named president of the company by the board of directors May 23 to succeed Frank E. P. Latt, deceased. Mr. Cooney has been an officer of the company for about two years. He is widely known in anthracite mining circles.

An examination for certificates of qualification as mine foreman, assistant mine foreman and fire boss for the First, Sixteenth, Twenty-First and Twenty-Seventh Bituminous Inspection Districts was held in Turner Hall, Sixth Street and McKean Avenue, Charleroi, May 27, 28 and 29, 1924. The examining board was composed of the following: C. P. Byrne, chairman, Joseph Edwards and Michael Timlin, with Alexander McCand and W. H. Howarth as assisting inspectors.

At recent meetings of the Hudson Coal Co. general grievance committee efforts to call a general strike by alleged radicals in the ranks of the union proved fruitless. The grievances submitted are being adjusted by the company and the Conciliation Board.

Coal loadings in central Pennsylvania have been showing slight gains in May over April, which is regarded as the poorest month of the year. Up to May 17, 28,527 cars were loaded as against 24,366 for the corresponding period of April. Loadings of 50,000 cars are predicted for the entire month.

The mines of the Glen Alden Coal Co. flooded several weeks ago by the Lackawanna River are still being unwatered. Pumps are in operation at several shaft openings. It is estimated it will require at least another month to complete the work and prepare the mines for operation.

The Pennsylvania Coal Mining Institute is planning a big first-aid meet on the Cambria County fair grounds near Ebensburg. President W. A. Swift has appointed the following committee to consider the proposition and make a report at the next meeting of the institute, on June 20: T. J. Davis, John Reed, V. A. Stanton, D. Hopkins and T. A. Stevenson, of Johnstown; J. E. Cheynoweth, of Boswell; James Gatehouse, of Seward, and Isaac Rounsley, of Kelso. A committee composed of F. J. McKernan, George J. Playez and D. L. Boyle was named to obtain a larger and more suitable place for the meeting on June 20, when Floyd W. Parsons, formerly editor of *Coal Age*, will deliver an address.

John Brophy, president of District No. 2, United Mine Workers, has appointed Paul W. Fuller, of Pittsburgh, as director of education of the district. The union's department of education is a new departure and was created at the annual convention held in Altoona in March, last. Mr. Fuller entered upon his duties at the close of the State Federation convention in Allentown last week. For the present, headquarters of the new department will be in the district office building in Clearfield while Mr. Fuller makes a survey of every local in the district which consists of about 50,000 miners. The new department will co-operate with the department of education of the Pennsylvania Federation of Labor.

The Bethlehem Mines Corporation, with extensive operations at Johnstown, Heilwood, Wehrum and Slicksville, all in central Pennsylvania, and at Preston, W. Va., announces that, effective at once, the company's 5,400 miners will be placed on the 1917 scale of 72c. per ton instead of 92c.

Owing to a disagreement between operators and miners over the payment of a 10c. bonus on each ton of coal produced, the greater portion of the Broad Top coal field is closed, with every indication of a long period of idleness unless the union miners relinquish their bonus claim. The wage agreement was not signed by operators in the Broad Top region because the union refused to abolish the bonus, which, it is contended, the United Mine Workers pledged themselves to take out of the wage schedules in that district since April 1, 1918. The union has started to distribute relief and there is a general feeling of satisfaction among the miners.

Indications point to a long-drawn-out strike of all employees of the Lehigh Valley Coal Co. in the Pittston field. The district union officials have made it clear that they will have nothing to do with the strikers or their committees because of the fact that the walk-out is illegal. The company officials will not meet with the men until the collieries are working.

No improvement is observable in the Connellsville coke region. W. J. Rainey, Inc., has put out 300 ovens at the Allison plant, but is still working the Allison mines full. The Lincoln Coal & Coke Co. has closed 400 ovens at Keister, near Uniontown. The Consolidated Coke Co., near Masontown, has reduced wages to the 1917 scale.

Work has begun on the erection of 200 new homes at Shenandoah Heights and families are ready to occupy the houses when they are constructed. The tract is on a mountain over Shenandoah and was sold to the present owners by the Philadelphia Board of City Trusts, which administers the Girard Estate.

The Eastern Fuel Co., of Pittsburgh, announces the appointment of J. M. Gates as resident manager at Philadelphia in charge of sales in the Philadelphia and nearby districts of New Jersey, Delaware and Eastern Pennsylvania. The Prudential Coal Co., which was affiliated with large Canadian interests and with which company Mr. Gates was interested as vice-president, is liquidating its business in the United States. It is expected that the Eastern Fuel Co. will take care of the operating connections, as well as the old customers of the Prudential company. An addition to the sales force of the New York Office of the Eastern Fuel Co. is Edward C. Clark. Mr. Clark is a Yale graduate and a former resident of Boston. The resignation of H. J. Burkey, formerly of the Pittsburgh office of the Eastern Fuel Co., became effective May 10.

Announcement was made Saturday, May 3, of the purchase by the Hudson Coal company, of Scranton, of several lots in Carbondale, Pa., from William T. Carden, for \$14,000; and in Archbald from William R. Gilboy, for \$10,000. An unconfirmed report is to the effect that the land will be used for the erection of homes for colliery superintendents.

W. A. Chandler, formerly consulting electrical engineer of the Hudson Coal Co., Scranton, recently was placed in charge of all the engineering and construction work of the company, including the shops and laboratory.

James D. Sisler, associate geologist, Topographic and Geologic Survey of Pennsylvania, is in the coal fields of western Pennsylvania. During May and June he will study the geologic occurrence of various coal beds and investigate new methods of mining and the use and application of new mining machinery.

Charles F. Barrett has taken the management of the Buena Vista Coal Co., of Butler, with office in the Butler County Bank.

Mine No. 13 of the Pennsylvania Coal & Coke Co., at Hastings, Cambria County, has indefinitely suspended operations, due to the present depression. Employees of the mine are razing the tippie and the pumps and other machinery, which will be transferred to other operations of the corporation.

TEXAS

The State Board of Control of Texas, sitting at Austin, has awarded contracts to supply the various state institutions with fuel for the remaining portion of the fiscal year that ends on Sept. 30 to the McAlester Coal Co., of Dallas, and the Sparks Lignite Co., of Rockdale. Prices for coal average \$2.14 per ton, while the price for lignite is \$1.53 per ton.

The Texas Power & Light Co., of Dallas, has acquired lease on several thousand acres of land in Henderson County, near Malakoff, and is now testing this land to determine the extent of the lignite beds that underlie it. It is proposed to open extensive lignite mines, if the fuel is found in sufficient quantities, and to mine it for use as fuel in the company's electric-generating plants in Texas. A part of the electric company's development program also calls for the establishment of another great electric plant on the site of the lignite beds near Malakoff, and thus eliminate cost of haulage. The Malakoff plant will cost \$2,000,000

and it is planned to open sufficient mines to give employment to approximately 1,000 miners and other employees.

UTAH

The Union Carbide Sales Co. has lodged a complaint against the amendment to the safety code proposed for Utah coal mines which would require the use of electric lamps in coal mines. The company holds that not all coal mines in Utah are gaseous and that for this reason some of them are safe for the use of the open-flame lamp. It asks that the amendment be drawn to permit the chief mining inspector for the Industrial Commission to designate the kind of lamp to be used.

Eli F. Taylor, local U. S. land office registrar, will auction off 1,818.84 acres of coal land in Castle Gate district on June 18.

Production of coal in Utah in April was 325,195 tons, as compared with 286,352 tons in April a year ago and 255,319 in April, 1922.

The Utah Briquetting Co. has been formed and is applying for permission to sell \$50,000 worth of stock for financing the company. George W. Love, Mohrland, is president of the company and inventor of a process.

The Utah Oil Refining Co., of Salt Lake City, one of the largest oil-refining concerns in the West, has decided to go back to coal for use under its stills. Coal consumption will be 80,000 to 100,000 tons a year.

VIRGINIA

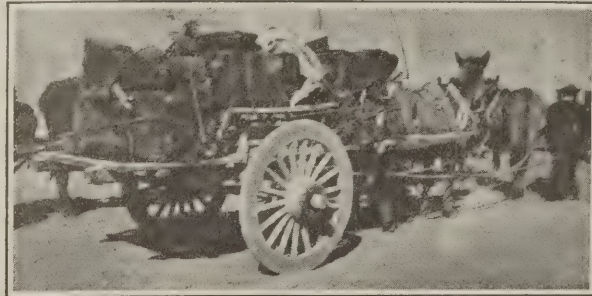
Directors of the Virginia Iron, Coal & Coke Co. voted May 22 to omit the regular semi-annual dividend on common stock. At a meeting in November last a declaration of 1½ per cent was made and a year ago a 2 per cent semi-annual dividend was ordered. The regular semi-annual 2½ per cent preferred dividend was declared, payable July 1.

The Chesapeake & Ohio Coal Exchange, of Newport News, Va., the last of the coal exchanges now in operation at Hampton Roads, will cease operation as an exchange May 31.

Clayton M. R. Wigg, Southern representative of the Houston Coal Co., has been elected president of the Hampton Roads Coal Club to succeed T. M. Bailey, resigned. T. R. Licklider, manager of the Norfolk office of the Trans Ocean Coal & Transport Co., was elected vice-president to succeed Mr. Wigg. Chester B. Koontz continues as secretary and treasurer.

Transporting Coal in China

Basket below ground, the backs of coolies and lumbering wagons on the surface make coal expensive in the Orient, despite cheap labor.



WEST VIRGINIA

The Richard Mine of the Bethlehem Mines Corporation was shut down indefinitely during the second week of May and about 140 men who have been working on a part-time basis were affected. So far as can be learned only the Masontown and Bretz mines of the company are now in operation. The understanding is that the 1917 wage scale has been put in effect at the mines still continuing in operation. Mines of the Bethlehem Mines Corporation on the Morgantown & Kingwood R.R. are operated on an open-shop basis.



Inn at Glen Rogers

Owned and operated for the benefit of employees by the Raleigh-Wyoming Coal Co., Glen Rogers is in Wyoming County, West Virginia.

The body of George Holliday, Sr., mine foreman, has been recovered from the Benwood mine. Further exploration brought to light another body—that of an unidentified miner. In all 119 miners lost their lives in the explosion which wrecked the mine, on the morning of April 28.

The West Virginia Super Fuel Co. has just been organized with a capital stock of \$400,000 to operate in the northern panhandle of West Virginia. The general office of the company for the time being is at Moundsville. The organizers of the company are A. R. Bice, of Bellevue; Ernest Fry, Stephen Steranchak, and J. R. Dorsey, of Pittsburgh, Pa. and H. S. Allshouse, of Irwin, Pa.

The Three Fork Coal Co., of Ellamore, is installing an up-to-date screening system in addition to building a large number of houses for miners, a storehouse and a club room. This company has been mining nothing but run of mine coal heretofore but having learned that the coal under careful mining and preparation will screen about 75 per cent lump, it was decided to install the necessary screening apparatus. Such a large percentage of lump is a little unusual for Sewell coal, but inasmuch as the coal comes within the area of the Deer Park anticline, it is unusually hard. About 20,000 acres of coal land are owned by the company.

Oren F. Kelley, representing A. J. Thompson, of Titusville, Pa., is in Elkins with a corps of men and is starting to open the Sewell coal on a tract of 2,000 acres near Woodrow, in Randolph County. Present indications point to the existence of several hundred acres of high grade Sewell coal underlying the property, averaging about 40 in. in thickness, there being one other vein of good coal.

Operations have been resumed at the Pursglove mine of the Connellsville By-Product Coal Co., on Scotts Run, after a short suspension. This mine is owned by the Paisley interests, of Cleveland. This is a union plant but was shut down for a time pending agreement on a new wage contract. About 300 men are normally employed at this time.

A loss of about \$35,000 was sustained when the store building of the Booth Supply Co. at the Riverseam mine of the H. J. Booth glass interests, of Pittsburgh, was destroyed by fire. A cold-storage plant operated in connection with the store also was destroyed.

Fire early in May destroyed tipple No. 5 of the Raleigh Coal & Coke Co., entailing a loss aggregating several thousand dollars. The fire was of unknown origin. Although the mine had not been in operation since July, 1923, several men including a watchman have been kept at work in order to keep the equipment in shape. The No. 5 mine is located between Beckley Junction and Beckley.

Although hardly more than a year old, the mine of the King Fuel Co., of which A. J. King, of Huntington, is the head, has attained an output of 1,800 tons a day.

WISCONSIN

Construction of a modern coal dock at Superior, Wis., to cost at least \$750,000 was announced by the Reeves Coal & Dock Co. May 20. The new structure, to be electrically operated, will replace the wooden dock now being dismantled. Permission to extend the shore line, granted by the United States Engineer's Office, will provide the dock with 150,000 sq.ft. additional storage space. The Reeves property, 23 acres in extent, is one of the best sites on Superior Bay. Work on the new dock is expected to start as soon as the old one is torn down.

CANADA

Briquetting of Saskatchewan lignites as the lignites of the Dakotas, are now being briquetted, is proposed by the Lignite Utilization Board, supported jointly by Saskatchewan and Alberta. The board has just reported that it has developed a successful method and is asking for an additional appropriation so that it may demonstrate the process to convince capital that the scheme offers a good investment. The

board wants to run its plant longer so as to determine exactly the cost of materials, labor, repairs, replacements and technical supervision and control.

Coal production in British Columbia for April totaled 144,205 tons, a decrease of 58,725 tons from March. This is explained by the lack of output in the Crows Nest Pass field, where a strike is in progress. In March the Crows Nest district produced 69,007 tons. April figures show that the Vancouver Island coal mining industry is improving. The output of the Canadian Collieries (D), Ltd., improved by 3,398 tons, that of the Western Fuel Corporation by 5,538 tons, and other collieries advanced to the extent of 2,060 tons. In the Nicola Princeton field, however, there was a slight drop of 714 tons.

Major S. J. Robins, and Captain Henry Davies, both of Cardiff, Wales, representing a syndicate of Welsh coal operators, have spent some months inspecting coal properties in Alberta. They are now on their return journey to England to report to their principals who have in view the development on a large scale of the Western coal fields for supplying eastern Canada. Major Robins and Captain Davies have purchased extensive coal areas for the syndicate from individuals and small companies not having sufficient capital to carry on development.

A noticeable improvement in the Cape Breton coal trade is reported. All the British Empire Steel Corporation collieries in Cape Breton except the Jubilee are working with good outputs and shipments to Montreal are in full swing. There has been considerable activity at Louisburg with several bunker steamers as well as cargo steamers in port.

Charles Camsell, Deputy Minister of Mines for Canada, and Thomas Molly, Minister of Industry for Saskatchewan, have been appointed to the Lignite Utilization Board.

Industrial Notes

The following executive changes were made in the **Timken Roller Bearing Co.**, effective May 1: George C. McMullen, formerly manager of sales of the industrial bearings division, became district manager of sales of the Timken interests on the Pacific Coast, with headquarters at San Francisco, Cal., and Harry H. Gildner, formerly in charge of the Chicago office of the company, became manager of the industrial division with headquarters at Canton, Ohio.

The Pittsburgh office of the **Sullivan Machinery Co.**, which has for many years occupied quarters on the fifteenth floor of the Farmers Bank Building, moved April 1 to larger space and now occupies rooms 517-520 in the same building. William R. Jarvis has been the company's Pittsburgh manager since 1904.

In connection with the opening of a mine at Calvin, Va., by the **Blackwood Coal & Coke Co.**, of Blackwood, Va., the company will have a large tipple with revolving dump and reinforced concrete storage bins of a capacity of 2,500 tons. The contract for the construction has been awarded the Roberts & Schaefer Co. of Chicago.

The Canadian budget, just presented, should have far-reaching benefits to manufacturers of machinery in the United States. The duties have been considerably reduced on coal-washing and coke-making machinery and on mining machinery and equipment.

Traffic News

Ohio Collieries Co. Alleges Discriminatory Rates

Alleging discriminatory freight rates the Ohio Collieries Co., of Toledo, lodged a complaint against the Hocking Valley Ry., with the Ohio Public Utilities Commission. The complaint asks that the commission determine a rate which will place the Ohio Collieries Co. on an equal basis with companies operating in the Pomeroy fields and in West Virginia and charges that rates to Columbus over the Hocking Valley line now give these companies an unfair advantage.

The Ohio Collieries Co., it is stated in the complaint, operates coal fields near Poston, Ohio, whence shipments are made to Columbus over the Hocking Valley Ry. Keen competition exists in this Columbus market between companies operating in the Pomeroy fields and the complaining company, it is charged.

That, to Columbus, on its line, the defendant maintains and assesses a common or group rate from all shipping points, is an allegation made in the complaint which charges that the Hocking Valley company collects a "discriminatory and therefore unlawful rate" on bituminous coal from the Hocking district to Columbus.

Obituary

Frank E. Platt, treasurer, vice-president and acting president of the Scranton Coal Co., died at his home in Scranton, Pa., May 13, aged 65. Death was due to heart disease. Mr. Platt came of a family of early settlers in Scranton. With his brother-in-law, Joseph H. Scranton, and Sanford Grant, J. Curtis Platt, father of Frank E. Platt, established the first steel and rolling mills and blast furnaces in Scranton. After graduating from Rensselaer Polytechnic Institute, Troy, N. Y., Frank E. Platt, engaged in the iron business. He gave his entire attention to the management of the blast furnaces. Mr. Platt served for a time as director of the Moosic Powder Co., the Weston Mill Co., the Rivoton Mills Co., and other companies. Since the organization of the Scranton Coal Co., he was active in official capacities for that organization.

Association Activities

The board of directors of the Central Pennsylvania Coal Producers' Association has named a committee of twenty-one to act as an advisory board to the members of the association. The committee is divided under three heads: mining methods, machinery and power. The work of these committees will be to furnish information to the members of the association upon these subjects which would otherwise require considerable individual time. Following are the committees: Mining methods—A. B. Crichton, Johnstown, chairman; Fred Vinton, Indiana, vice chairman; C. D. Oldknow, Du Bois; R. W. Austin, Clearfield; C. L. Patterson, Robertsdale; William C. Faulk, Elbon; J. W. Stephenson, Hastings; Malcolm Mc-

Dougall, Sonman; Thomas L. Jones, Altoona, and S. T. Brown, Indiana. Machinery—L. W. Householder, Indiana, chairman; Richard Peale, St. Benedict, vice chairman; R. V. Williams, Bethlehem; Fred Norman, Kittanning; C. J. Hamilton, El Mora; Robert F. Roth, Altoona, and F. D. McBellis, Gallitzin. Power—E. K. Davis, St. Benedict, chairman; A. S. Wilson, Johnstown, vice chairman; E. E. Hewitt, Indiana, and James M. Cook, Johnstown.

The West Kentucky Coal Bureau, holding its monthly meeting in Louisville on May 13, re-elected C. W. Taylor as representative of the association on the Board of Directors of the National Coal Association, and heard a report from M. B. Lanier, representative of the National Coal Association, to the U. S. Chamber of Commerce meeting in Cleveland the previous week. A communication also was read from Secretary Hoover concerning summer stocking of coal.

Recent Patents

Overturning Mine Cage. Andrews Allen, Chicago, Ill.; 1,482,536. Feb. 5, 1924. Filed Jan. 21, 1921; serial No. 438,844.

Automatic Mine Shaft Gate. Robert Quigley and James Cunningham, Portage, Pa.; 1,483,243. Feb. 12, 1924. Filed Aug. 21, 1922; serial No. 533,294.

Mine-Car Coupler. Charles W. Lauby, Vincennes, Ind.; 1,483,628. Feb. 12, 1924. Filed Nov. 6, 1922; serial No. 599,237.

Coal Jigger. Earl J. Wagner, Tamaqua, Pa.; 1,483,958. Feb. 19, 1924. Filed June 7, 1923; serial No. 643,966.

Intermittent System for Treatment of Coal. James T. Fenton, Salt Lake City, Utah; 1,484,256. Feb. 19, 1924. Filed Aug. 24, 1922; serial No. 584,038.

Continuous System for the Treatment of Coal. James T. Fenton, Salt Lake City, Utah; 1,484,257. Feb. 19, 1924. Filed Aug. 24, 1922; serial No. 584,039.

Actuating Mechanism for Coal Dump Cars. Jonathan B. Dodd, Cumberland, Md.; 1,484,764. Feb. 26, 1924. Filed June 1, 1923; serial No. 642,869.

Coming Meetings

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

West Virginia Coal Mining Institute. Annual meeting June 3 and 4, Elkins, W. Va. Secretary, R. E. Sherwood, Box 1026, Charleston, W. Va.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Association. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

Midwest Retail Coal Association. St. Louis, Mo., June 17-18. Secretary F. A. Parker, St. Louis, Mo.

American Society for Testing Materials. annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers. annual convention, June 23-27, Edgewater Beach, Chicago, Ill. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

First International Management Congress. Prague, Czechoslovakia, July 21-24.

World Power Conference. Wembley, London, England, June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

New Equipment

New Reflector for Highly Concentrated Light

For use in industrial operations where highly concentrated light over a limited area is desired, a new reflector has been developed by the Westinghouse Electric and Manufacturing Co. It has been designed to give maximum light distribution from a 25- or 50-watt mill type lamp, insuring intense illumination. In such work as coil winding, machining, planing, drafting and any other operation requiring accurate vision, it is particularly suitable.

The body of the reflector is a one-piece steel stamping covered with a ground coat of fired porcelain enamel and a finishing coat of white enamel. It is provided with a brass holder so that it may be fastened to a brass-shell socket without other support.



Reflector Intensifies Light Over Limited Area

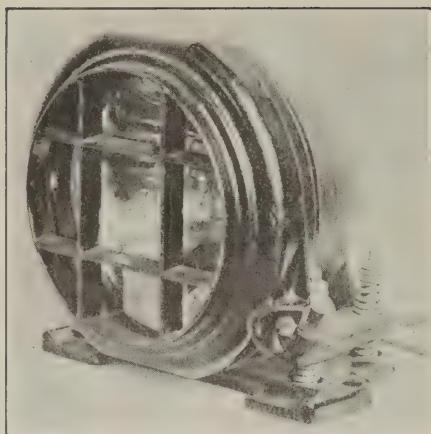
In buildings where there is considerable vibration the use of mill type lamps has greatly increased. This reflector has been designed to obtain the maximum possible light distribution from a 25- or 50-watt mill type lamp.

Headlight Built to Sustain Bumps on the Road

A mine locomotive headlight possessing a number of improvements over previous designs has been developed by the General Electric Co. This light is of especially rugged construction to withstand rough usage.

The frame incloses a simple focusing mechanism which adjusts the lamp to the focal point of the reflector by a horizontal movement of the socket. Heavy door pins, hinges and guard grids add to its ruggedness. The leads enter through water- and moisture-tight stuffing boxes, and the lead itself is covered with soft but durable rubber, thus insuring a tight joint. The general contour of the unit is such that blows from falling objects glance off without doing any damage. The casing is supported on springs and spherical headed studs, permitting universal movement.

The glass door is recessed in the casing, and is protected by a grating heavy enough to withstand severe shock in case of collision. The glass itself



Headlight for Mine Service

Manufacturers are now giving more and more consideration to adverse mine conditions. Here is a headlight designed particularly for mine locomotives. It is claimed it will withstand severe shocks without damage.

is reinforced with wire. Both the door and mirror reflector are cushioned with tarred rope for the dual purpose of insuring the interior against dampness and of affording some degree of resiliency in case of shock.

The reflector is of heavy glass, silver-plated and copper-coated to protect the silvering and strengthen the mirror.

Fifteen-Ton Dump Car Cuts Strip-Pit Costs

One of the biggest types of dump cars used anywhere in coal mining is the 15-ton car recently put into service by the Penova Coal Co., at its strip pit in Adena, Ohio. This company, backed by such experienced coal strippers as Grant Holmes of Danville, Ill., who has been actively interested in stripping for 40 years, decided the average 4-yard dump car was too small and also that an automatic dumper was

needed in order to reduce costs. The Western Wheeled Scraper Co. of Aurora, Ill., manufactured the 15-ton car shown herewith to meet these requirements.

This car handles fully four times as much coal as the average 4-yard car; it is a double truck, one-way, air-dump, self-righting car built for 36-in. gage track. The dumping angle is 35 degrees. This, the operators think, reduces breakage of coal as it is being discharged. The double truck feature reduces the spillage along the track because it produces good riding qualities.

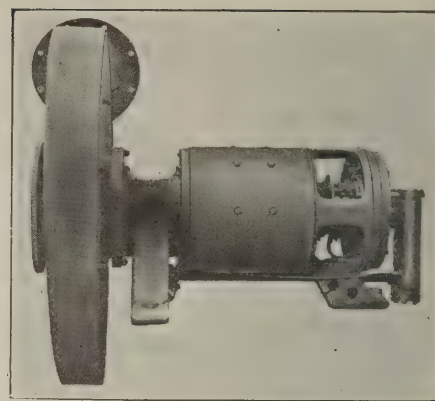
Two cars are spotted at a time and are dumped by a man below who directs the loading of a conveyor belt. He pulls a cord which lifts a trigger on the cars' air dumping mechanism. The two cars discharge their loads, right themselves automatically, and are pushed ahead.

Well Balanced Air-Compressor

A new design of single-stage centrifugal compressors, has been perfected by the General Electric Co. and is now on the market. The new compressors are of two types, single- and double-inlet. The single-inlet type is designed for general use; the double inlet type being necessary when the ratio of impeller inlet and exit diameter reaches a value demanding its use.

The machines are available in capacities of from 500 to 75,000 cu.ft. per min. at 0.75 to 6 lb. pressure. They are provided with oil pumps designed to furnish plenty of oil to the bearings. Capped holes in the tops of bearing linings are eliminated, thus preventing dust from entering the lubricating system. A heavy hinged cast iron cover is provided on one side of the middle bearing bracket which may be lifted to inspect the return flow of oil from the lubricating system.

The pulsation point of these machines occurs at very light loads. The



Motor-Driven Air Compressor

Unit construction makes it possible to design this compressor so that it vibrates only slightly at very low speeds.

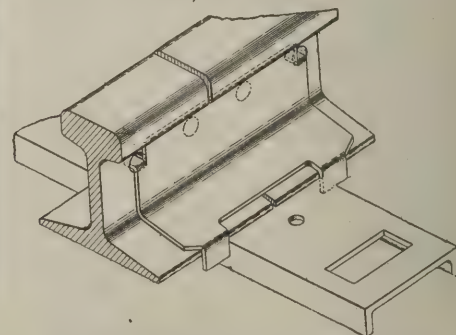
efficiency curves are very broad, thus showing an improvement over older types. The no-load power consumption is between 60 and 70 per cent of that required for previous machines.

Outstanding construction details include bearing supports of strong construction, the casing being attached to the bearing bracket by a flange. The weight of the casing, although not great, has been distributed in such a manner as to make the unit mechanically strong. This is made possible by the use of steel plates varying from $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. in thickness in the various parts of the compressor.

Fish Plate Holds Rail and Tie in Position

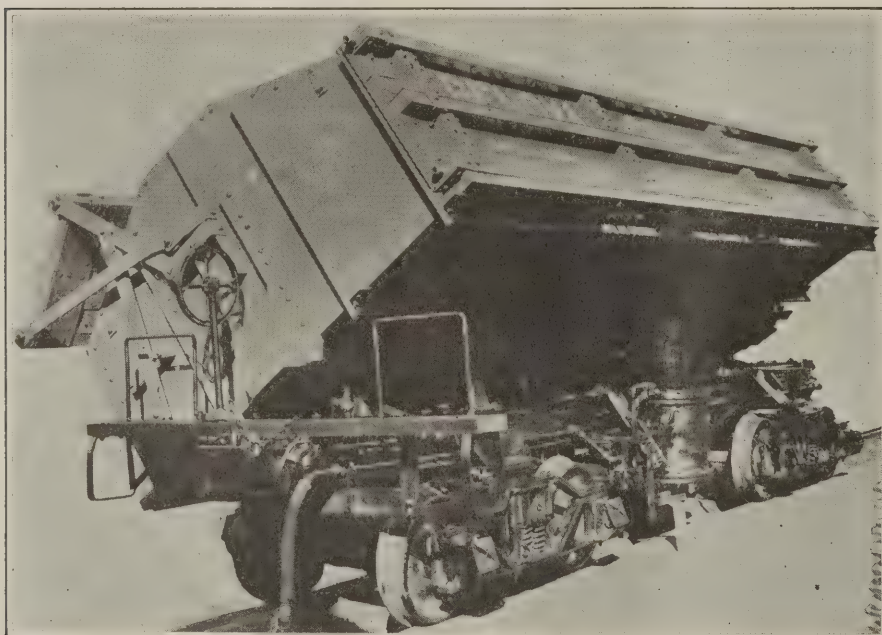
The illustration shows a fish plate or splice-bar which can be used with most track ties. It is made from a single piece of sheet metal and at each of its upper corners are laterally projecting lugs formed by cutting the metal and bending the free ends as shown. These lugs are located so that they project into and through the rail bolt hole.

At the bottom of the vertical section is a laterally extending base or flange which conforms to the rail flange. Extending downward near the ends are lugs which are formed by cutting away part of the metal. These two lugs are spaced so that the fish plate straddles the cross tie and locks it in position on both sides. This plate not only holds the rails together, but holds the ties in position. No special tools are necessary for its adjustment and no bolts and nuts are required. It has lately been put on the market by S. M. Casterline of Crafton, Pa.



Splice-Bar Performs Two Functions

When used with a suitable cross tie, this fish plate assists in holding the rail ends together and secures the tie in position.



Large Dump Car for Coal Stripping

This 15-ton car was built for the Penova Coal Co., Adena, Ohio, to speed up the output and help reduce the cost at the company's big strip pit. The air mechanism shown under the side of the car dumps and rights its automatically so that no employee need go onto the tippie.

COAL AGE

McGraw-Hill Company, Inc.
JAMES H. MCGRAW, *President*
E. J. MEHREN, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

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Negative Minds

PROGRESS in industry has in all branches and at all times been held back by conservative minds. Many men resent "being shown," and as a result no new method of operation is successful till enough have so tried it, proved it and profited by it that the men with negative minds find its adoption the only possible means of defense against their more aggressive and less negative rivals. A generation that has learned to fly, that has superseded the horse, that talks with wires and by wireless, that does nearly everything by machinery has no occasion to be negative. With everything changing and being changed there is no reason to take the attitude that the way of the past is the wise way, that something cannot be done because, forsooth, hitherto it has not been done.

After Waiting Six Thousand Years

IN THE year 4000 B.C. clay pipe was used in Babylonia. It may have been used even earlier. Yet it is only in the last few years that we have been able to attain the jointless pipe. Many operating men still remember the pneumatic undercutter. It was a hard machine to handle and its capacity was limited. It doubtless deserved to die, but that demise was greatly hastened by power loss on the line. Where we have low voltage today we had low pressure then. If only we had been able to establish good joints from mine to face the compressed-air puncher would have fallen into disuse less rapidly. If oxy-acetylene welding had come just a little earlier the air puncher would have stayed a decade longer. There are still many compressed-air lines in mines and it would seem that those who have them should weld them with oxy-acetylene. Thus most air would not be lost in transmission, the machine receiving the pressure of air with which it is designed to operate.

Conveyor in Stripping

GOING over the past history of stripping as printed in this week's issue we have an opportunity to review the various methods by which stripping may be accomplished and are led to question whether the full revolving steam or electric shovel is the last word in stripping. Is it certain that the dragline and conveyor do not have their place where stripping to greater depths than 40 ft. is justified by greater thickness of coal or even in shallower strippings?

That these projects gave way to the present-day large capacity shovel is no evidence perhaps that it was the only practical machine in the then existing state of the art. We are constantly getting new materials of construction and perhaps what was impossible then may be possible now. Just as the airplane was a failure till we developed the internal-combustion engine, so today we may have advanced to such an extent in the

art of dirt removal, in the materials of construction and in mechanical control that some of the equipment with which success was impossible in the nineties and in the first decade of the present century might be made feasible today. The suggestion awakened by Grant Holmes' reminiscences published this week and last is worthy of thought. Surely stripping has not reached its limit as to depth and operating methods. A slight increase in depth would greatly widen the field of its applicability for large areas lie under cover too deep for present equipment, and the deeper the coal the better its quality.

An Excess of Technical Men

MUCH has been said of the excess of workers in the coal industry and what has been stated cannot well be controverted, though most sections would like to have more men, for they have room for them in the mines. However, the men now employed can flood the railroads with coal and cannot find market enough to keep them continuously at work.

Of technical men, however, we really have a dearth, but they are so little appreciated by the operating forces that there are many of them without jobs. Operators cannot understand that only proper control of operations will produce cheap coal. The most expensive mine is one that is undermanned in its management, its safety, mining, mechanical and electrical forces. Without the needed officials, accidents hamper production, explosions destroy both human life and the mines themselves, machines fail to work steadily and efficiently and the repair bills are enormous. No one can leave the mines with economy and safety to the operation of blind chance and incompetent or insufficient direction. Anything that is worth doing is worth doing well.

Keep Goodwill with Your Neighbor

NO INDUSTRY can afford to neglect its public relations. It is a losing game that is played against a combination of players. No industry knows just when it will have an important message for the public, some condition in its operation it desires to establish for its own well-being. When that time comes it will be well if it has the ear of the public rather than its boot. If the public is convinced of the disinterestedness of the industry much success will be attained in meeting its just ends. A poor way indeed it is to show no interest in a neighbor till you desire to borrow something or to ask for a favor.

Much can be imposed on any one or on the public, we can hold ourselves proud and unapproachable, so long as others must accept our conditions but when a favor is desired that perhaps will hurt no one, we have no friends who are willing to bestow it and the service is withheld. The coal industry should beware of this.

When the sun shines and everything is going well between ourselves and our neighbors it is good time to establish friendly relations. Today, prices are low, labor troubles are temporarily at an end, coal is plentiful, no one ventures to ship poor coal, the miners are compelled to keep the coal clean, the snowbirds have disappeared, now is the time to cultivate good relations and to plan some way by which those friendly relations may be maintained.

Simplification of Sizes

SOME have contended that the reason why anthracite is sold in so many sizes is because an unhappy necessity in the cleaning of coal made meticulous sizing essential. Perhaps the real cause was a desire to make an even and therefore a handsome product; but whatever was the reason the fact remains that more sizes are being made than the public really needs.

A few would have served just as well had not the operators, by putting them on the market, developed the desire for every one of the many sizes and made it difficult to amalgamate any without evoking public clamor. Some companies have found it necessary in the jigging of coal to prepare two sizes of chestnut but they had sense enough to mix the sizes after they were made. The lesson had been learned, but too late unfortunately for the elimination of other unnecessary sizes.

One method of washing is based on the flotation of coal in a medium of a given specific gravity. It works equally well on coals of any size, eliminating the necessity for careful sizing. But as coal is sold in many different sizes, that extremely valuable characteristic is left almost entirely unutilized. The operator with the mixed product must go to the expense of preparing his coal so as to afford the many sizes which an uninstructed public now demands.

The Illinois region also has developed a demand for close sizing. It makes several sizes and many mixtures of sizes and all to no purpose. This misfortune the operators of Illinois have called down on their own heads. They are utterly without justification.

A new coal-cleaning machine recently has been developed and introduced into West Virginia. It requires the most careful sizing. It would be deplorable folly if this size making resulted in educating the public, burning West Virginia coal, to demand a closely sized product. Rather than allow this habit to grow the operators who may install and use this machine should mix the product so as to obtain only those sizes which the public is accustomed to receive, thus doing their part to prevent demands for excessive sizing. The marketing of many sizes inevitably results in an inequality between their production and sale. This is harmful to the man who does not have the particular proportion of sizes that his trade is demanding, for he wants to move all his coal and not merely a part. Many sizes also involve a multiplicity of bins and loading tracks and all manner of trouble in loading.

A campaign of education is what we need. Simplification in sizes in certain cleaning operations may not be possible, but a simplification in selling is within reach. Here is an opportunity for an active coal-trade body or for the big father of all—the National Coal Association. Why let an unhealthful condition be perpetuated.

More Power to Him—And Less

FRANK FARRINGTON is no fool. Neither is he short of nerve. This president of the Illinois miners has proved those two facts before and he proved them again at his state convention the other day. He rose before his thundering thousand—some of them red-necked radicals ready to fight him at the drop of the hat—and stated some plain and unpleasant truths. He told his men that the industry is in a mighty bad way, and why. He told them some things they can and must do about it, and what he said was not all a pæan of praise for the domination of the industry by the United Mine Workers.

"I do not expect any outburst of applause," said he, and he got none. But he sent his men home thinking. Thus he performed a real service to the industry even though his schemes for curing coal's ills were not all sound.

Of course, Mr. Farrington's plan to provide work for workless miners by creating a great power-producing system in the coal fields of Illinois, burning Illinois coal to make electricity for the Midwest, is unsound. Not even Mr. Farrington himself can regard it seriously in his heart. If the miners, producers, consumers and state of Illinois were to build co-operatively enough power plants on the Mississippi and Ohio rivers adjacent to the state's coal fields to provide mining work for the 100,000 Illinois miners, enough power would be generated to supply practically the whole of the United States. How could it be sold within the 200-mile transmission district? Who would finance so vast an enterprise? And how many years would elapse before it could operate?

If the Illinois miners were to cling to their present rate of wages, which is assumed, does Mr. Farrington think Illinois coal could be used exclusively in his proposed power zone? It isn't so used now. Approximately 30 per cent of the total power consumption of the nation is within the range of Mr. Farrington's dream-power system, yet cheap non-union coal is hauled in to generate a great part of that 30 per cent. Does Mr. Farrington imagine his public-owned plants could run so much more economically than the great private plants of the Midwest that the spread between union and non-union fuel costs would be counterbalanced?

Farrington is no fool. He knows the truth of these things. He knows that the labor costs of Illinois coal must be reduced. Being the miners' leader he knows he cannot suggest it. He would be committing political suicide. The demand for reduction must come from the rank and file. So the best that the Illinois leader can do is to make his men realize the impossibility of their present position by giving them the cold facts of non-union competition, as he did, and then propose some such fantastic thing as his co-operative power plan as the only alternative to a wage cut.

The miners will soon perceive the futility of the power plan. Mr. Farrington hopes they will also perceive that he has done everything he can to save them. Then they will be ready to talk wages. More power to Farrington's wage plan and less to his power plan. Central power stations should be erected at mines but in moderation and as opportunity is presented. We must generate power for the present market as determined by a careful survey. Wild hopes that discount the future can help neither operator nor mine worker.

Freezing Process Enables Lessees to Sink Shafts in Deep Marsh Land of North Belgium

Forty-Six Beds Aggregating Over One Hundred Feet of Coal Made Almost Unapproachable by Bogs Thousands of Feet Deep—Shafts Sunk With a Protecting Ice Wall.

BY MAURICE BIQUET

Engineer, A.I.L.g.
Hensden, Limburg, Belgium

UNUSUALLY rich is a coal basin recently discovered in the northern part of Belgium. The entire thickness of the coal formation is probably not less than 2,000 m. (6,560 ft.) and will possibly attain 3,000 m. (9,840 ft.), but authorities are not yet agreed on these figures.

Forty-six beds are actually known. Their total thickness, in coal, is about 36m. (118 ft.), the average proportion of coal to the measures which contain it being from 2 to 4.1 per cent.

The average thickness of the layers is about 0.80 m. (2.62 ft.). The volatile matter in the coal varies from 6 to 42 per cent. Unfortunately, the rich portions are found to be covered by stagnant marshes, the thickness of which varies from 460 m. (1,509 ft.) in the eastern part of Belgium to 690 m. (2,263 ft.) in the actually prospected western portion. This makes it difficult to develop this coal basin, for any shaft that may be sunk must penetrate these great thicknesses of marshland, which consist for the most part of sand and wet marl. It has been possible, however, to overcome these difficulties by means of the freezing process, which consists in isolating a portion of the strata from the mass of surrounding marsh by means of an ice wall of approximately cylindrical form. In the center of this cylinder a shaft protected by the wall of ice is excavated.

SOLIDIFY RUNNING BOGS BY REFRIGERATION

To form this wall a number of bore holes about 1 m. (39½ in.) apart are drilled on the circumference of a circle concentric with, and of larger diameter than, the shaft to be dug. In each of these holes is lowered a vertical pipe sealed at the lower end. In this an extremely cold solution of salt is circulated. Around each pipe a frozen zone is formed that continues to widen until it unites with the frozen zones of the two adjoining pipes.

Preliminary to the initiation of the freezing process a careful study is made of the strata to be penetrated: (1) With regard to their nature because the freezing is transmitted differently in different strata, (2) in respect to the water in the strata encountered, which may be standing or gushing, and either fresh or of

varying degrees of salinity, and (3) with regard to the permeability of the surface layers. From this last consideration it is possible to determine whether a foreshaft should be excavated. A foreshaft presents certain advantages: (1) A reduction in drilling, (2) a diminution of the cold necessary, for that part of the shaft that is driven without freezing, (3) a saving

resulting from the greater facility of work at the surface, the distributing equipment for the brine being placed in this foreshaft. It presents at times some great inconveniences, for the inflow of surface water interferes with the work.

The number of borings depends on several factors, notably on the depth to be frozen. These factors influence the size of the circle along the circumference of which the holes are to be drilled. The number of

holes also depends on the ease with which the earth can be frozen, for if the ground does not freeze readily the distance between the holes must be decreased.

The holes should be made as vertical as possible, so that the frozen area shall be throughout of a predetermined thickness, otherwise there will be places where the shaft protection is inadequate. Different devices have been designed for the purpose of determining any deviation in the borings. The one that, at the present time, has given the best results is a teleclinometer invented by M. Denis, of Paris.

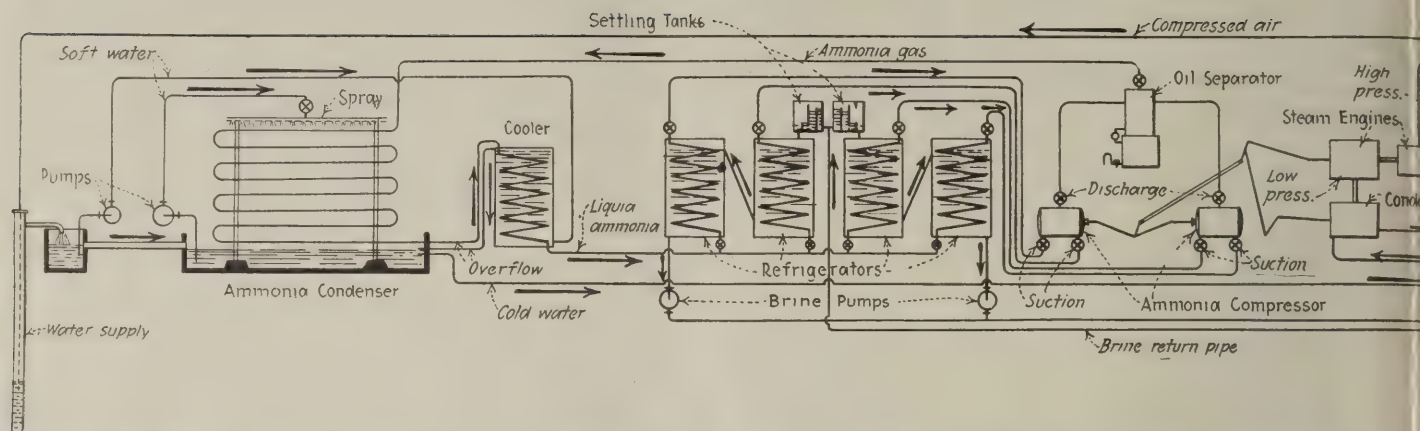
Through the indications given by these instruments it is possible to determine the horizontal section of the drilled area at all points in its depth. One can learn from these sections where, in order to prevent breaks in the protecting wall, it is necessary to make additional borings.

The freezing pipes must be made of a metal capable of resisting the changes in temperature to which they are subjected. Care must be taken to provide the pipe with tight joints.

In calculating the necessary thickness of the ice wall, the nature of the strata must be carefully considered, as it may be sand and moving gravel, or a chalk formation with extensive fissures. In such strata as these the ice plays the rôle of the mortar in concrete. As the ice in this instance receives the full compressive stress the wall should not be submitted to a pressure exceed-

WHEN WATER AND SAND CONSPIRE

MANY of our shafts have to be sunk in river bottoms where water and sand make caissons advisable. However, the depth of the shifting strata may be so great that the air pressure will exceed human endurance. In that event the caisson method cannot be adopted, and solidification of the ground is the only alternative. Cement has been used but in stubborn cases refrigeration is "indicated" as the doctors would express it. Mr. Biquet in this article describes the sinking of two shafts by refrigeration nearly a mile deep.



ing 20 kg. per sq.cm. (280 lb. per sq.in.). On the other hand in compact formations, the ice serves only to calk the fissures and the rock itself must support all the weight. This explains why with rock the thickness of the frozen ground may be reduced considerably.

The freezing is not transmitted uniformly along the freezing tubes. The theory of M. Lebreton proves that, other things being equal, the cross-section of the ice wall formed around the pipe will assume the shape of an erect cone, of a cylinder or of an inverted cone, according as the depth to be frozen is equal to, less, or greater than the theoretical depth, which depends on the following elements: The thickness of the inner pipes, their diameters, the conductivity of the metal, the quantity of salt solution in circulation at any time, and finally, the specific heat of the brine. Inversely, the depth being given, the form of the ice wall will depend on the elements that have just been enumerated.

With the aid of Lebreton's theory, the shape of the ice wall may be calculated. Consequently, knowing the quantity of water contained in the ground (or assuming it approximately) the number of necessary units of freezing for the formation of this ice wall can be deduced; but it is necessary to remember that all the cooling does not result in the formation of ice. At each level the temperature decreases progressively from that of the natural ground to that of the brine returning in the freezing pipe.

Taking into account, also, the losses due to radiation in the brine pipe, between the central refrigeration plant and the shaft to be frozen, the total units of freezing that must be employed can easily be deduced. On ascertaining the length of time required to form the ice wall, we find the degree of refrigeration per hour that is required.

To ascertain whether the area to be excavated is completely enveloped by an ice wall a borehole is drilled in the center of the shaft. In this hole no freezing pipe is inserted. The variations in the level of the water in this borehole determines the progress of the refrigeration. Where water is found at several levels, the adequacy of the wall may be tested by using several concentric pipes, each reaching one of these levels, the interior one reaching to the lowest level of all. Each of these pipes, because of the watertight bottom at the bottom of the hole, manifests the tightness of the wall at the water level to which it extends.

The brine used is a simple solution of calcium chloride (CaCl_2), or of magnesium chloride (MgCl_2), having a density such that the saline solution without itself freezing will afford the degree of cold desired.

The refrigerating machines most commonly used are those that are based on the evaporation of a liquefiable gas, such as ammonia, carbon anhydride, sulphuric anhydride, or a methyl chloride, ammonia and carbon dioxide being those most generally used. The gases

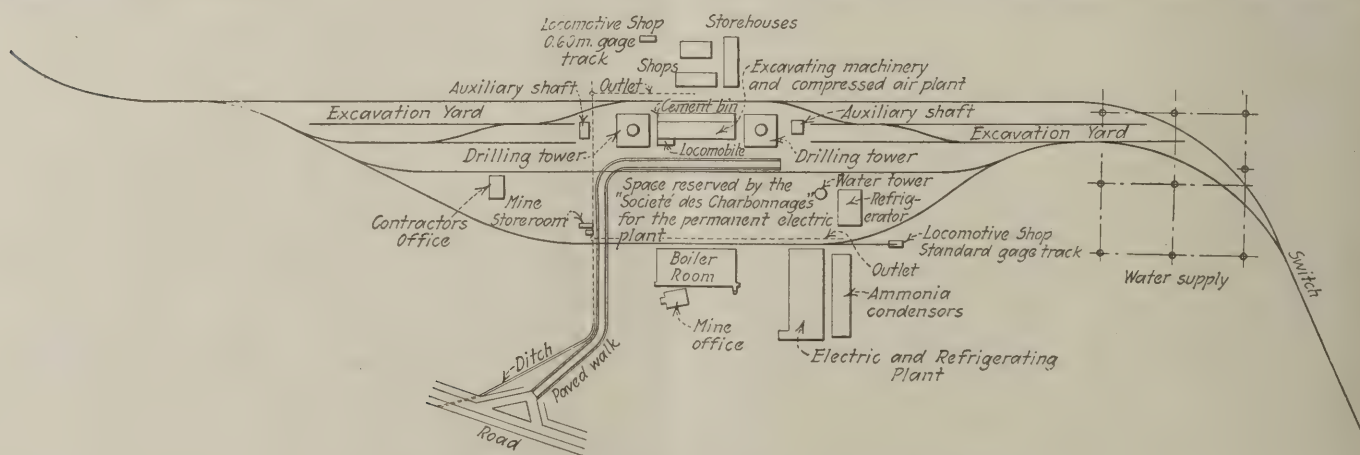


Fig. 2—Plant for the Sinking of Shafts by Refrigeration

The difficulty of putting down two shafts 2,034 ft. through ground artificially frozen, to say nothing of its further extension of 457 ft. through solid ground makes it necessary to build a plant merely for shaft sinking such as we, in America, would regard as quite elaborate if erected for the

final extraction of the coal. Belgian mine concessionaires face expenditures that in America would be appalling, but the richness of the coal deposits in northern Belgium is high enough to justify the cost; besides it must be considered that each concession contains about twenty square

miles and as each shaft is of large diameter it can accommodate a big output. It is evident that these unusual expenditures are required where the freezing must be carried to such extreme depths. Where the depths are less the expense is naturally less also.

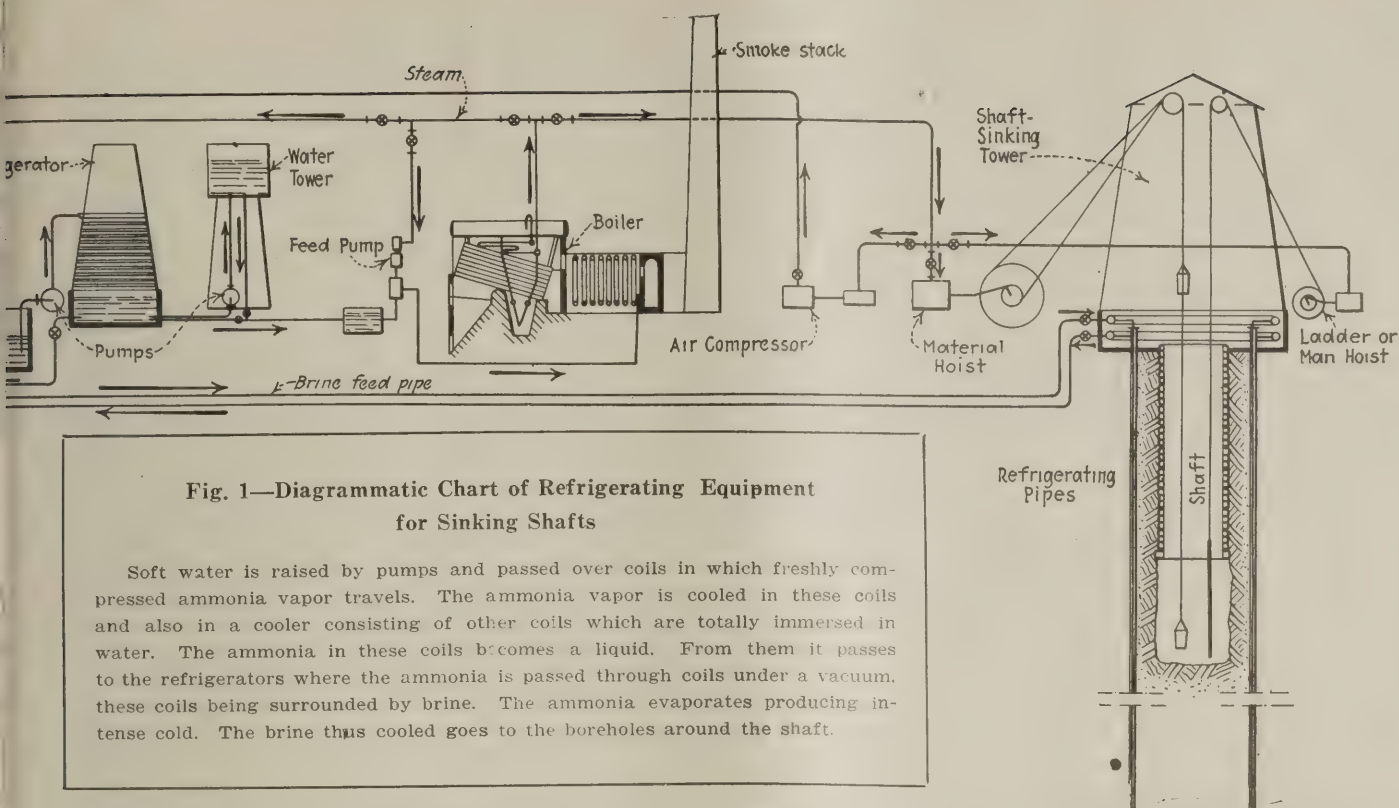


Fig. 1—Diagrammatic Chart of Refrigerating Equipment for Sinking Shafts

Soft water is raised by pumps and passed over coils in which freshly compressed ammonia vapor travels. The ammonia vapor is cooled in these coils and also in a cooler consisting of other coils which are totally immersed in water. The ammonia in these coils becomes a liquid. From them it passes to the refrigerators where the ammonia is passed through coils under a vacuum, these coils being surrounded by brine. The ammonia evaporates producing intense cold. The brine thus cooled goes to the boreholes around the shaft.

are compressed and then liquefied in the coils of a condenser which removes the heat of compression. These coils are kept cool by passing water over them continuously. The liquefied gases then pass through refrigerating coils over which the freezing liquids are circulated. The liquefied gases are vaporized in a vacuum maintained by the gas compressor. As they evaporate they create intense cold, lowering the temperature of the freezing liquids to the required degree. These liquids are used over and over again, so that all the heat they receive is that observed in passing through the boreholes which gradually reach their low temperature and cease to impart heat to them.

The Société de Fonçage de Puits Franco-Belge, of Brussels, is sinking two shafts in the coal-mining district of Helchteren & Zolder, each shaft being 790 m. (2,591 ft.) deep, of which 620 m. (2,034 ft.) is being frozen by a single current of refrigerating liquid. Fig. 1, shows the general arrangement; and Fig. 2 a plan of the installation.

It has been necessary to sink, for each shaft, 50 tubes arranged on the circumference of a circle, the diameter of which is 12.25 m. (40.2 ft.). Each of these tubes reaches down 620 m. (2,034 ft.). This, therefore, represents more than 60,000 m. (37.28 miles) of tubes, which means 60,000 m. (37.28 miles) of outside pipe of 113 to 128 mm. (4.4 to 5 in.) and an equal length of inside pipe of 50 to 60 mm. (2 to 2.4 in.) diameter.

The central freezing plant has seven units, each having two double-acting compressors driven by a compound condensing steam engine of 250 hp. The solution contains calcium chloride (CaCl_2) and has a density of 1.25. Nine electric pumps circulate the brine in the pipes, five of these pumps having a capacity of 150 cu.m. per hr. (660 gal. per min.), and four of 60 cu.m. per hr. (264 gal. per min.) at a pressure of 12 kg. (26.46 lb.), making a total of 990 cu.m. per hr. (4,356 gal. per min.). Each shaft requires a circulation of about

350 cu.m. per hr. (1,540 gal. per min.) so that some of the pumps can be held in reserve. The circulation pipes are combined in an ingenious fashion, in such a way that, by manipulating certain valves, the flow can be directed toward one shaft or the other.

Besides the seven refrigerating units, the central plant has two tandem compound condensing engines of 300 hp., each driving an alternator and a steam turbine, Zoelly system, of 500 kw. In another part of the plant is another engine driving an alternator of 100 kw. This represents a total electrical energy of 1,100 kw. Part of this serves to drive the electric pumps for the brine circulation, part is expended in circulating soft water for the condensers and part drives the warm water of condensation back to the Balke refrigerating plant. All this requires about 650 kw. The remainder is held in reserve. The boiler room contains eight boilers of the Bailly-Mathot type of 300 sq.m. (3,229 sq.ft.) heating surface, each. Five of these are generally in service, one is usually in process of cleaning, and two are held in reserve. The daily coal consumption when operating at full load varies from 66 to 72 short tons. Water is supplied by nine pipes sunk to a depth of 60 m. (328 ft.) from which the water is pumped. These are located 300 m. (984 ft.) from the plant.

The central air compression plant has two electric compressors of 100 hp., and four air compressors driven by steam engines and having capacity of 200 hp. The compressed air is used not only for the purpose of actuating the pumps but also to drive the pneumatic picks and drills for sinking the shaft. Each shaft has a compartment for hoisting excavated material, one for raising men, a service compartment and a compartment in which safety rope ladders are suspended. The hoist which handles the excavated material and shaft lining is a horizontal, duplex, non-condensing type of engine, controlled by a regulator, of American type. The principal dimensions are as follows: Diameter of

the steam cylinder 700 mm. (27½ in.); piston stroke 1,400 mm. (55 in.); diameter of brake flywheel 3,750 mm. (12 ft. 3½ in.); outside diameter of drums 6,800 mm. (22 ft. 3¼ in.).

One shaft was to be finished a year after the other. The freezing of the first shaft required seven months. The sinking and the insertion of lining took 21½ months or 567 working days. The average advance of the finished shaft per working day was thus 1.118 m. (3 ft. 8 in.), which is a veritable record for such a depth. The work goes forward rapidly after the ice wall is formed.

The freezing of the second shaft also took seven months. On April 10, 1924, of this year, after 401 working days, 451 m. (1,479 ft.) had been completed. The average advance of finished shaft per working day to this depth, was therefore 1.124 m. (3 ft. 8¼ in.).

The Société de Fonçage de Puits Franco-Belge, at Brussels, undertook to sink these two shafts to a depth of 790 m. (2,591 ft.) and of a diameter of 6 m. (19.68 ft.) as measured on the inside of the tubbing. The cost per meter, not counting the coal consumed in the boilers nor the price of the cast-iron tubbing, but including all other items, as for example, the boring of the refrigeration holes, the installation of the pipes, the freezing of the ground, the sinking of the shaft and the insertion of the tubbing, etc., is about 20,000 francs (\$1,177 par exchange) per foot. The weight of the tubbing of a shaft of 6 m. (19.68 ft.) in diameter and 620 m. (2,034 ft.) deep is about 20,000 tons. It may be added that these shafts are believed to be the deepest that have been sunk by freezing anywhere in the world.

Mine Management Should Furnish Data When New Tipple Is to Be Designed

BY ALPHONSE F. BROSKY
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Pittsburgh, Pa.

COAL companies should regard the design and construction of tipples and the equipment they are to contain of sufficient importance to warrant them in providing operating data for their proper construction. Observation has shown, however, that a mine owner generally confines his activities to informing the manufacturers of tipples that he desires a certain type of structure and equipment. He almost never suggests their proper proportions. It would seem that by no means enough attention is given by the coal company to the future capacity of a new mine as measured by its tipple. In this statement I am not discrediting the ability of the tipple manufacturer who, as a rule, unquestionably knows his business and has the interest of his client at heart. I maintain, however, that the mine manager or his engineers should keep in closer touch with the builder and take a more active part in the actual design of the tipple and equipment than is usually customary.

The manufacturer and erector should have a knowledge of the coal to be prepared in order to properly design a proposed tipple. In order to determine the percentages of the sizes that the tipple is expected to handle—slack, nut, egg and lump—the coal is, in many cases, tested by hand methods. The conditions under which the coal is thus screened are not even similar to those existing in the tipple where shaker or other screens are employed. The person making such hand tests chooses coal from mine cars taken at random and screens it to obtain the percentages of the different grades. Who shall say that the samples chosen are representative of the mine output? In many cases they are not. If they come from near the outcrop, they, of course, will not be representative, and no matter how accurately the tests may be made the results will not represent the real mine output so far as the percentages of the various sizes are concerned.

In the dumping from the cars also, be they of either the endgate or solid-body type, the coal necessarily is broken and therefore the sizes of the coal in the car are not representative of those which the tipple will have to screen. In chuting coal, as well as in passing it through conveyors, the coal is broken more or less and the effect of this action in the aggregate may be

appreciable. Coal screened in hand testing is not broken up as much as when passed over tipple screens. For these and other reasons great care should be exercised in using or interpreting the results of hand tests.

When a tipple designer is called upon to draw plans suited to any particular operating condition or coal bed he may not possess absolutely accurate data. The mine may be opened in a new field upon which no basic figures are available. Even adjoining mines in a field already developed may furnish misleading data; perhaps the methods by which the coal is loosened at the face may cause an excess of fines. Another fact that the builder lacks is the percentage of refuse to be expected in the mine run. An assumed average is not a sufficient basis upon which to establish specifications for picking tables, which must be so designed as to handle the maximum quantity of refuse from capacity tonnage.

The correct width of screens may be easily ascertained, but it is more difficult to determine their proper length. The former dimension governs the tonnage capacity, while the latter regulates the thoroughness of size separation.

It is preferable to have a screen too long rather than too short. Fortunately, the builder usually arranges to avoid the latter. If the screen is too long, part of it may be veiled. An attempt should be made to obtain a screening area that will prepare the coal to the best advantage. When a new tipple is erected to replace an old one the company should be able to furnish many valuable suggestions to the builder as to the arrangement best suited to prepare the coal to be handled. It knows from its established trade what sizes are in greatest demand, and from the behavior of the old tipple it is able to advocate which unsatisfactory details in the first tipple should be eliminated and to suggest others which would be beneficial. Most important of all, it is familiar with the action of its coal in passing over screens; how long the screens should be and whether the openings should be oblong or round, also whether the screens should be plane or stepped, horizontal or inclined. The company officials should be in excellent position to specify the feeding arrangements best suited to the product handled.

This question should be subjected to detailed discussion. Certainly, the procedure to be followed by coal companies when planning and specifying a new tipple is important enough to warrant an exchange of ideas in an open forum. Only by such discussion is our sum total of knowledge increased.



Early Coal Stripping Full of Heartbreak—II

At Close of Last Century Butler Bros. Constructed Their Super Dragline—Experiments Were Made Later With Excavator and Conveyor—Finally, Revolving Shovel Establishes Stripping Industry on Firm Basis

BY GRANT HOLMES
Danville, Ill.

THE fair success attending the first machines used in light stripping led Butler Bros. to believe that a larger excavator would be a huge success. Financed by the Consolidated Coal Co., they began the erection of a monster dragline which would handle deep stripping, shale, soapstone and the coal. In 1900 the great machine was completed at a cost of \$30,000. Its massiveness required that it be supported on three 10-in. axles, each 22 ft. long. The center axle was geared to the engines, and the end axles were tied to the center one by side rods in locomotive style, giving traction to all six wheels.

One-hundred-and-thirty-five feet of horizontal boom supported by 60 ft. of vertical gantry frame made it necessary to weight the rear end of the machine with 25 tons of iron. Later on, after a fire, 20 ft. was amputated from the horizontal boom. Then it was difficult to keep the "giant" from tipping backward. Three drag buckets were used, each designed for handling one of the three materials encountered—dirt, rock and coal. The capacity of each was about 2 cu.yd.

Equipped with the new and supposedly capable machine, Butler Bros. started to clean off the remainder of the Missionfield coal. The first trouble encountered

was the immense weight of the stripper causing both rails and ties to be buried deeply in the ground, especially, those near the edge of the bank. This situation caused constant fear that the machine would slide down into the pit, and also was a cause of constant expense.

As soon as soapstone was reached, it was seen that the rock bucket was a rank failure, and a knife or sort of plow to cut into the hard material was attached to this "drag," but without success, as there was no way to hold it into the cutting. Drilling and blasting the work at a heavy expense were necessary if coal was to be obtained.

Coal loading with the machine was successful—twenty-five railroad "gondolas" could easily be filled in a day. But after two years of hard fighting to keep up their part of the contract with the coal company, Butler Bros. gave up the unprofitable business for a second time. This ended their efforts in Missionfield, and, discouraged, they left for other fields of endeavor.

Confidence in Butlers' machine to do the work was by no means shaken. Sixteen of their employees leased the dragline and accompanying equipment. This new concern, called The Salt Fork Coal Co., was a co-operative venture. For two years it operated with fair success, getting such coal as was not covered with hard material, but in 1904 the enterprise failed, a case of too many bosses spoiling the job.

While the co-operative Salt Fork Coal Co. was working, another firm was engaged in dragline stripping in a neighboring river valley. In 1903 a Mr. Donovan and

NOTE—First article appeared in the issue of May 29, pp. 797-800. Headpiece shows Butler Bros.' dragline drowned out. One of the frequent troubles in stripping is that it has to be done on flat land where the dangers of inundation are always imminent. Perched upon a weak bank with the water lapping it below and weakening the foundations such a heavy machine might conceivably pitch over the brink. At best, flooding impedes operations and muddies the coal.



Butler Bros. Last Dragline

In an effort to overcome the troubles caused by rock and thickness of overburden, this machine was built at a cost of \$30,000. It was supported on three 10-in. axles each 22 ft. long. The boom at first was 135 ft. in length. Its length made 25 tons of counter-weight necessary on the back of the machine frame to prevent upsetting.

some associates purchased a Schenable dragline and some stripping property in the Middlefork bottom near Missionfield. This dragline although much smaller than Butlers', had the advantage of being able to revolve in a complete circle. For nine months, these men attempted to strip coal, but river water constantly filled their cuts, and the wastebanks slid down so badly that no coal was taken out. Edward Gray then organized the Gray Coal Co., which bought the machine and property, but after five months of useless operation, gave it up in despair.

The "co-operatives" now made Mr. Gray manager and president of their company. Operations were carried on less than a year under the new management. Heavily in debt, the "co-operatives" again took hold of the work themselves, and for another two years they fought soapstone, repair bills and river water without success. Thus the financial rocks were struck for the third and last time. After nine years' work, only seven or eight acres of coal had been stripped at a cost approximating \$100,000.

The year 1907 saw the start of another strip mine the history of which somewhat resembles that of Missionfield up to this point. This was near Lily, Ky., in the Robinson Creek bottom, where a bed of coal 28 in. thick, lies under 6 ft. to 12 ft. of overburden. The seam is known as the Jellico. The first two companies to work at this pit had two steam shovels, one for stripping, the other for mining—built by the now defunct Vulcan Steam Shovel Co., of Toledo, Ohio.

A 2½-yd. dipper, 28-ft. boom and the mounting or railroad-car trucks, were the points of note on the stripper. The mining machine designated as the Vulcan "Little Giant" had a 1½-yd. dipper, a 22-ft. boom, and was mounted on traction wheels. Another interesting feature of this work was the use of an immense centrifugal pump to wash off the coal after it had been stripped. A few months' time convinced the operators that there was no money to be made with these shovels, so they discontinued the work.

A Monighan dragline was placed in this field in 1912, by the Ideal Block Coal Co. No better success attended

this machine than the others, so the company was forced out of business after two-and-one-half years' work.

In both Missionfield and Robinson Creek Bottom, steam shovels were first used, then draglines. A job in which both were operated in association, will be described. The Danville Brick Co. of Danville, Ill., owned a field adjacent to its brickyards, containing about four acres of coal under 25 ft. of cover. To strip off this much overburden, a small Vulcan steam shovel worked on top of the bed, dumping the spoil at one side. Moving parallel with the shovel, a small revolving dragline mounted on top of the nearest wastebank, picked up this spoil and deposited it in front of the machine. The dragline laid its own track, and did what the shovel could not do; it built wastebanks.

The coal from this mine was used in the company's plant, therefore, the question of whether reasonable profit could be realized on the strip pit did not enter so long as the cost of stripping and mining was below the market price for delivered coal. The Fall and Winter of 1912 and 1913 were occupied in uncovering this piece of coal.

To the southeast of Missionfield, about six miles, the same bed of coal lies within an average of 35 ft. of the surface. This shallow area contains about 70 acres, and the overburden consists of sand, gravel, loam and a heavy bed of shale. Here was a task for an extraordinary stripping machine, owing to the depth and composition of the covering. The dragline could have made short work of the soft materials, but shale was too much for it as was proven by the experiences of the Butlers at Missionfield.

The Consumers Coal Co. of Danville, purchased this field in 1904, and persuaded George W. Prutsman, an excavation contractor, to take the contract for stripping. The machine to do the work was built by the Bellefontaine Foundry & Machine Co. of Bellefontaine, Ohio, according to some of Mr. Prutsman's ideas, but the design and inventions were the work of George E. Turner. They had seen the failures of the dragline. Consequently they pinned their faith in the steam shovel, and instead of trying to use a long-boom shovel

as Wright & Wallace had done, Mr. Turner incorporated a belt conveyor with a shovel having a short-boom.

The advantage of this arrangement was that the shovel thus equipped with a short boom could dig rapidly, depositing the waste into a hopper that emptied on the conveyor, which operated at right angles to the digging, and carried the spoil to the dump. Four two-cylinder engines were required to operate this shovel, one for hoisting the 2-yd. dipper, a second for "crowding" it, a third for swinging the 35-ft. boom, the fourth running the conveyor which was 105 ft. long.

As with the old dredges in Missionfield, wood construction was used throughout. Four four-wheeled trucks supported the machine, giving a four-point suspension without attempt at keeping a level frame. The means of propulsion was by block and tackle. Like other steam shovels of its day, this could only dig forward, which meant that the circular plan of operation had to be adopted.

Work began in 1904—the stripping to be carried on

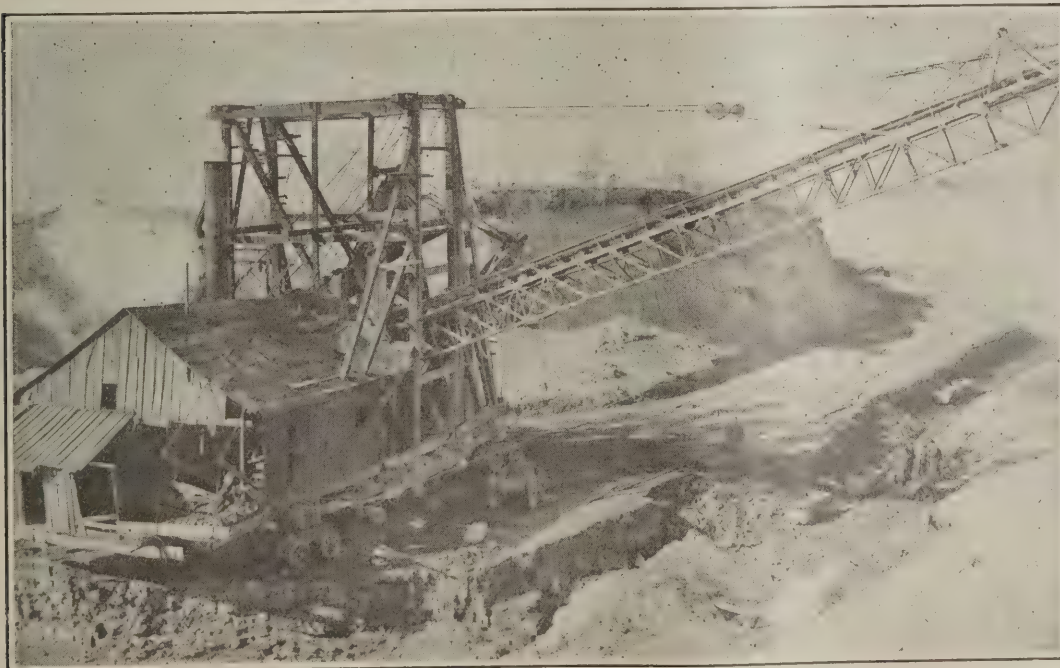
in the summer, the coal loading in the winter. After several attempts at getting the field in shape for circular operation, the plan had to be abandoned because of the irregularity of the coal area and the excessive depth of overburden that had to be removed in places.

The usable stripping consequently had to be opened in parallel cuts. This necessitated leaving the coal in the cut until the excavator could be moved back to the far end, ready to start on the next cut. "Moving back" usually occupied about two weeks' time. These parallel cuts were not straight, but contained many "inside" turns, that is, turns in which the dumping arc is smaller than the digging arc.

Where such turns occurred the immovability and length of the conveyor boom made its dumping end practically the center, the machine traveling around it for the length of the turn. Therefore, on such a turn the wastebank became so high as to clog the conveyor. Lengthening their stacker to 147 ft. did not aid conditions much, and only hastened the wearing out of the

Steam Shovel And Conveyor

George W. Prutsman and George E. Truner, in an effort to overcome the the obstacles that had defeated all previous stripping machines, combined, on a single base frame, a short-boom shovel for fast digging, and a belt conveyor 105 ft. long to dispose of the spoil. Various changes were made in it, but it wore out parts at an alarming rate and finally the idea was abandoned as a "theoretical success but a practical failure."



Close-up of Machine

Possibly a modification of this machine with the conveyor placed on a separate truck and supported by a tall tower may be able to give the shovel a range it does not now have, both as to depth and width of excavation, thus enabling it to proceed without risk of shutting itself in. In that case the shovel need have only capacity and not excessive reach, the material to be moved being tumbled down to it by explosives.



Combination Shovel and Conveyor Was Rebuilt

The Consumers Coal Co., instead of letting out its stripping, then a common practice but since that time less usual, decided to do its own work. Thereupon it rebuilt the Prutsman shovel.

whole machine. Heavy repair bills, especially, the frequent purchase of new conveyor belts, was a third disadvantage. In two years, Mr. Prutsman had made no gain from his contract, so he stopped work.

Backed by men calling themselves "The Coal Production Co.," Mr. Prutsman tackled the contract a second time, but in a few months the operations stopped again for want of funds.

The Consumers Coal Co. now decided to do its own stripping. The first move was to rebuild the shovel completely, the notable change being the substitution of steel construction for wood. The chances for fairly successful work were thus greatly enhanced. However, in spite of this reconstruction and its careful management, the company quit business in 1913 without having made any profit. The machine was abandoned as a theoretical success, but a practical failure.

Other men than Mr. Prutsman and Mr. Turner have spent their time and money designing and experimenting with such stripping machines. Morton E. Pugh, who spent a fortune and a lifetime with conveying belt strippers, took out his first patents on a machine that moved and dug sideways, the conveyor dumping behind. Later patents show that he separated the excavator and the conveyor into two independent machines, a steam shovel being substituted for his own excavator, and a crusher being added to the conveyor for sizing the waste before dropping it on the belt. The two machines operated on parallel tracks. Mr. Pugh also had planned to use a revolving steam shovel so that the conveyor could be on the same track just behind the shovel, and thus save the work of double tracking. Several attempts at operation were made in Iowa, but without success.

Meanwhile, stripping in Missionfield had not been idle, for there were people who still believed that the Butlers' big dragline would do the work in spite of all the failures made. In 1909, the Missionfield Coal Co. was organized with W. G. Hartshorn as president. It leased the stripping machine and other equipment from the Consolidated Coal Co., on a royalty basis. After two months of operation, the new company bought the property and machine. Easy stripping and the absence of floods and labor trouble enabled these men to make a good profit with the dragline for about sixteen months,

then repair bills began to overbalance the gains; the boilers gave out completely, and rather than replace them and risk future failure with the whole machine, the company abandoned the dragline.

These men, like Turner and Prutsman, saw that the principle of dragline stripping was wrong, because the machine would not operate on the soft bank. They also saw the faults in Prutsman's combined shovel and conveyor. The ultimate stripper, in their minds, had to combine the dumping range and digging power of the conveyor steam shovel with the ability to dig and dump in any direction. The propelling gear used by Butler Bros. was another desirable feature.

A long-boomed, self-propelled, steam shovel which could revolve in as complete a circle as Donovan's dragline, should solve the problem. All of the stripping machines up to this time were unable to stand the hard work and required constant repairs until they wore out, which did not take long. Therefore, the required stripper must necessarily be a giant in strength as well as size.

Several steam-shovel manufacturers were making small steam shovels and locomotive cranes which possessed the revolving feature, but none of the builders was willing to undertake the construction of a large revolving shovel, as they firmly believed it to be impossible.

In 1910 the Vulcan Co. constructed two revolving shovels for stripping purposes, having 1½-yd. dippers and about 50-ft. booms. Patrick Durkee and Joseph Stephenson each purchased one of these machines, putting them at work near Pittsburg, Kan. These revolving strippers were badly proportioned in the swinging parts, which caused constant breakdowns. Various men besides the original owners, have tried operating these machines, and are still attempting it today, but without making any money.

Next, the Browning Co. of Cleveland, Ohio, built a locomotive crane modified into a revolving steam shovel with 2-yd. dipper and 50-ft. boom. This stripper started work in Missionfield in the Fall of 1910, and in about six months, the factory received the "remains." The too-lightly constructed machine had torn itself to pieces, but here was a start in the right direction.



Another View of Preceding Machine as Rebuilt

The clumsy wooden construction which marked the first machine and which had been characteristic of all the earlier stripping machines, was replaced by a lighter, stronger steel construction but even this could not stand the gaff. For one thing the machine could not revolve and, for another, the four-point suspension made no provision for keeping the frame level.

The First "250"

The first revolving steam shovel in strip mining. This illustration from a photograph, taken in 1911 when the shovel was proving itself, shows the best practice of that year. The coal was drilled by hand. Where it was hard the coal was drilled as in the foreground, where it was soft rotary hand drills were used as in the centerground. "Pop" shots loosened the coal, which was loaded into mine cars by hand.



Two years of persuasion finally moved the Marion Steam Shovel Co. of Marion, Ohio, to begin the construction of a revolving shovel according to the dimensions and ideas of Grant Holmes and W. G. Hartshorn of Danville. One of their ideas was the hydraulic compensating trucks by which this immense shovel could keep a level frame on irregular tracks. This corrected one of the greatest faults of all previous machines—the twisting and breaking of the frame. The 3½-yd. dipper, 40-ft. handle, 65-ft. boom and 150 ton weight made this machine the largest in the world at that time.

In the spring of 1911, the big shovel, known as Model 250 began work in Missionfield. Old "Missionfielders" having seen the failure of so many machines, knowingly timed the downfall of this latest stripper. But this time they erred. The shovel saw years of service under conditions that had ruined its predecessors.

This first successful stripping machine had not been at work long before the news spread world-wide. Men

from Kansas, Indiana, in fact from wherever there was coal to strip, came to investigate.

The Bucyrus Steam Shovel Co., of South Milwaukee, Wis., was also aroused to action, and, following a visit of its engineers to Missionfield, built its first big, revolving shovel in 1912. Later it developed a complete line of successful stripping and mining machines. To keep the base level on these shovels, one of the axles was pivoted to the middle of the frame, giving three-point suspension when moving over irregular tracks. When the machine was at work, jacks near the ends of the axle kept the base righted.

Thus the heavy, revolving steam shovel made its entry into coal stripping and won the place it has held ever since. The development of light coal-loading shovels and various other types of equipment in recent years has brought stripping up to the point it now has attained. But the end is not yet. Stripping of coal is an art that still is advancing.

British Rules for Locating Magazines

Explosive stores in Great Britain are of four kinds, or, as the British law somewhat unfortunately terms them, "divisions." In magazines classed in division A, 300 lb. of gunpowder may be stored or half that quantity of other explosives, or, if both gunpowder and other explosives are kept, ½ lb. of other explosive is regarded as the equivalent of a pound of powder. With the same rule as to the equivalence of powder to the other explosives, Divisions B, C and D include storages containing 1,000, 2,000 and 4,000 lb. of gunpowder respectively.

The store must be licensed by the local authority in the name of the occupier, either for powder or mixed explosives. This license must be renewed annually. The magazine must not be situated below ground in any mine or quarry or in any tunnel or other underground place in which any work is being performed or any persons employed or in any place communicating with such mine quarry, tunnel or underground place.

The stores must be kept certain distances from houses and other buildings which for purposes of legislation are divided into two classes. Class 1 and 2 both include dwelling houses, shops, rooms or workshops of any kind, mineral or private railways whether or not worked by steam, furnaces or kilns, fires for boilers, machine or manufacturing purposes, magazines for explosives,

stores for explosives and what are known as registered premises. But though the buildings specified are the same in both classes, Class 1 refers solely to such buildings as are in the occupation of the licensee or to those buildings the occupier of which has waived his rights in writing whereas Class 2 refers to the same class of buildings where not occupied either by the licensee or by a person who has surrendered his rights to the more generous protection.

In Class 1 other objects are grouped. The magazine must be kept at a distance from these objects, equal to that prescribed for those already enumerated. They are: highways, public footpaths or promenades, open places of resort of persons carrying on any trade or business, canal or navigable work, dock, river-wall or sea-wall, pier or reservoir. Class 2 includes in addition to those enumerated factories, public roadways, churches or chapels, universities or schools, hospitals or public institutions, town halls or courts of justice, theaters or covered markets, buildings where people are accustomed to assemble and government buildings.

Distance Magazines Must Be Kept From Buildings

Magazine	Distance from Class 1	Distance from Class 2
	Buildings in Feet	Buildings in Feet
A	75	150
B	150	300
C	225	450
D	300	600

What to Avoid When Storing Soft Coal

Don't Pile Coal of Different Sizes, Ages or Localities Together — Keep Away Water and Wood — Once Well Warmed Coal Is Almost Sure to Break Into a Blaze

By A. J. HOSKIN

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Scene of University of Illinois Coal Storage Pile

THE University of Illinois purchases its fuel supply under specifications and usually maintains in storage a large reserve for emergencies. Following the long coal-miners' strike (1922), it became necessary to replenish this stock which was then completely exhausted. At that time, advantage was taken of the situation by the late Prof. H. H. Stoek, head of the mining department, who undertook a systematic investigation of the phenomena of the heating and firing of stored coal, a subject in which he had long been interested. Prof. Stoek assigned the problem to Otis G. Stewart, a graduate research scholar, who worked under his supervision up to the time of the professor's sudden death, March 1, 1923, after which it fell to me to direct Mr. Stewart's work.

The results of this investigation, which have never been published, are embodied in a report prepared by Mr. Stewart in fulfilling the requirements for scholastic credits. The report consists largely of tabulated data which are of no special interest, except in respect to the deductions they warrant.

However, a discussion of the phenomena observed, together with a few of the conclusions reached in the course of this research may prove interesting to any who find it necessary to store coal. Though no actual discoveries were made relative to the spontaneous firing of stored coal, some theories were confirmed and opportunities were afforded for the observation of firing phenomena.

SEVERAL STORAGE CONDITIONS OBSERVED

All the coal investigated had been mined in various Illinois districts. As it was to be burned in automatically stoked furnaces, each shipment as received, if not already of a grade that would pass a 2-in. screen, was crushed to this fineness. During the building of one pile, however, the crusher broke down and run-of-mine coal of all sizes up to 6-in. lump was stocked as received.

The coal was hauled in auto trucks from the powerhouse to the storage lot, a distance of two or three blocks. Each truck arriving at the lot backed up and dumped its load as close as possible against the pile, and laborers with shovels threw the coal up the bank, which was maintained at a height of about 9 or 10 ft. Some of the coal was piled by a portable bucket elevator, but the results were about the same as in hand shoveling.

Several carloads of coal would thus be stored at one time and work would then cease awaiting the receipt

of more coal. The relays between shipments allowed the sloping bank of the storage pile to weather somewhat between storage periods, and this weathering accounts for some of the subsequent phenomena. The intervals varied at times, reaching a maximum of a month. Construction of the mine coal piles studied continued until the middle of November.

The manner of piling the coal was favorable to its gravity classification, the coarser pieces accumulating close to the ground. No attempt was made to spread the coal in a series of relatively thin strata. The ground which had been used previously for the same sort of storage, was of a clayey nature and muddy at rainy times.

No effort was made to prepare the ground for the storage. The coal was handled by contractors whose only object was to form the piles. Deep waterfilled ruts were often covered by the coal, and remnants of former piles, together with leaves and twigs from neighboring trees, were scattered about promiscuously. On two sides of the large area were common board fences against which the coal was stocked. The headpiece gives an idea of the average condition of the storage floor, and shows how the coal tended to classify according to size when being piled.

IRON PIPES USED FOR OBSERVATION

It was first planned to use potentiometer pyrometers or some sort of thermocouples that would automatically record variations in temperature. The expense involved, however, proved prohibitive, and instead, 10-ft. lengths of ordinary $\frac{3}{4}$ -in. iron pipe were prepared for use as thermometer wells. The lower end of each pipe was drawn to a point, and the top fitted with a screw-cap for use in driving. These pipes were sunk into the coal piles at nearly equal intervals of about 20 ft.; but, owing to the irregular outlines of most of the piles, this distance was often varied.

Each forenoon Mr. Stewart went over these piles, taking observations with a number of accurate 10-in. thermometers whose range was from -10 to $+212$ deg. F. Each thermometer, being attached to a cord wound on a spool, was lowered in turn into a pipe to a depth of 5 ft. and left suspended. After making a complete round of the pipes in one pile and returning to the first pipe the observer would read the temperature and then lower the thermometer to the bottom of the pipe. Returning from his second round Mr. Stewart obtained the bottom readings and removed each thermometer before proceeding to another pile. Some-

times he would hang two thermometers simultaneously in a single well at the specified depths of 5 ft. and 10 ft. respectively. Occasionally, when unusual heating conditions were indicated, he has taken readings at one-foot intervals; but there appeared such uniform gradations between the readings at the 5-ft. intervals that he eventually dispensed with other readings.

When the work was well under way, the Federal Engineering Development Co. kindly donated twenty of its sentinel-type indicators, one three-dial and two single-dial sounding instruments. These instruments



Fig. 1—Pile of Coal Showing Size Segregation

As the coal is piled the fine material stays near the top of the pile, and the coarser material rolls down on the pile toward or to the bottom. If another pile is built on this the fine coal on the top of this pile is in contact with the coarse coal on the bottom of the other and the variation in size and in the age of the coal may cause a fire even if the coals in the two piles come from the same bed in the same mine.

carry the general name of "protectometers." They were promptly put into service and served to check the results obtained by the thermometers. They proved wholly dependable as sentinels over coal piles during long storage; but they were found less convenient for the research work than the simple pipe-and-thermometer units previously employed. The protectometers were more cumbersome than the light pipes. Throughout the entire investigation ample time was afforded each thermometer to register accurately. In Table I is shown the thermometer readings in two holes compared with those of contiguous protectometers.

WHERE OLD AND NEW COALS MIX, FIRE OCCURS

One pile was started with old, dried screenings from bins in the power house, and against this was stocked fresh screenings. After the completion of the pile the difference between the two halves was distinctly noticeable, the new coal being blacker and more brilliant, the appearance of the older coal being dull and dirty. Twelve days after storing, heating began to affect the thermometers along the plane of contact between these different coals. The following day the pile smoked vigorously, showing that such a contact between fresh and weathered lots of coal presents a condition favorable to spontaneous combustion.

The heating and subsequent fire spread rapidly till it reached the fence against which the pile was built. The fence quickly took fire and ignited the adjacent coal along its course, the large cracks between boards affording excellent drafts of air. Workmen tore down

Table I—Thermometer and Protectometer Readings, Contiguous Holes

Depth Feet	Degrees Fahrenheit			
	Pipe 608		Pipe 609	
	Thermometer	Protectometer Dial	Thermometer	Protectometer Dial
2	158	158	144	145
3	168	166	157	155
4	177	175	174	170
5	179	180	167	164
6	181	181	168	165
7	178	178	170	166
8	181	179	178	178
9	193	183	163	168

the fence and removed all coal showing any evidence of fire.

However, heating soon began further along the contact plane and increased so rapidly that the entire pile would have been ruined had it not been expeditiously moved to the power plant and immediately utilized. Temperatures rose from 78 deg. F. to 356 deg. F. during these observations. The portable elevator used in removing the fired coal is shown at work in Fig. 2 where it is loading a truck for transportation to the power-plant.

DISSIMILAR COALS FIRE AT CONTACT SURFACE

It was intended that a certain pile should consist exclusively of screenings from a single mine; but, after about 200 tons of this coal was stocked, receipts ceased for a time, and the pile was finished with coal from a mine in a different field. It chanced that the placing of the last few truckloads of the first kind of coal left a little level bench about 4 ft. above the ground. When the new coal was thrown upon the pile, there was a segregation of the coarser fragments on this bench the surface of which was naturally composed of the finest fragments of the first coal. This established a plane of contact between not only unlike coals but also unlike sizes. The second lot of coal contained much more pyrite than the first. This condition had not been previously noted but it was easily disclosed subsequently. Heating increased at the rate of from 4 to 5 deg. daily, and a lively combustion ensued.

When the fiery masses were subsequently excavated, coke was found mixed with half-burned coal, red ashes and a yellow, viscous substance that proved to be sulphur probably reduced from the pyrite. Iron oxide from the same pyrite was present as a fine, red dust. The conflicting reactions that occurred in this pile provide imagery for the chemist.

Before the fiery masses were removed their heat had radiated until both kinds of coal reached a temperature of 180 deg. F. This was not considered a critical or ignition temperature and yet, when the pile was opened, the spots at this temperature quickly caught fire. Here is a phenomenon deserving scientific study.

One pile was formed exclusively of coal from a single mine. However, the first few hundred tons of this coal consisted of screenings, the rest being the run-of-mine coal previously mentioned as being stocked because of a broken crusher. The plane of contact of the two sizes proved to be occupied by the coarser lumps, many of them 6 in. in diameter.

The temperature of the coal, as placed, averaged 80 deg. F., but rose rapidly, and various wells near the contact showed temperatures ranging from 125 to 150 deg. F. These temperatures were not, at that time,



Fig. 2—Portable Elevator Loading Fired Coal

When the coal fired it was loaded out and carried away to the boiler plant. Fire first started where well-weathered screenings, already dull with age, from the bins in the power house, were stocked with fresh screenings. Such coals if possible should never be stocked together.

regarded seriously, but excavation being made into the heated zone for inspection, energetic combustion started instantly.

A strip about 20 ft. wide extending through the pile along this plane of contact, was then removed and it was thought the rest of the pile was safe. Nevertheless, one of the sections of the pile burst into flames a few days later. Investigation showed that the spontaneous heating had occurred at a limited contact plane between a stratum of fine coal and the overlying stratum of coarser coal.

WATER IN RUTS APPARENTLY STARTS A FIRE

A certain pile was formed on ground badly cut up with ruts made by the heavy coal trucks in wet weather. These ruts and other depressions in the floor were filled with rainwater. This pile heated early but the temperature failed to exceed 142 deg. F. A white cloud of vapor was often visible over the pile. When a cool thermometer was inserted in a well it promptly became clouded with moisture.

The pile was assumed to be safe against fire, and yet when the coal was subsequently hauled away there were numerous pockets showing the products of complete combustion. The water appears to have induced a quick heating of the bottom coal; but the vapor that permeated the mass must also have deterred the combustion to a considerable degree.

WOOD FENCE APPEARS TO HAVE FIRED PILE

Fire was discovered in one pile where it came into contact with a board fence. The thermometer nearest to this fire read only 106 deg. F. It is believed that spontaneous heating occurred because of the coal actually touching the wood. The crevices between the fence-boards permitted just the requisite supply of oxygen without sufficiently removing the heat by circulation. By tearing down the fence and flooding the coal with water from a fire hose, the bulk of this pile was saved. Similar phenomena were observed in another pile to which corrective measures were successfully applied.

A few piles remained comparatively low in temperature throughout. In one pile the temperature rose only along a limited horizontal stratum that was unintentionally produced about 4 ft. from the ground during the stocking of the coal.

Heating always occurred in the lower half of a pile, except in the instance of the fence fire mentioned. The reduced and molten sulphur frequently found in burned pockets often matted lumps of coal together. Removal of fiery coal alone did not prove adequate to prevent further combustion. The relief was but temporary. Heat from the fire usually permeated the pile, and it may be that combustible gas also from the fire was entrapped in the coal pile ready to aid in re-establishing combustion.

The heat of any fiery spot was strongly noticeable for about 5 ft. in every direction. Heat from an interior fire travels further along strata than in a direction transverse to them.

If coal is stored in the open, the piles should be relatively shallow because firing occurs in the lower zones, and because with high piling large quantities of coal must be handled to get at a fire. Contacts of coal with wooden structures or other inflammable substances should be avoided.

Keep different kinds and different sizes of coal separate. Keep old and fresh lots of coal apart. Sort out or otherwise remove as much pyrite as possible.

Use of Rock Dust More Dependable and Less Costly Than Sprinkling

EMPLOYMENT of rock dust in coal mines to prevent coal-dust explosions should not add to the cost of coal, according to George S. Rice, Chief Mining Engineer of the Bureau of Mines. In England, where some of the mines have been using rock dust for this purpose for more than ten years, and where its use in dry mines has been required by law since 1920, the direct cost is not over 1c. per ton and in many cases not more than half that, Mr. Rice points out. However, in the United States the costs probably will be higher on account of the higher wages in this country.

This is not really an added cost as far as the general public is concerned, even though the whole cost of mining is finally paid by the consumer of the coal. Two coal-mine explosions which have cost about a million dollars each in workmen's compensation, property damage and other costs have occurred in the United States since the first of the year. Averaging the cost of these two explosions over the approximately 500,000,000 tons of bituminous coal that will be produced this year represents an added cost of approximately 0.5c. per ton that in the last analysis must be paid by the consuming public. In other words, a sum of money equivalent to the damage done by the two mine explosions (which the use of rock dust undoubtedly would have prevented) probably would have sufficed to pay for the rock dusting of all the bituminous coal mines of the United States.

Many bituminous coal-mining companies in this country, in order to keep down the coal dust, are sprinkling their mines with water at a cost several times that of rock dusting. Sprinkling is not as dependable as rock dusting, for the water continually evaporates, and if sprinkling is neglected for a short time an explosion may result. How great is the difficulty of effectually wetting coal dust is evidenced by the fact that coal dust may float on the top of water in sufficient quantity to cause an explosion even in a mine that is so wet as to make work in it uncomfortable.

How to Keep Mining Equipment in Satisfactory Operating Condition at All Times

Electrical Apparatus Should be Supplied With Rated Voltage—Repair Worn Parts by Welding and Machining—Pumps and Fans Must Not Be Required to Deliver More Than Their Normal Capacity

BY J. F. MACWILLIAMS

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ALL electrical apparatus is designed either to generate a particular voltage or to operate when supplied with a certain quite definite electric pressure. It is, therefore, important that generating equipment deliver its rated voltage and all other apparatus receive at its terminals the pressure for which it is designed.

Burnouts, breakdowns and other failures of electrical equipment are generally the result of the low voltage it received. Excessive pressure will cause the insulation to fail; the liability of such a breakdown depending upon how great the over-voltage may be. However, too high an operating voltage is rare because of the nature of power supply systems. Consequently, electrical men and others responsible for the successful operation and maintenance of electrical apparatus need to guard mostly against low voltage.

Nearly all motors are designed with ventilation ducts. Should these passageways become only partly obstructed with oil, dust or dirt the circulation of air is reduced and the temperature of the motor is abnormally increased at all loads. If the dirt is composed of current-carrying material there is great danger of short-circuits and grounds. For these reasons electrical equipment should be cleaned at frequent intervals.

KEEPING ROTATING PARTS IN POSITION

The air gap between the revolving and stationary elements of all machines should be inspected frequently. Normal wear of bearings gradually decreases the clearance at the lower part of an armature or rotor. When the air gap is not uniform the unbalanced magnetic attraction causes the shaft and bearings to wear much more rapidly than when the revolving element is in a central position.

Commutators should be kept smooth and clean as dirt and roughness will cause them to deteriorate rapidly.

Motor and generator fields should be kept in good condition. A weak motor field increases the normal operating speed and usually strains the armature windings. Unbalanced fields cause cross currents to flow in the armature and result in excessive heat.

When a motor or generator is designed certain characteristics determine the grade and type of brush to be used. After the motor is completed the manufacturer makes a thorough test of the motor and much time and money is spent to ascertain whether the brush previously selected is satisfactory. For these reasons it is always advisable not to change the grade of brush supplied by the manufacturer without first making a careful investigation.

Particular attention should be given to the proper

lubrication of electrical apparatus. Too little oil on motor bearings will cause excessive heat and wear, whereas too large a quantity will overflow and be sucked into the windings where it quickly rots the insulation.

Storage batteries should always be properly charged. The cells should be frequently examined to determine the level of the electrolyte in the jars. A proper charging current is essential to long life and efficient service. Each week the battery should be given an equalizing charge so as to be brought back into step with the ampere-hour meter.

Locomotives should never be run with broken frames or bumpers, as the bearings, gears, axles, etc., thereby are subjected to excessive wear and the motorman is exposed to great danger. Worn bearings, housings, and axles should be built up by welding and then machined so as to fit properly. If there is much lost motion in these parts, the power of the motors is partly absorbed in pushing the gear and pinion apart and clashing the teeth, instead of being used in useful work.

OPERATE EQUIPMENT PROPERLY

Motor suspension springs should be maintained in good condition; they absorb the initial shock that the motor gets when the power is applied. If these springs do not take the shock the shafts and gears are almost sure to be broken.

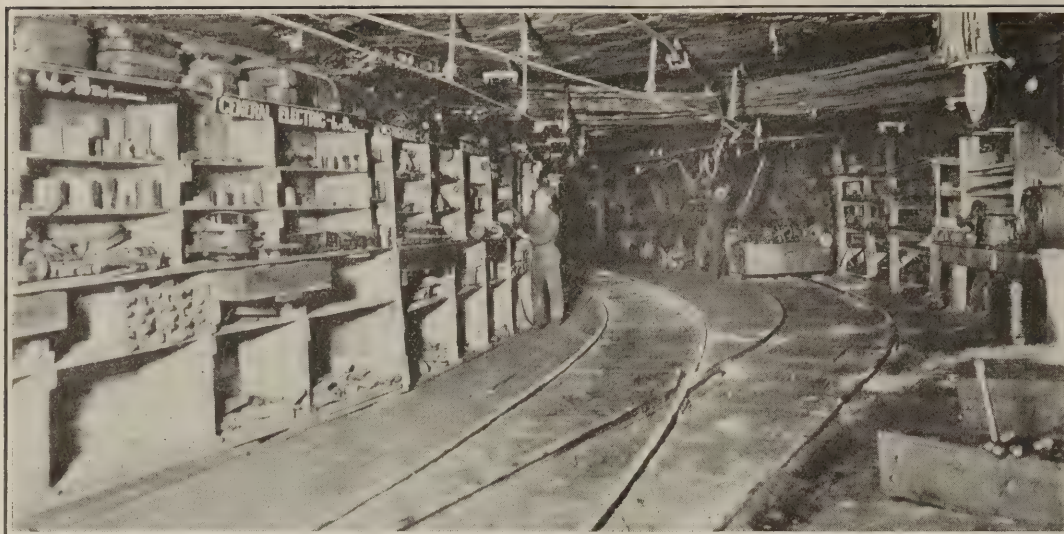
Starting locomotive motors in parallel is an all too prevalent practice around coal mines. When the motors are started in this manner the locomotive must accelerate twice as fast as it should. Smooth operation and greater starting torque can only be obtained by starting the motors in series and later changing them over into parallel.

No locomotive should be allowed to run on any mine track when the wheels have developed a false flange more than $\frac{1}{4}$ in. high. The delays and high maintenance costs of locomotives and track are excessive when the wheels have high false flanges. Turned-down locomotive wheels should be paired so that their diameters will not differ more than $\frac{1}{8}$ in.

Soldered cable and wire joints are always to be preferred, soldered feeder ears and connectors are better than mechanical connectors. The size of current-carrying conductors should never be less than that specified by the National Board of Underwriters. It must be remembered that these recommendations are based upon safe heating capacity and consequently larger conductors must frequently be used where the lines are long. Otherwise the loss of voltage in the small conductor may be quite large.

Electric generators are designed to deliver a certain current at a definite pressure. This is also true of fans and pumps. We would not expect to drive a

NOTE—Paper delivered before Mining Institute at Barnesboro, Pa., May 24.



Storeroom and Repair Shop

In the mine machine shop large savings can be effected by prompt repair service. Partly worn equipment can be easily welded and placed in the stock bins instead of being lost in the mines or put in the scrap pile.

generator built for 250 volts at a speed necessary to develop 500 volts, so why should we expect a fan or pump to operate satisfactorily at greater capacity than that for which it was designed? An electric generator if short-circuited may burn up; likewise, a pump or fan is subjected to strains if the head is reduced or the flow is short-circuited.

Usually plunger pumps are purchased because they can be operated at high efficiency, therefore special care should be taken so as not to defeat the purpose of the management. It is possible by not removing old packing or by pulling up new packing too tightly to

decrease the efficiency of a plunger pump 30 per cent. Loose packing and a little leakage of water at the glands is much better than tight packing.

Some types of centrifugal pumps are designed so that the bearings are water-cooled. Pump operators, especially those who have been accustomed to maintaining plunger pumps, should be careful not to pack the glands so tightly as to score the rotor shaft or shut off the cooling water. Water-seal rings in centrifugal pumps should never be removed or placed in a position on the shaft where the sealing water cannot properly enter them.

Peabody Picture Film Shows Mine Explosion

“WHEN a Man’s a Miner: a Story of Safety in the Coal Mines” is the title of the latest addition to the series of industrial motion picture films prepared by the Bureau of Mines in memory of Francis S. Peabody, and at expense of his son, Stuyvesant Peabody.

In this film, which is four reels long, the principle of “Safety First” is woven into the story of “Lucky” Burns, a carefree young coal miner who is inclined to laugh at danger and to take big chances in order to increase his daily output of coal. “Lucky,” however, learns the lesson of “Safety First,” as shown in a realistic scene where his neglect to pull down a block of loose coal results in his leg being crushed. His life is saved by a “buddy” whose knowledge of first aid enables him to apply promptly the proper emergency measures. “Lucky,” after his accident, concludes to take the first aid and mine rescue training offered by the United States Bureau of Mines, a knowledge which is of immense practical aid later in the story.

Following the arrival of the Bureau of Mines rescue car in Tiptonville, the typical midwestern coal mining town in which the story is laid, the gathering of several hundred coal miners at the mine mouth for their day’s labor is shown. The miners obtain their “life checks,” descend the shaft, and proceed in long trains of mine cars through the shadowy underground depths to their daily work. As “Lucky” and his “buddy” are engaged in loading coal the sound of a mine explosion is heard. They rush toward an entry, only to sense that deadly mine gases lie in that direction. “Lucky,” utilizing his new knowledge, retreats to a safer part of the mine,

gathers about him a number of his comrades, and instructs them in the method of building a barricade to protect themselves against the deadly afterdamp.

Meantime, in a series of vivid pictures, the power-plant whistle gives the disaster signal; the frenzied women and children of the town rush to the mine entrance; and the rescue men trained by the Bureau of Mines, wearing oxygen breathing apparatus, hasten to the aid of the imperiled miners.

Behind his hastily improvised barricade, hundreds of feet below the surface, “Lucky” Burns instructs his “buddies” how to conserve their limited supply of oxygen. He puts out crudely written signs to guide the rescuing party, and details men to rap on the rib as a signal to the rescuers.

Vivid glimpses of the rescue crew making their way through the dark mine passages are given, and finally the rescue of the entire party, made possible by the conversion of “Lucky” Burns to “Safety First” principles is depicted. “Lucky” has his reward in winning the hand of pretty Mary Kincaid, the girl of his choice. He is awarded the Joseph A. Holmes safety medal for heroism in time of mine disaster and is appointed mine safety inspector for the Tiptonville district.

The film will be available, after June 15, for exhibition purposes by educational, civic, commercial and similar institutions and may be obtained from the Bureau of Mines, Pittsburgh, Pa.

IT’S FUNNY ABOUT COAL FIRES. The Astoria Light, Heat & Power Co., of New York, is proud because its fire has burned one hundred years. The Alden Coal Co. is proud because its fire has finally been put out.

Mechanical Loading Problems and Their Relation To Room-and-Pillar and Longwall Workings

Ayrshire Coal Co's Experiences with Cars of 3200-Lb. Capacity—
Forty-Eight Cars Loaded per Day—Wagons Placed with Less Than
One-Minute Waits—Control of Roof the Problem with Longwall

Mechanical Coal Loading in Room-and-Pillar Mine

David Ingle, president of the Ayrshire Coal Co., in the closing session, May 15, of the meeting "On Correlation of Mechanical Loading with Haulage and Mining Systems" of the American Mining Congress, gave a description of the conditions under which his machine loaders operated and detailed the results obtained. Last week on p. 811 is contained his description of the mine. In detailing the method of shooting down and loading the coal Mr. Ingle said:

All the coal is undercut before being shot. Three holes usually are drilled and in general black powder is used although experiments have been made with other kinds of explosive. Mules are used to gather the coal and to furnish cars to the loading machine. An endeavor is made to have a switch in each working place, set as near the face of the coal as possible so that the minimum time will be lost in shifting cars. The purpose is not to allow any working face to get more than 200 yards from the gathering place.

NO MORE HAND LOADING

The mine has been operating since December, 1922, and since that time not a single car has been loaded out by hand. Seven Joy (4 B. U. type) machine loaders have been used. A record has been kept of these machines. Several months ago a man with watch, pencil and note book began keeping a record of just exactly what each machine did in an eight-hour day. Twenty-five different records were made.

The results obtained in the last eight days are set forth in Table I.

Some coal hangs up refusing to fall and the loader had to be stopped while

the operative broke the coal down so that the loading machine could get at it. The coal could be shot hard enough to overcome this loss of time, but if this were done the coal would be broken up unduly.

The delay in cleaning up the corners with a hand shovel was due to the fact that the Joy machine has a wide and straight loading end and as the corners of the room are square all the coal could not be loaded by the machine. The machine is kept at right angles to the face so that only a little coal is left in the corners. This is something peculiar to this machine loader which is the smaller of the types manufactured.

Breakages do not now cause as much waste of time as they did in the first

Each loading machine is given six places, though it is really unnecessary to provide so many. As there are seven machine loaders there are 42 places, whereas with hand shoveling there would probably be 75 places, for, under the agreements, with hand shoveling three places have to be allotted for every two men. With 50 men loading by hand 75 places would be needed instead of 42. This shows how greatly the work can be concentrated. In the hand-loading mines of the Ayrshire Coal Co., the production averaged 5½ tons per day per man for a period of three months. To some that may not appear to be a large production, said Mr. Ingle, but that is what the figures showed including every man on the payroll. With the machines the output



Loading Mine Cars

The loading boom has to be placed above the top of the car so that in low places it is necessary to use a low car. This illustration proves that large material can be loaded by machine—
Courtesy, Myers Whaley Co.

months of operation. Still too much time is lost, and the new machines are expected to do better. The loading tracks are of 16-lb. steel and are laid on steel ties. They are easy to shift. Mr. Ingle said he thought the short time consumed in shifting track was quite creditable. For the time lost for lack of power there could be no excuse, for it could be avoided entirely by keeping the power lines in good condition.

UPKEEP COST 7-8c. PER TON

With these machines 48 cars each containing 3,200 lb. a total of 75 tons were loaded daily per machine. The cost of upkeep for four months has averaged between 7 and 8c. per ton. That cost includes the upkeep on the cutting machines which is, of course, only a small part of the charge. The cost for explosives is 3c. per ton. As the work is done by the day all the explosives are furnished by the company which also does all the drilling and shooting. The cost for gathering with mules does not seem to be any more than for gathering with machines in hand-loading mines, because the territory to be served is smaller.

is 7 tons per day per man or a gain of 1½ tons. It is costing 85 per cent as much to produce coal by machines as by hand loading.

Questioned by Howard N. Eavenson, the chairman, Mr. Ingle said that 43 min. were lost in shifting 48 cars from the nearest switch point to the machine. That is more than one car per minute. Mr. Ingle said that no objections were raised by the union to the introduction of the machines. The district leaders set the scale for their operation at \$12 per day, the rate paid for operating a different type of machine at a mine ten miles away.

OPERATOR AND HELPER SPLIT PAY

Since that time the sum that was paid the operator and his helper has been divided equally between them. As the helper was getting \$8 per day the new rate is \$10 for each of them. That is good pay, but said Mr. Ingle, skilled men were needed on the job. Men who operate cutting machines are making \$15 and \$20 a day on tonnage rates. If the machine loader would not be profitable at those rates it could not hope to succeed.

Table 1—Detail of Operation of Mechanical Loader for One Day

Operation	Min.
Loading coal.....	181
Shifting loader to get in favorable position to load.....	28
Moving loader (sometimes four or five moves per day).....	33
Switching cars.....	43
Delay in bringing cars to switch.....	27
Waiting while coal is broken down.....	35
Cleaning up corner with hand shovel.....	34
Oiling and tightening up machine and replacing broken material.....	56
Shifting tracks.....	14
Cars off track.....	15
Loss of power.....	2
Cleaning away fallen slate.....	6
Miscellaneous delays.....	481

NOTE—Part of discussion on "Correlation of Mechanical Loading with Haulage and Mining Systems" at the Cincinnati Conference and Exposition of the American Mining Congress.

Making Cars Large and Low For Machine Loading

Mr. Eavenson in discussing Mr. Ingle's address on the operation of the Ayrshire Coal Company's mine said it was remarkable that cars could be delivered to the machine with a loss of only one minute or less. The loss of time had appeared so important to persons installing machines that they were using cars of unusual capacity in order to reduce that loss to its lowest limits.

D. J. Carroll was using a 5-ton car with loading machines at the Chicago, Wilmington and Franklin mines and one operator was introducing 7-ton cars. Mr. Hockensmith said that the problem had been to devise a car that would have the same capacity as the old cars and yet leave room for loading with a mechanical loader. That made necessary a departure from the wooden mine car. By using a composite car, part steel and part wood, the capacity was increased 10 per cent.

OUTSIDE FLARE ELIMINATED

In the last few years the Hockensmith Wheel & Mine Car Co. has devised a semi-box type in which the flare at the sides is eliminated and the wheel is partly housed. This reduces the over-all height from 3 to 6 in. and adds 25 to 50 per cent to the inside capacity. A car has been constructed in the last few years that will hold 3,200 lb. without exceeding the outside dimensions of one of an early type that carries only 1,600 lb.

A car built for the Pittsburgh seam had an increase in capacity over former designs of 25 per cent. The machine operators now need cars that will hold 5 to 7 tons. These can be provided if the seam is thick enough, the roof is good and wide roadways are possible and are provided. The cars in the Pittsburgh region are relatively short. In West Virginia they are 10 to 12 ft. long, and they work satisfactorily but they cannot be constructed of wood. A wooden car would not withstand such loading.

A car 42 in. high, 6 to 7 ft. wide and 12 ft. long has been constructed to carry 7 tons. In order to start long trips with the larger types of cars special draft gear must be provided. The semi-box type of car can be used with other cars without material change of equipment. With a change from the semi-box to the true box type of car an increase of capacity of 10 to 15 per cent can be attained.

STEEL CAR LIGHTER THAN WOOD

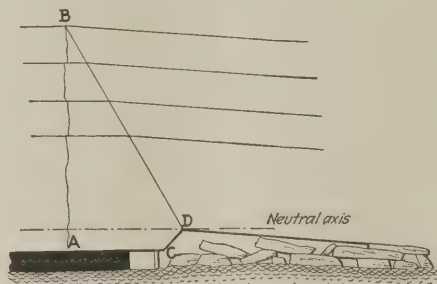
A car only 24 to 30 in. above the rail can be built to carry 3 to 5 tons, but such cars can be used only with rotary dumps. The cost of a car divided by its carrying capacity will be about the same whether it is constructed of steel or of wood, for wood has greatly increased in price and will increase still more. A steel car can be built that will be lighter than a wood car of the same capacity. Some steel cars built over twelve years ago out of bessemer steel are only now being repaired. If they had been constructed of open-hearth steel they would have had a longer life by 25 per cent. The upkeep on steel

cars is not expensive so far as repairs are concerned. If they get in a wreck they can be put in a frame and be jacked back into shape. The same wreck would make it necessary to rebuild a wooden car.

It might be interesting to add that investigation has shown that the 18-in. wheel used in the Pittsburgh region is too large. It should be replaced by a 12-in. wheel. Tests the Hockensmith company has made show that the smaller wheel has the advantage because of its lighter weight. The Department of Mines will have a definite pronouncement to make on this in sixty days.

How Does Roof Break Ahead Of Face in Longwall

In the time devoted to the subject of the use of loading machines in longwall working, R. Dawson Hall, engineering editor of *Coal Age*, discussed the nature of the roof break beyond the longwall face prefacing his remarks, however, with the advantages inherent in longwall provided conveyors are not used and the roof tends to break in a manner favorable to operation. He remarked that he had always been an advocate of longwall mining in connection with loading machines.



Where Does It Break

At A B or C D B? If it breaks along the former line it will be impossible to hold the roof when the point A is reached unless the mined area has been closely back filled.

It has the advantage that the face can be cut and loaded continuously, the coal being fed by the machine loader into a trip of cars steadily moved in front of the face which is being loaded. Consequently less time is lost in placing each car in front of the loading machine. However, the progress of the conveyor has shaken that faith. Nevertheless conveyors are expensive and many will desire to use cars instead and consequently will continue to favor the longwall face.

Attempts might be made where something of the nature of a longwall face is being worked to deliver the coal to a trip of cars which pass at right angles to the longwall face on a roadway leading to one of the main roadways of the mine. But as the rear end of the trip when the front car is presented to the conveyor is well back in the goaf, cribs are needed along the roadway and these support the roof for a while but the working thus inadequately supported is always in danger of a sudden and dangerous squeeze or fall which may close the working face and injure the machinery.

Great Britain has a number of longwall faces but we must be cautious in accepting the results obtained in that country as a guide, because in Great Britain it is customary to fill the excavated area, the coal being, in most cases, sufficiently thin to make that practice actually economical for some place must be found for the stowage of waste.

In the early days when subsidence was first being discussed, said Mr. Hall, he was already an advocate of the conclusion that the roof broke back over the solid coal and the roof thus broken could not come down till the coal was removed. The principle which led to that conclusion was derived from the action of a stick held over an edge and pressed down. The stick broke over the support instead of at the ends. George S. Rice has been an advocate of breakage at the extreme edge of the pillar declaring that the roof did not fracture over the coal, at least in room-and-pillar workings.

BREAKAGE DUE TO "DRAW"

That fractures occur over the coal has been abundantly proved in Great Britain. This breakage has been described appropriately as due to "draw"—that is, to a tension in the measures above the coal. But in the United Kingdom the practice has been to deny that this fracture is vertical or even nearly vertical. It is argued correctly that the main roof is partly in tension and partly in compression, an area lying between the two which is neither in tension nor compression but at zero stress. This is known as the neutral area, it corresponds to the neutral axis in beams.

This area lies about one-ninth of the distance between the surface of the ground or upper surface of the rock and the top of the coal or drawslate. The compressed rocks compose the lower ninth and the stretched rocks compose the upper eight-ninths. So far the argument is indisputable. The British assert that the break near the coal slopes out into the gob until it reaches the neutral area and that from that point it slopes back away from the gob and over the coal, its extremity reaching the point of draw. Actually, of course, this break starts from the surface and works down to the neutral axis. Thus the break is not straight nor vertical but an angle break, one break extending from over the coal into the gob and the other extending from over the gob back to or toward the coal.

There is no question but that the observation that the rock above the coal breaks toward the gob is abundantly proved in practice, but the assumption that it connects with the break that comes down from the point of draw is not susceptible of proof. Moreover the lower break, that toward the gob, may be in the drawslate only and not in the roof proper. It is difficult to determine how far above the coal the drawslate extends and how much of the roof may be regarded as a monolith. The lower break may not extend any further than to the true roof. So far every assumption as to the slope of the fracture from the point of draw is a mere surmise. No one has been able to follow it.



News Of the Industry



Summer Storage by Railroads Would Level Coal Production

Coal Exports Tell International Railway Fuel Association That 20,000,000 Tons Each Summer Would Turn the Trick—Many Methods Discussed to "Save that Pound" During 1924

If the railroads would store 20,000,000 tons of coal during every summer, as they did in 1923, it would go far toward solving the coal problem of the nation. The country would follow their lead and they would benefit largely. This doctrine was driven home to 500 railroaders in Chicago last week at the seventeenth annual convention of the International Railway Fuel Association. F. G. Tryon, of the U. S. Geological Survey, laid the groundwork in an illustrated talk pointing out the painful fluctuation of coal production and the steadying effect the 1923 railroad-storage program had on it. Then along came Eugene McAuliffe, president of the Union Pacific Coal Co.; F. R. Wadleigh, of the Tuttle Coal Co., and C. F. Richardson, head of the West Kentucky Coal Co., hammering the idea deeper. Even the association's own committee on storage, surveying the attention the subject had been getting all year in the country, said that "it is the duty of each consumer to consider his responsibility in the matter of storage and see what he can do for himself."

"Save that pound of coal!" was the slogan of the association—an organization made up mainly of executives, operating men and fuel supervisors keen to help the lines of the world to get more out of what they burn. The slogan wasn't officially adopted, but R. H. Aishton, president of the American Railway Association, voiced it during the first session so punchfully that it just naturally was sounded all down the line of speakers from both railroads and the coal industry.

"Save Pound" in Various Ways

"That pound" was saved—verbally—by a variety of suggested methods, both direct and indirect. The burial of the old ax of enmity between railroad purchasing agents and coal men would help save it, Mr. Wadleigh intimated. It was saved by better fuel inspection and by better inspection work by the railroads at mines, proposed by Malcolm Macfarlane, chief fuel supervisor for the New York Central Lines. It was saved fifty times over by many railroaders proposing economies great and small. It can be done because "that pound" per 1,000 gross ton miles was saved nearly three-fold last year, according to Mr. Aishton, reducing the

average consumption for that haulage unit 2.8 lb., or down to 160.1 lb. To do that again would save the railroads \$3,165,000, he declared.

The four-day meeting was a wide-awake convention of the type this as-



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F. G. Tryon

Parliamentary question by Geological Survey attaché, on summer coal storage by railroads, arouses deep interest at International Railway Fuel Association convention.

sociation has been holding every year since 1908, when Eugene McAuliffe and 35 other railroad men who understood coal started the organization. The first few years were not noteworthy for the approval they won from the executives of the world's railroads. But the staggering fuel waste by railroads was a subject that gave the engineers, firemen, roundhouse foremen, road foremen of engines and fuel men composing the association their chance to propose and demonstrate real savings to their companies. The resultant change in the attitude of the executives toward the association was exemplified by the presence and participation at this year's convention of a good many such executives.

The doctrine of great coal storage by railroads was preached strongly. Mr. Tryon brought it up "merely as a parliamentary question" but nevertheless

forcefully in his address, which will appear later in *Coal Age*. He incidentally raised one of the few voices to be heard in this country in praise of the U. S. Coal Commission, when he paid tribute to the value of the great mass of data on coal and coal mining which the commission collected. He defended the commission in a few words for not producing a panacea for all the ills of coal. The commission showed good judgment by not trying to produce any such thing, he said.

His "parliamentary question" was: "Why should not the railroads of this country store 20,000,000 tons of coal every summer?" He showed with charts how the coal production of the nation fluctuates wildly and disastrously to everybody concerned, including the railroads, and pointed out how the coal production curve had been flattened during 1923 by the admirable program of storage in which the country indulged. Railroads stored 19,800,000 tons early in 1922 against the strike and 19,000,000 tons during the summer of 1923, as compared with a storage of but 13,000,000 tons to meet the emergency of war. Thus he demonstrated that 20,000,000-ton storage programs are entirely possible by American railroads. The exact cost should be studied to determine just what losses there are from fire and chemical change and what counterbalancing gains there are by getting railroad coal out of the way of revenue coal each fall and winter.

Cites Example of 1923

Coal production now is so heavy that the railways never again can handle it in bursts, as formerly, without tremendous additions to equipment. This probably never will be necessary, he said, if the whole country, led by the railroads, will store every year as it did in 1923. He urged the roads to let their reserves work down to about 5,000,000 tons each spring and build them up to 19,000,000 or 20,000,000 tons by autumn, carefully timing the movement of this deadhead coal so as not to interfere with revenue coal. This timing means more money to the railroads than many may realize. He estimated that if railroad coal moved an average of 150 miles from mine to consuming point the average cost to the road of handling that coal would be about \$1.30. Multiply this by the 150,000,000 tons of railroad coal consumed annually and the roads can easily realize that getting their own coal is enough of an item of operating cost as it stands without letting railroad coal cut down freight revenue by getting in the way of revenue coal.

When Mr. Tryon finished showing his

charts H. T. Bentley, general superintendent of motive power for the Northwestern, rose to declare it was "the best thing I ever heard," and moved that the paper be printed and distributed.

"Twenty million tons moved in and out at the right times will balance the bituminous production of this country," Mr. McAuliffe told the convention. Maintaining this balance, he said, would benefit the railroads not only financially and in steadiness of rail traffic but in public esteem too. To prove this he declared that 50 per cent of the public criticism of the railroads has been raised at the times that the lines failed to deliver coal to the people when they wanted it. The reason the railroads couldn't deliver it was because so little coal had moved in the summers that it congested in the autumns.

The discussion that day veered for a while to coal miners' wages. Mr. McAuliffe said the agony of fluctuation in the demand for coal had given miners such irregular working time that some of the best racial groups of miners in this country, notably the English, practically quit the industry. The men of all colors and degrees that remained in such great numbers had to have a wage high enough to earn them a living. For this reason some of the most ignorant among them are paid a higher rate than the average American locomotive engineer. McAuliffe himself once was an engineer.

Then came C. F. Richardson, another "hog head" of other days and now head of the West Kentucky Coal Co., telling the audience that miners' wages certainly ought to be lowered but that he believes they ought to get enough work to provide them 4½ or 5 days a week. This, he thinks, should be a part of a big program of regularizing the coal industry. Railroads should help in that process by buying regularly and at such times as would best fill in the low points of the market.

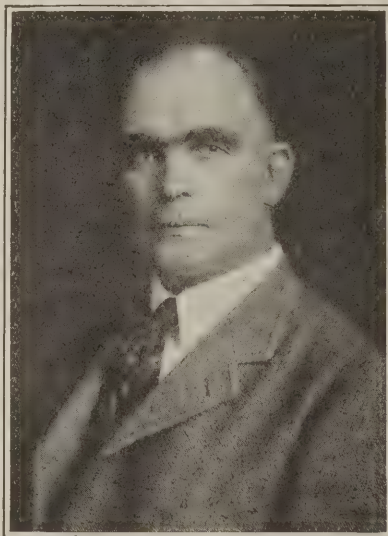
Mining Not Wilfully Wasteful

Still another coal man who used to pull an engine throttle, M. B. Morrow, operating head of the Camnor Coal Co., operating in Alberta, defended the coal operator against the charge of willful waste of coal in the process of mining. He admitted that much coal of low grade must be gobbled because of the presence of impurities in it and showed the reasons for the abandonment of pillar coal, but held that the percentage of extraction in this country still is more than 50 per cent. Recovery of the balance is too expensive to be economical.

"The antagonism that undoubtedly exists" between coal men and the railroads ought to be wiped out, according to Mr. Wadleigh, who was Federal Fuel Distributor and therefore had close contact with both industries before he left the government service last autumn. This is partly due, he thinks, to constant effort on the part of so many purchasers of railroad fuel to beat down the price and to the lack of mutual understanding between railroads and mining companies of their industrial problems. The railroad often loses in the end because of this condition.

He urged that railroads give more

attention to the importance of their coal traffic and that some sort of uniform contract for coal purchases be worked out and agreed upon by both industries. He spoke of the proposed "coal institute" which may be of such great technical and economic help to the coal industry and recommended that the International Railway Fuel Association co-operate with it when it is formed. He also urged closer study of the economic side of coal storage by the railroads so as to bring out all the phases of the storage problem.



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F. R. Wadleigh

Former Federal Fuel Distributor, who favors coal institute and indorses proposed summer storage by railroads.

An appeal for better handling at the mines of railroad coal was made by Mr. Macfarlane. If the railroad fuel of this country contains but 10 lb. of non-combustible matter per ton, then there are 15,000 fifty-ton carloads, or 200 trainloads, of such matter hauled and handled every year adding to the cost of fuel and cluttering up channels that ought to be free for good coal.

The miner at the face is the man who should get most of this burden off the railroad, Mr. Macfarlane thinks.

He urged that in loading mine-run railroad coal at the mine the sizes be more thoroughly mixed so that when it gets into use, one engine will not receive a tank full of machine slack while the next one gets all lump.

Railroads should set up larger and more efficient forces of fuel inspectors who would study coal and know its conditions and handling all the way from mine face to coal chutes. Many improvements in the quality and preparation of railroad fuel have been made, he said, because an inspector actually studied mine and tippie conditions and made suggestions to the mine operator.

The greatest railroaders' interest of the convention was awakened by D. F. Stevens, general superintendent of the Baltimore & Ohio, who read a paper showing how division superintendents can make great fuel savings by bearing coal in mind as they handle the movement of their divisions.

The association's committee on storage reported that much study had been given the subject all last year by many

agencies and that the general result was good, but that the public must get the storage habit before storage will give the coal industry much relief. The committee gave much space to the report of W. L. Abbott's committee of the Federated American Engineering Societies, in which "a sustained policy of storage by railroads in quantities similar to the practice of the past year is indicated as of advantage to the roads and to the public." The problem of spontaneous combustion, however, needs much further study.

In a symposium on coal and oil fuel R. E. Rightmire, engineer of tests for the Consolidation Coal Co., spoke briefly of the improvement in the preparation which railroad coal has received, due partly to increased coal inspection by the roads, partly to the fact that of late coal had to be well prepared or it wouldn't sell, and partly to the fact that there are some operators who take pride in their output. Apparently the present standard of quality will be maintained so long as there are no serious disturbances affecting coal production, he said.

George W. Reed, vice-president of the Peabody Coal Co., welcoming the association to Chicago on behalf of the coal fraternity of the city, remarked that 20 per cent of the coal produced in the United States is sold through Chicago, 95 per cent of this by rail, and that therefore there is a close interest between the Chicago coal man and the railroad. Of all the Chicago-handled coal, he said, 86 per cent moves direct from producer to consumer. This is an important low-price factor probably not equalled in any other industry.

He paid tribute to the increasing attention railroads are giving to fuel economy. Last year with 50 per cent more traffic than in 1914, the railroads consumed only 3 per cent more coal. He said the country's coal operators are trying to help in this improvement of efficiency by preparing coal better every year. Today it is an actual fact that operators are shipping coal cleaner than nature made it.

In the election of officers at the final session P. E. Bast, J. W. Dodge and J. R. Evans were candidates for the presidency, nominated by a committee. Mr. Bast won by a large vote and Mr. Dodge moved that it be made unanimous. Thus Mr. Bast succeeded M. A. Daly, of the Northern Pacific. The other officers chosen were: Vice-presidents, J. R. Evans, C. & O.; J. W. Dodge, Illinois Central; E. E. Chapman, Santa Fe. New members of the executive committee are: A. W. Perley, Oregon-Washington Railroad & Navigation Co.; T. C. Hudson, Canadian National; O. J. Brown, B. & M.; W. J. Tapp, D. & R. G. W.

Berger Wants Government to Own Natural Resources

Victor Berger, Socialist, of Wisconsin, has introduced in the House of Representatives a joint resolution proposing that the government take over and operate the natural resources of the country, including coal, minerals, oil, water power, waters and forests. The resolution was referred to the House Judiciary Committee.

Varying Estimates of Coal Stocks Reveal Need of Accurate Consumption Data

Texas Retailers' Convention Urges Summer Buying

Figures Necessary for Intelligent Production and Buying—Would Prove Valuable Business Barometer—Small Outlay by Congress Required—Incomplete Statistics Responsible for Heavy Losses

By PAUL WOOTON
Washington Correspondent of *Coal Age*

Some exception has been taken to reference, in this correspondence last week, to 65,000,000 tons as the amount of coal in storage on April 1. That figure was arrived at only after due study had been given such information as throws light on the extent of storage. The fact, however, that the figure was questioned prompted an inquiry of various coal specialists as to their estimates of storage on April 1. These estimates varied from 40,000,000 tons to 75,000,000 tons. The inquiry also developed that the men who are specializing in coal recognize that one of the important elements in the present situation is the amount of storage.

While the reference to the 65,000,000-ton figure was made only incidentally in an effort to reflect opinion to the effect that consumers would be well advised to buy coal now, when it is selling below cost, and save their stock-piles against the time when transportation may be scarce and coal prices higher, this incident has emphasized the deplorable lack of figures showing current consumption of coal. Not only are such figures necessary for the intelligent production and purchase of coal but they would furnish one of the most valuable business barometers just at this time when there is such difference of opinion as to the extent industry is slackening its pace.

It would cost only \$20,000 a year for the U. S. Geological Survey and the Bureau of the Census, possessing as they do going statistical divisions handling coal exclusively, to compile a stock report quarterly.

As it is, the only way of estimating consumption is to take the figures of the railroads, the public utilities and the few large industrial establishments which prepare such statistics. There are figures showing the amount of coke burned and certain other facts which can make the estimate more accurate, but at best it is only an intelligent guess.

When it is considered that great losses could be avoided by having these figures, it is difficult to understand why there should be this loophole in our coal statistics. Since the public is the chief beneficiary, it frequently has been suggested that Congress appropriate the small amount needed. With that parsimony which characterizes the attitude of the appropriations committees toward the mining industry, this item fails to get into the supply bills.

There are some who contend that there is little use to provide consumers of coal with this information, as most of them would pay no attention to such figures. This contention is that with a few outstanding exceptions, coal is used with less intelligence than nearly any other operation entering into the

business of conducting industry. The average consumer burns storage when he finds that coal is selling for less than it was when he bought his reserve. By the time he has consumed his stock on hand and he prepares to go into the market again, he finds that coal has risen in price. Then, being low on coal, he rushes into the market along with thousands of others who have done the same thing, with the result that prices are forced to abnormal levels and the railroads are called on to handle an unnecessary peak in the coal movement.

The foregoing, however, is a minority view. The majority believe that the storage idea is well entrenched. There are current statistics to show how well the railroads, the public utilities and the large manufacturing plants have learned the lesson. Enough is known of the practice of smaller concerns to justify the belief that they too have change their policy. All consumers, however, would be able to regulate the amount of their storage more intelligently were there a positive knowledge as to the general level of stocks.

A warning comes from an important official source that in calculating the extent to which reserves of coal can be depleted consideration must be given to the possibilities of weather conditions that would interfere with transportation efficiency. For several years the winters have been open ones. The railroads have been able to operate during the period of grain movement and other heavy demands for transportation without having to combat much unfavorable weather. There always is the chance that the next winter will set in early. Not only would that interfere with the efficiency of transportation but the early advent of cold weather would accentuate the autumn peak, with resulting price increases and the possibility that many plants might be unable to obtain the supplies necessary to continue operation. That official expresses the opinion that the provident consumer buys in a buyers' market and does not put himself in the position where he must buy in a sellers' market.

Ruhr Coal Strike Settled

Indications point to the resumption of work this week by the Ruhr miners who have been on strike, refusing to accept a lengthened working day. According to an announcement May 31 the miners' union decided that work should be resumed on the terms of the award made by Dr. Syrup, special arbitrator of the Department of Labor. The award, announced May 27, grants a 5 per cent increase in wages.

The Retail Coal Dealers' Association of Texas met in nineteenth annual convention in Vernon, Texas, May 20 and 21, with a large attendance.

In compliance with a written request by Herbert Hoover, Secretary of Commerce, a campaign was ordered and will be inaugurated immediately under the direction of Secretary Goldman to induce coal consumers to purchase their winter supply of fuel during the summer months. Representatives of miners, operators, wholesalers and railway companies present pledged co-operation to the fullest extent.

J. E. Simpson, an operator in the Henryetta (Okla.) field, declared that wages and freight rates put into effect during the war period have not been reduced in the coal industry as in other lines of activity, and this makes appreciable reductions in the prices of coal impossible, he said. Operators, wholesalers and retailers are operating on the smallest margin of profit possible with safety, he said.

Senator F. R. Wood, of Trinidad, Colo., president of the Colorado-New Mexico Coal Operators' Association, urged closer co-operation among operators, wholesalers and retailers to bring about a higher standard of ethics and business practices in the industry as the best means of eliminating waste.

Elijah Coles, of Houston, president of the association, reviewed in his annual address the association's activities during the year, and related at length efforts that had been made to bring about all-year buying of coal to the end that the industry may be stabilized. Mr. Coles referred to the fact that there are about 2,000 retail coal dealers in Texas, but that so far only about one-eighth of this number had become members of the association, and suggested a campaign to increase the membership of the association.

C. R. Goldman, of Dallas, secretary of the association, reviewed the work of the association during the seven years he has been secretary. Closer co-operation among the retailers, he said, may be regarded as the outstanding accomplishment of the association.

Gomer Jones, of Muskogee, Okla., vice-president of District 21, United Mine Workers, in a brief address pledged the co-operation of the mine workers of his district in any movement looking to the improvement of conditions in the coal industry.

W. F. Sterley, of Fort Worth, general freight and passenger agent of the Fort Worth & Denver City Ry., said that only by starting the movement of coal during the summer could it be hoped to avert a car shortage during the fall and winter months when the demand for coal becomes heavy.

At the closing business session on Wednesday, Houston was selected for the convention city in 1925 and Harvey S. Trewitt, of Dallas, was elected president. Other officers elected are: W. N. Martin, of Vernon, first vice-president; D. F. Bushnell, of Waco, second vice-president; C. R. Goldman, of Dallas, secretary and treasurer.

More Connellsville Plants Return to 1917 Scale

Effective May 27, the following companies in the Connellsville coke region reduced wages to the Nov. 10, 1917, scale: Hillman Coal & Coke Co., Oliver & Snyder Steel Co., Washington Coal & Coke Co., Puritan Coke Co., Consolidated Coke Co., Reliance Coal & Coke Co. and Redstone Coal & Coke Co., the two latter being subsidiaries of the Weirton Steel Co.

All these companies continued at work without any trouble at the reduced wage scale. The Hillman Coal & Coke Co. is firing some additional ovens at the Isabella plant, at Hillcoke. The Westmoreland-Fayette Coal & Coke Co., at Cheat Haven, Pa., which had been idle for several months, has resumed operations at the 1917 scale.

The Republic Iron & Steel Co., W. J. Rainey, Inc., and the Monessen Coal & Coke Co., subsidiary of the Pittsburgh Steel Co., have not yet made any reduction.

The following are the rates paid under the Nov. 10, 1917, scale:

	Rates Before Reduction	
Pick mining and loading, room and rib work, per 100 bu.	\$2.29	\$3.24
Pick mining and loading, heading work, per 100 bu.	2.52	3.56
Loading machine mined coal, per 100 bu.	1.65	2.10
Pick miners drill their own holes and furnish their powder, while the company drills holes and furnishes powder for machine-cut places.		
Drivers, rope riders, motormen, snappers, blasters, timbermen and tracklayers (8 hrs. per day)	5.00	7.50
Helpers for same (8 hrs. per day)	4.35	6.75
Inside common labor (8 hrs. per day)	4.15	6.55
Mine mechanics and wiremen (8 hrs. per day)	5.00	7.50
Outside common labor (9 hrs. per day)	3.30	3.60 to 4.50

Eastern Coal Retailers Scan Trade Problems

Nearly a thousand retail coal dealers of eastern Pennsylvania, New Jersey, Delaware and Maryland were represented at the twentieth annual convention of the Pennsylvania Retail Coal Merchants' Association, May 22 and 23 in the Commercial Museum, Philadelphia. Public officials and men prominent in the coal and railroad industries made addresses.

In addition to the regular business sessions there was a dinner at the Bellevue-Stratford, May 22, with Edward J. Cummings, Director of Public Welfare Grakelow and former Director of Public Safety Sheldon F. Potter as the speakers; a luncheon at the Commercial Museum, May 23, with Henry Wolf Bikle, general solicitor of the Pennsylvania R.R., and Howard W. White, former president of the Pennsylvania Retail Coal Merchants' Association, speaking, and a dinner in the Bellevue-Stratford Friday night, with Walter L. Montgomery, vice-president of the association; J. Washington Logue and the Rev. Arthur C. Baldwin making addresses. For the ladies there

Northwest Dock Operators Win Lake Dock Cases

In a decision covering nearly 50 pages the Interstate Commerce Commission has upheld the objections of the plaintiffs in the case of the Northwestern Coal Dock Operators' Association vs. the Chicago & Alton R.R. et al., and has ordered that "the present unduly prejudicial and preferential rates" be withdrawn on or before Aug. 21, 1924.

was a dinner at Valley Forge on May 23, with addresses by Mrs. Maurice J. Crean and Rev. W. Herbert Burk, in addition to a luncheon in the Bellevue-Stratford, when E. E. Bach, director of the Americanization Bureau of the Chamber of Commerce, was the speaker.

Among the important topics considered at the sessions were a general discussion of coal legislation. "Coal Organization," by Samuel L. Kamps, commissioner of the Philadelphia Coal Exchange, and "The Future Anthracite Market," by James B. Neale.

An interesting feature of the convention was an exhibition, open to the public, of heating problems and methods by which the householder may economize in the consumption of fuel. A demonstration of the mechanical problems involved in the delivery of coal also was given.

Dr. Bain to Study British Accident-Prevention Work

Dr. H. Foster Bain, Director of the Bureau of Mines, is en route to England, where he will spend some weeks in the study of the measures employed in that country to prevent or minimize accidents in the coal-mining industry.

Dr. Bain's mission is in furtherance of the agreement effected some months ago between the British Home Office and the U. S. Department of the Interior for the exchange of technical information as to means of preventing mine accidents and the promotion of mine safety conditions, and follows the recent visit to this country of Dr. R. V. Wheeler, Director of the Eskmeals Testing Station, Cumberland, England, for the purpose of observing conditions in the American coal-mining industry.

The Director of the Bureau of Mines will visit the Eskmeals Testing Station and will attend mine-safety conferences of British government officials and mine operators' and miners' representatives. He will devote special attention to the study of the stone dusting method generally employed in England to limit coal-dust explosions. He also will visit a number of the larger coal mines in France for the purpose of noting conditions in these mines. Dr. Bain expects to return to the United States on July 3.

Navy and Marine Corps Award Coal Contracts

The Navy Department awarded contracts, May 26, based on proposals opened May 21, covering the delivery of 300,000 tons of steaming coal at Hampton Roads during the fiscal year beginning July 1, as follows:

Pocahontas Fuel Co., New York, 150,000 tons at \$4.58 per ton; Crozer-Pocahontas Co., Philadelphia, 100,000 tons at \$4.48 per ton; Castner, Curran & Bullitt, Inc., New York, 50,000 tons at \$4.72 per ton. Awards for delivery of coal during the coming fiscal year to other points will be made during the next few days.

Contracts for bituminous coal, for delivery during the coming fiscal year, also were awarded by the U. S. Marine Corps on the basis of proposals opened May 15, as follows: Sixteen thousand tons run of mine for delivery at Paris Island, S. C., Clinchfield Fuel Co., Spartanburg, at \$3.56 per ton f.o.b. mines; 6,000 tons for Quantico, Va., Johnstown Coal & Coke Co., New York, \$4.80 per ton delivered; 3,500 tons for Philadelphia, Maryland Coal & Coke Co., Philadelphia, \$4.385 delivered; 4,000 tons Paris Island, S. C., Clinchfield Fuel Co., \$1.95 f.o.b. mines; 3,000 tons for Quantico, Va., Chesapeake & Virginia Coal Co., Lynchburg, Va., \$4.91 delivered, and 300 tons for Charleston, Clinchfield Fuel Co., \$1.95 per ton f.o.b. mines.

Coal Commission Report To Be Printed

Washington, May 31.—The joint committee on printing finally has been convinced that it will be wise to print the report of the U. S. Coal Commission. As the printing of this report involves a cost of more than \$20,000, the committee declined for several months to authorize the expenditure. Arguments to the effect that it is poor economy to eliminate the expense of harvesting after the crop has been planted finally prevailed with the committee, which has submitted a favorable report. The report, however, must be acted on by each house. As a rule, however, resolutions carrying recommendations of the committee on printing are passed perfunctorily.

Two of the reports, the Cost of Production of Bituminous Coal and the Investment and Profit of Bituminous Operators, were not issued even in mimeographed form. The question has been raised whether these reports are open to public inspection. The policy of Director Smith, of the U. S. Geological Survey, the custodian of the Coal Commission's record, has been to give every possible access to these reports. The manuscripts of all the reports have been in the hands of the Senate committee and of the Public Printer for some months. Duplicate copies, however, have been available for inspection and portions of these reports have been copied during recent months by those interested in them. As some time is certain to elapse before printed copies of the report will be available, Director Smith calls attention to the fact that copies of all the reports may be consulted at his office.

Model Mining Law Chief Objective of House Safety Hearings

Increased Facilities for U. S. Bureau of Mines Also Sought—Recent Mine Disasters Responsible for Action in Congress—Varying Conditions Make Possibility of Standardized Regulations Uncertain

Although the hearings on mine safety which have been conducted recently at Washington by the House committee on mines and mining will not be concluded until Congress reconvenes, anticipating adjournment on or about June 7, it is evident that committee members at present have in mind two definite objectives relating to the subject, namely, increased facilities for the U. S. Bureau of Mines and a model law under which mines on government land shall be operated.

How far the committee will go in recommending legislation to embrace these objectives remains to be seen, as the information desired by the committee has not been developed fully. The hearings thus far held, called by Chairman John M. Robsion after attention had been directed to the general subject by explosions in mines in West Virginia, Pennsylvania and Utah, have been rather in the nature of educating members of the committee as to what constitutes hazards in coal mining. With this as a background, the committee intends to go more deeply into the subject and also to give attention to conditions in metal mines.

Committee members appear convinced that the Bureau of Mines is in a position to do greater good for the mining industry if Congress will provide the money to increase its personnel and to make possible further research and experimentation. Whether it would be possible to draft a law to govern the operation of mines on government land and to serve as a model upon which state laws might be builded is regarded as somewhat uncertain by the committee members in view of testimony that widely differing physical conditions in various sections of the country make a single mining law impracticable, although the desirability of a model law is recognized.

Stresses Government Responsibility

In testifying before the committee, H. Foster Bain, director of the Bureau of Mines, explained the research work of that agency and its educational work in training operators and miners in safety and first-aid work. He stressed the permissible system of the Bureau in testing explosives and mine equipment. Safety precautions must be increased as the upper veins are worked out and the mines are thrust deeper into the earth, Mr. Bain emphasized. He expressed the opinion that the responsibility for mine safety will rest more heavily upon the federal government in the future, because the great coal reserves of the nation are on public land in the West, which will be developed in the future generation as older mines become exhausted.

L. C. Ilsley, electrical engineer of the Bureau of Mines, told the committee the Bureau lacks sufficient personnel to test apparatus as rapidly as it

is offered for this purpose. The use of electrical equipment increases the hazards of coal mining, Mr. Ilsley said, but if it were forbidden the cost of mining would increase heavily. There are about 200,000 pieces of electrical equipment in use in mines of the country which bear the safety label of the Bureau of Mines, the witness said. Safety equipment costs more, he said, but pays in the long run even from the sordid dollars and cents standpoint because of minimizing disaster. The field is a large one, Mr. Ilsley stated, as there is not a single approved motor for pumps, loading machinery or hoists. The Bureau could use to advantage an electrical engineer at every coal mine in the country, the witness said, but hopes in the next fiscal year to be able to add three to its staff. Mr. Ilsley testified that the recent explosion in West Virginia was caused by an unapproved electric coal drill; that in Pennsylvania by an unapproved electric coal-cutting machine, and that in Utah by an unapproved flame safety lamp.

Compares Conditions in Europe

Information regarding conditions in European mines as compared with those in the United States was given the committee by George S. Rice, chief mining engineer of the Bureau. Natural conditions in Europe are more hazardous than here, he said, but greater precautions are taken. Safety precautions are not keeping pace with increased use of mechanical devices in United States mines, Mr. Rice testified. He also declared that there is a lack of technical operating staffs at domestic mines as compared with those abroad.

O. P. Hood, chief mechanical engineer of the Bureau, testified that there is a large field of work in testing mechanical devices which the Bureau has been unable to enter because of lack of funds. The Pittsburgh experiment station has never been used to its capacity for this reason, he stated. The Bureau could use \$100,000 immediately in tests of safety stops, overwind devices and brakes on mine locomotives, Mr. Hood said. He told the committee that economy and efficiency in the use of fuel is highly important also, as tending to reduce consumption and thus reduce the opportunities for mine accidents.

E. A. Holbrook, head of the School of Mines of Pennsylvania State College, who was chairman of the Mine Safety Committee of the U. S. Coal Commission, urged that personal contact in educating miners in safety precautions is the outstanding need. The Bureau of Mines is undermanned and hampered in investigations and research by lack of funds, Dr. Holbrook asserted. He suggested extension of the permissible system. Explosions are dramatic, this witness said, yet are not the principal

Railroads Indorse Move to "Ship Coal Now"

The Car Service Division of the American Railway Association has joined Secretary Hoover's campaign to get large manufacturers to ship their coal early. All of the railroads throughout the country will call attention of their consumers to the conditions.

The transportation companies call attention to the fact that the usual autumn demand for coal comes at the period when railroads are handling the grain movement. In the second place, the volume of coal handled in recent weeks has been far below that moved in the same period of last year. These conditions indicate an immense movement of coal traffic in the fall unless something is done to avoid such congestion.

cause of fatalities in mines. He explained to the committee that the chief hazard in bituminous mines is falls of roof or of coal; secondly, underground transportation, and third, explosions. This information appeared to astound several members of the committee. Many state laws need revision badly, Dr. Holbrook said, declaring that competitive conditions have interfered with progress in this line and that in some instances changes have been opposed by operators and by miners in other cases. Dr. Holbrook urged means of extending the preventive work of the Bureau of Mines.

Edgar Wallace, of the American Federation of Labor, urged more appropriations for the Bureau of Mines and a model federal mining law. He urged that surface water lines be piped into the shafts and that working places and roads be sprinkled. John B. Andrews, national secretary of the Association of Labor Legislation, New York, urged uniform mining laws as far as uniformity may be carried.

The bituminous operators stand ready to co-operate in safety work at all times, Harry L. Gandy, executive secretary of the National Coal Association, told the committee. Personal education of the miners in safety work is necessary, he declared. Miners in some instances have resisted installation of safety devices, Mr. Gandy stated. A uniform law to apply to all coal mines would be impractical, this witness said, owing to varying conditions under which operations must be conducted. He suggested that state universities give instructions in mining according to local conditions. He also stated that state mining laws should apply to all operations, large and small, as some states exempt smaller mines and this tends to make the workers careless. He further suggested that a survey be made to determine whether more mine-rescue stations and cars are needed, and where.

The question of more mine-rescue stations and mine-rescue cars is one that the committee has expressed great interest in and will be taken up more fully later.

Illinois Union Curtails Farrington's Power

Miners who answer more questions than the law requires in applying for work in Illinois mines will be subject to expulsion, according to an amendment to the constitution of the Illinois district union as adopted at Peoria just before their fifth biennial and thirtieth consecutive convention ended May 27. The restriction was an indirect blow at the operators, who, it was complained, are requiring new workmen to fill out a questionnaire before getting work. The convention instructed the miners that they must answer no questions except those required in the miners' certification law and the workmen's compensation law. Delegates complained that operators are rejecting men over 45 years old because they are more expensive risks under the compensation law.

A roll call vote of 496 to 443 deprived President Frank Farrington of power to appoint the nine legal investigators, three auditors and three alternate auditors, one arbitrator, two special accountants, and two legislative committeemen. They will henceforth be subject to election, the first one Dec. 9, 1924.

Efforts to abolish the district executive board failed, as also did efforts to abolish the sub-district organizations. A heated fight over the Ku Klux Klan issue was avoided by the chairman by delaying it till the last half hour of the convention.

The miners voted to investigate the possibilities of the giant power-plant proposal of President Farrington, by which the entire state would be provided with electricity, and Illinois coal be consumed in making it. They also adopted an old-age pension of \$25 monthly for miners 65 or over who have been miners twenty years, ten consecutively in Illinois, and then decided to refer it to the rank and file for approval in a referendum. Funds for the pension would be raised by a 1-per cent assessment of members. The convention voted to join the states of Michigan and Kansas in demanding that Alexander Howat, deposed Kansas district president, be restored all rights and privileges and that an international convention be called to give him a hearing.

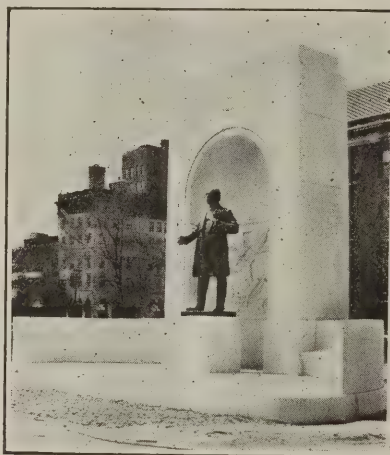
C. W. Hunt Succeeds Murdock On Trade Commission

Charles W. Hunt, of Logan, Iowa, secretary of the Iowa Farm Bureau Federation, was nominated by President Coolidge, May 26, to be a member of the Federal Trade Commission, succeeding Victor Murdock, of Kansas, who recently resigned. The Senate confirmed the nomination May 31.

Appointment of Mr. Hunt was recommended by the Iowa delegation in Congress, including Senators Cummins and Brookhart. He also had the endorsement of the Farm Bureau Federation and other farmers' organizations in Iowa, Nebraska and Missouri.

Mitchell Memorial Unveiled At Scranton

Mine workers from all sections of the United States, labor leaders, state and national officers, and men prominent in business and professional life, assembled in Scranton, Pa., on Friday, May 30, to pay tribute to John Mitchell, president of the United Mine Workers at the time of the anthracite strike of 1902. A monument and bronze life-size statue of the famous labor leader was unveiled on the Court House Square following a parade of 10,000 mine workers from the three hard-coal districts. Miss Catherine Mitchell, only daughter of the deceased miners' leader, unveiled the monument.



The memorial was erected by the miners of the anthracite region at a cost of \$75,000. It is constructed of Dummerstone granite from a Vermont quarry. Peter B. Sheridan, of Hazleton, is the designer; Charles Keck, of New York, the sculptor. The granite block originally weighed fourteen tons. Four tons was cut away in designing the memorial. The design shows seven miners at work in the mine, a mule pulling a loaded car and other mine equipment is depicted. On the block under the bronze statue is this inscription: "John Mitchell, 1870-1919."

Lehigh Valley Strike Called Off

At a meeting at West Wyoming May 23 the general grievance committee of the Lehigh Valley Coal Co. voted to call off the strike of 12,000 miners that had been in progress for a week and to send the men back to work Monday morning, May 24. Early May 22 the same committee voted to continue the strike and threatened to call out all maintenance men if their grievance was not adjusted by May 28. It was said that the threat of President Cappellini to appeal to the miners directly and ignore the general grievance committee had much to do with the sudden change.

The strike followed an alleged reduction in wages of 75c. in yardage work at the William A. colliery. The union heads blame the company for such action. Failure of the company to restore the old rate of wages may result in a walkout that will have the sanction of the entire union, it was intimated.

Bureau of Mines Opens Bids

Keen competition for government contracts was again disclosed when bids were opened last week by the Bureau of Mines for the supply of bituminous and anthracite coal for the Government fuel yards during the fiscal year 1925.

Quotations were asked on 239,600 tons of bituminous and 14,990 tons of anthracite, forty-eight proposals being received for the former and six for the latter. A wide range of prices was revealed in some items, the more important being as follows:

One hundred and fifty thousand one hundred tons run of mine: Sugar Creek Coal Sales Co., 20,000 tons at \$2.50; Central Pocahontas Coal Co., \$1.68; Minter Fuel Co., Beckley, W. Va. 54,000 tons at \$2.19; C. G. Blake Co., \$2.35 to \$2.49; Fayette Smokeless Fuel Co., \$2.10 to \$2.20; Smokeless Fuel Co., 60,000 tons at \$2.22; Leckie Coal Co., Columbus, Ohio, 50,000 tons, \$2.18; Johnstown Coal & Coke Co., Johnstown, Pa., \$2.13; Chesapeake & Virginia Coal Co., Lynchburg, Va., 20,000 tons at \$2.22; Lynch & Read, Baltimore, 24,000 tons, \$2.33; Equitable Fuel Co., Baltimore, 29,200 tons, \$2.54; White Oak Coal Co., 75,000 tons, at \$2.24; Lake & Export Coal Corporation, New York, 60,000 tons at \$2.18.

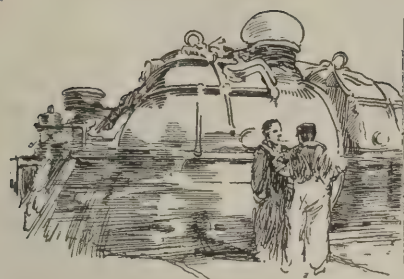
Shipping Board Contracts Awarded on Second Bids

The U. S. Shipping Board at New York on Monday of this week opened bids for furnishing and delivering alongside vessels, and stored in bunkers, operated by the board from New York harbor a maximum of 18,000 gross tons of bituminous coal per month, deliveries to run over a period of 12 months. The specifications called for coal with a minimum of 14,500 B.t.u., bidders to give the name or names of the mines from which the coal is to be shipped. Bids for this tonnage were opened by the board on May 12 and later rejected because of the failure of some of the bidders to name the mines from which coal was to be shipped.

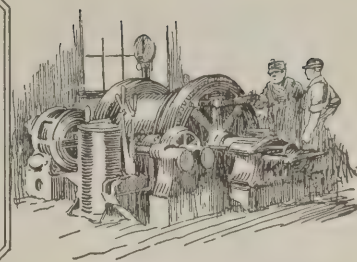
There were seventeen bidders on June 2 and the prices alongside ranged from \$5.19 to \$6, as compared with \$5.17 to \$6.12 on the former opening.

The bidders and prices named follow:

	T.I.B. Over Top	T.I.B. Over Side	F.A.S. according to tonnage taken
Cosgrove & Co.....	\$6.42	\$6.62	\$5.62
McNeil Coal Co.....			5.74
J. H. Weaver & Co.....			\$6.05 to \$6.55
Quemahoning Coal Co.....			5.375-5.23
Morrisdale Coal Co.....			6.00
Coleman & Co.....			5.40
H. B. W. Haff.....			5.99
Horgan Fuel Corp.....			5.34
Eastern Fuel Co.....	6.30	6.50	5.65
Seller Coal Co.....	6.08	6.28	5.43
E. Russell Norton.....	6.40	6.78	
Pattison & Bowns.....	6.52	6.87	5.82
Independent Coal Corp.....	5.89		5.19
Johnstown Coal & Coke Co.....			5.47
Imperial Coal Corp.....			5.50
Dexter & Carpenter, Inc.....			5.59
Steamship Fuel Corp.....			5.51



Practical Pointers For Electrical And Mechanical Men



Selecting Standard Pipes for Columns or Struts

Standard pipes often come in handy for use as columns or struts or for use as push members in transmitting forces. This is because a pipe is strong both in tension and compression.

However, when it comes to calculating columns, it often takes considerable time digging in handbooks, etc., and as result, the use of a pipe is avoided, or a pipe much too large or too small is used, chosen entirely by guess. The pipe that is too small may fail and be the cause of disaster. It is always best, of course, to be on the safe side, but at the same time, one should practice economy.

Table of Pipe Sizes and Loads

Size of Pipes in In.	Column A Maximum Length in In.	Column B	Column C
$\frac{1}{8}$	14.5	826.40	0.07
$\frac{1}{4}$	19.4	617.30	0.12
$\frac{3}{8}$	25.0	480.80	0.17
$\frac{1}{2}$	31.3	383.10	0.25
$\frac{5}{8}$	40.0	300.30	0.33
1	50.6	237.50	0.50
$1\frac{1}{8}$	64.7	185.50	0.67
$1\frac{1}{4}$	75.0	160.50	0.80
2	94.7	126.90	1.07
$2\frac{1}{2}$	114.0	105.30	1.71
3	139.0	86.21	2.24
$3\frac{1}{2}$	161.0	74.63	2.68
4	181.0	66.23	3.18
$4\frac{1}{2}$	202.0	59.52	3.68
5	226.0	53.19	4.32

To assist those who may have occasion to use standard pipes and to make it as easy as possible for them, the following simple table and rules have been developed:

(1) Knowing the load that is to be carried and the length of pipe needed, make a guess as to the size of pipe. Column A in the tables will help in making the guess as it gives the maximum length of pipe that may be used. Thus, never use a $\frac{1}{8}$ -in. pipe as an important column longer than 14.5 in. Never use a 3-in. pipe as an important column longer than 139 in., etc.

(2) Multiply the length of the pipe in inches by the corresponding figure in column B of the table. This product should never be greater than 12,000. If it is greater than 12,000 it means that you have guessed a pipe that is too small. After getting the right size, proceed as follows:

(3) Subtract the product, obtain as stated above, from 19,000. If the difference is equal to or less than 13,000 use it, in 4. If the difference is more than 13,000 use 13,000 in 4.

(4) Multiply by the figure in column C corresponding to the pipe size.

The result is the number of pounds that the pipe will carry as a column,

strut, or push member. If the result is less than the load to be carried, try again, using the next larger pipe size, and so on until the proper and most economical size is selected.

For example, it is desired to support a load of 10,000 pounds at a height of 84 inches. What size of pipe should be used? Following the rules, we do this:

(1) Guessing the size of pipe, column A shows that 84 in. falls between $1\frac{1}{2}$ -in. and 2-in. pipe. We will therefore try a 2-in. pipe.

(2) $84 \times 126.9 = 10,650$. This is less than 12,000 and we will continue.

(3) $19,000 - 10,650 = 8,350$. This is less than 13,000 and we may therefore use it in 4. If the difference were 18,350 we would have to use 13,000 in 4.

(4) $8,350 \times 1.07 = 8,950$ pounds.

Since 8,950 pounds is less than 10,000 pounds a 2-in. pipe is too small. We will therefore recalculate, this time trying a $2\frac{1}{2}$ -in. pipe.

(2) $84 \times 105.3 = 8,850$.

(3) $19,000 - 8,850 = 10,150$.

(4) $10,150 \times 1.71 = 17,370$ pounds.

This shows that a $2\frac{1}{2}$ -in. pipe would be amply safe to hold up 10,000 pounds. It shows that a $2\frac{1}{2}$ -in. pipe is capable of holding almost twice as much as a 2-in. pipe at a height of 84 inches. The small difference in pipe sizes and the great difference in strength indicates the necessity of careful computation and the danger involved in guesswork.

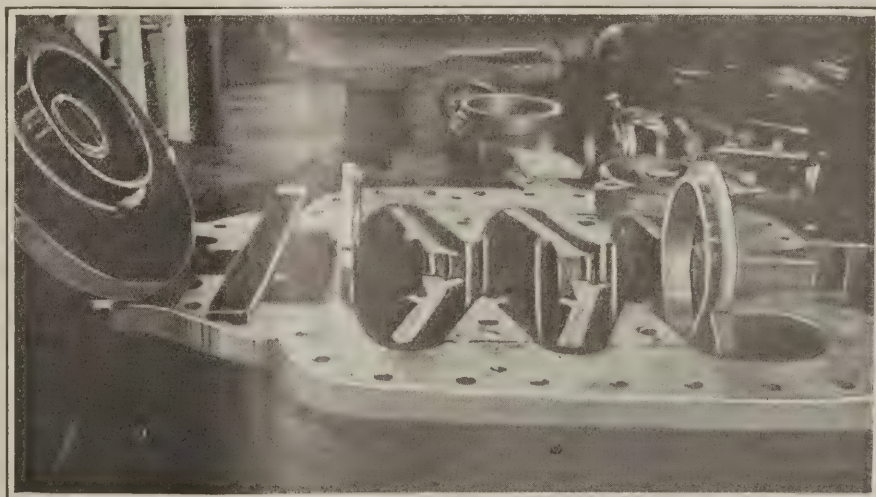
W. F. SCHAPHORST.

How Pipe Joints Can Be Made Truly Tight

So many forms of joints for pipes conveying oil, water or gases have been made that another new type would seem to be almost impossible. It is well known that pipes with screw connections are much more satisfactory than those with clamped joints, especially when carrying liquids or gases which easily flow through small openings.

Ordinarily the ends of pipes are screwed into collars or sockets and the cutting of the threads on the pipes, and particularly in the sockets, must be exact and accurate. For connecting the ends of pipes parallel sockets threaded from each end generally are used. In many cases, and especially where considerable pressures have to be carried, it is customary to give the threaded socket a slight taper from both ends, so that the pipe ends fit more tightly as they are screwed into the sockets.

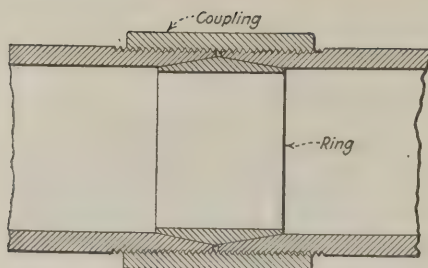
The new joint-making device shown in the illustration will make it less necessary to taper the threads in the sockets, and is a simple method of obtaining a tightness that will prevent leakage. A machined ring tapered to the same angle as the inside of the pipe ends is placed in the joint. As the internally tapered ends of the pipe are screwed into the socket a radial pressure is exerted by the ring, tending to swell the pipe outward and thereby make an absolutely pressure-tight fit.



Pump Casing Salvaged at Low Cost

The ring shown in the illustration was used to close the leakage space worn between the second and third stage of the centrifugal pump. Most pumps are scrapped when leakage from stage to stage has become too great to permit the pump to oper-

ate efficiently. Many times the unit is in every other way as good as new and considerable money can be saved by making the above simple repair, which was described in detail in the April 3 issue of *Coal Age*.



Leak-Proof Pipe Joint

The machined ring seals the joint between the pipe and sleeve coupling and also expands the end of the pipes so as to close the space along the threads.

The tightness of the joint is therefore not dependent solely on the precision of the screw thread on the pipe and in the socket. Although with the perfected system of the most recent thread-milling machinery great accuracy is insured, the tapered socket is frequently required, but it is thought this new ring joint will generally make this tapering of the socket less necessary.

THE ENGINEER.

Transformers Meet Many Requirements

Instrument transformers are used for two reasons: first, because they make the front of switchboards safe, and second, because they make it possible to use instruments with a reasonable amount of insulation and a reasonable current-carrying capacity. The function of these transformers is to deliver to the instruments and other controlling equipment a current or voltage which shall always be proportional to the primary current or voltage. Generally, the secondary of a high-voltage transformer is designed for about 115 volts, and the secondary of a current transformer for 5 amp.

In connecting instrument transformers to the various types of meters used in conjunction with them, it is necessary to know the relative instantaneous direction of current in the transformer leads. For this reason one primary and one secondary lead of the transformer is usually marked to indicate this polarity. The relation of the marked leads is such that the instantaneous direction of the current in them is the same; that is, toward the transformer in the marked primary lead, and from the transformer in the marked secondary lead, or vice versa.

GROUND INSTRUMENTS FOR SAFETY

All instrument transformers should be grounded on the secondary side as an extra precaution against danger from the high voltage in case the insulation of the transformer should be punctured by lightning, or other abnormal stresses. It is also a general and safe practice to ground the cases of the meters to which the transformers are connected. In polyphase groups of transformer connections any point of the secondary may be grounded, but it is preferable to use a connection where a neutral point or a common wire between the transformers may be readily grounded.

Voltage transformers are used with electrical measuring instruments, synchrosopes, synchronizing apparatus,

protective and regulating relays, and no-voltage and over-voltage trip coils of automatic circuit breakers. One transformer may be used for a number of instruments, or other potential coils at the same time, provided the total current taken by the equipment does not exceed that for which the transformer is designed, and compensated. Voltage transformers of this type usually have a capacity of 200 volt-amperes, but are compensated to give a correct ratio of voltage transformation at 40 volt-amperes, as this is the average load demanded by a voltage transformer. Special transformers may be compensated for any desired load condition up to the full capacity of 200 volt-amperes. The standard secondary voltage is nominally 115 volts.

The instrument voltage transformer is essentially an ordinary constant-potential device especially designed for close regulation, so that the secondary voltage under any condition will be as nearly as possible a fixed percentage of the primary voltage. There are several reasons why the secondary voltage can never be exactly proportional to the primary voltage or exactly opposite to it in phase. The losses in the transformer and the magnetic leakage between the primary and secondary winding must be considered. These two classes of errors, inherent in voltage transformers, namely the ratio error and the phase-angle error are always present. These errors are in part due to the exciting current which is however constant for any given applied voltage. In the design and manufacture of voltage transformers this error may be reduced to a minimum by choosing the best quality of iron and working it at a low magnetic density. That part of the error due to the load current, obviously, varies directly with the load and in turn can be minimized in the manufacture and design of the transformer by making the resistance and reactance of the winding low.

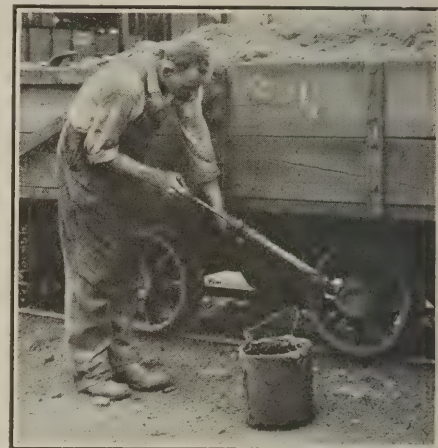
Low Power Factor Affects Meter Accuracy

The effect of the phase displacement of the secondary voltage in the voltage transformer is not important when using meters having only a voltage element and when using protective relays, because these devices depend only upon voltage for their operation. However, when watt-hour meters and similar apparatus are used the indication of these instruments depends not only on the value of the voltage, but also on its relation to the line current, therefore, the phase error has some effect. Obviously, the lower the power factor of the load the greater will be the phase error of the voltage transformer upon this type of instrument. The phase displacement depends not only upon the constants of the transformer but on the power factor of the load to be measured, and, therefore, the effect of this error cannot be compensated in the transformer. In the design of the transformer if the phase displacement is made as small as possible, its effect on reading for commercial purposes is not great.

Grease Cars with Bicycle Pump

The need for the proper lubrication of mine cars should hardly be a matter for argument. Nevertheless, it is not uncommon to see some mine-car bearings almost "crying" for lubrication.

With transportation equipment both expensive in first cost and maintenance our company has saved much money by keeping mine cars well greased, thus making it possible for every locomotive to pull a larger trip of cars than usual.



Grease Gun Lubrication

When one considers the delay occasioned by a dry bearing or the cost of repairing an axle worn out due to lack of proper lubrication, there is ample justification for providing efficient lubricating equipment whether it be by grease or oil.

As soon as we began to give close consideration to the lubrication of car bearings, we realized that the reason why equipment was sometimes inadequately greased or oiled was because the workman found the application of lubricant difficult or arduous. We were not long in learning that the best way to get good results is by making it as easy as possible for the workman.

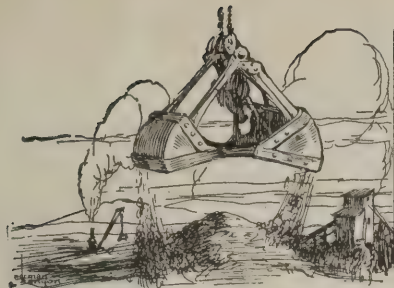
One of the mechanics' helpers at the mines brought an old bicycle pump to the shop one morning and before long had placed a nozzle on the end suitable for the grade of grease which we use. Now our oiler merely puts the nozzle of the grease gun in a pail of grease and with little effort can lubricate a large number of bearings in a short time.

Another advantage of this gun is that with it the workman need not get smeared with grease. This fact makes it much easier for us to get men for this work.

J. T. WARTON.

Oil Grooves for Locomotive Motor Bearings

In general, it is not considered necessary to have the axle bearing fitted with oil grooves, as these bearings have large surface areas and windows, and are of the split type. However, many men, who believe grooves necessary, use them as an extra precaution against hot axle bearings. Frequently a deep ridge cut in the babbitt at the joint between the upper and lower half of the bearings supplies sufficient extra lubrication.



Production And the Market



Bituminous-Coal Market Marks Time as End of Industrial Depression Approaches

That it requires patience and staying power to an unusual degree to stick in the coal business probably never was exemplified in a more striking manner than at the present time with reports of market conditions from the various centers week after week running the gamut in lugubrious expressions describing the state of business. The end of the depression—or “breathing spell,” as the more optimistic have termed it—seems to be nearing an end, however, the latest report of the Federal Reserve Board indicating that “constructive programs are under consideration in some business circles which a few months ago were content to meet only the demands upon them and make no future plans.” While the activity in some lines is traceable to seasonal increases, the general tone is healthier and it is prophesied that the approaching revival will have more than temporary life.

Government Departments Award Contracts

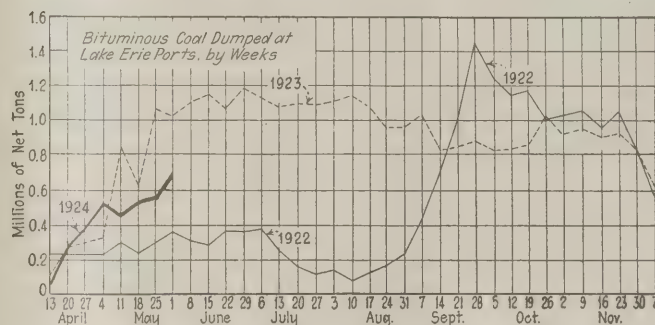
Regular summer storage of coal by the railroads, as proposed and warmly indorsed by the International Railway Fuel Association last week, is a big step in the direction of stabilization of the industry, which has been so strongly urged by Secretary Hoover. The government is doing its part, the Navy Department having awarded several large contracts last week with others to follow. The Bureau of Mines opened bids May 28 for 239,600 tons of bituminous coal and 14,990 tons of anthracite, the quotations of soft coal varying from \$1.69 to \$2.54 f.o.b. mine. Meanwhile the coal trade is marking time, there being little change in either demand, prices or output.

Coal Age Index of spot prices of bituminous coal advanced 2 points during the last week, registering 169 on June 2, the corresponding price being \$2.04. This compares with \$2.02 on May 26.

Dumpings of coal for all accounts at Hampton Roads

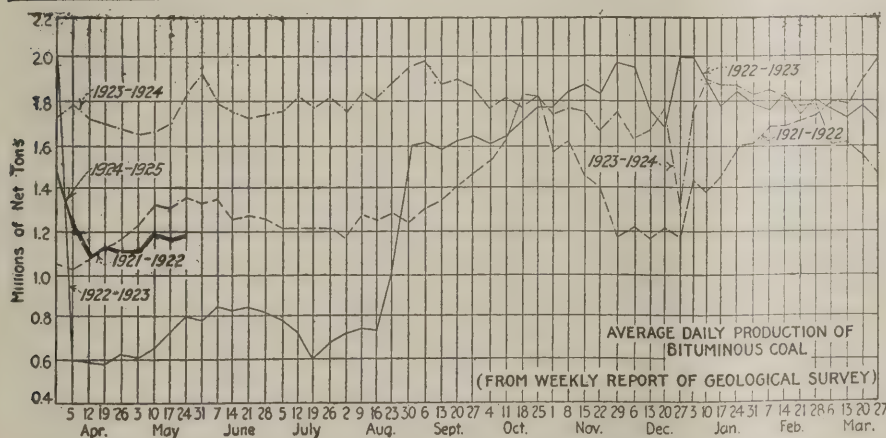
during the week ended May 29 amounted to 371,564 net tons, compared with 241,490 tons dumped during the previous week. Coal dumped at Lake Erie ports during the week ended May 31, according to the Ore & Coal Exchange, were as follows: Cargo, 625,440 net tons; fuel, 39,640 tons. The figures for the preceding week were 529,883 tons of cargo coal and 35,748 tons of fuel coal.

Output of bituminous coal during the week ended May 24, according to the Geological Survey, was 7,155,000 net tons, an increase of 124,000 tons over



the week before, when 7,031,000 tons was produced. Production of anthracite fell off slightly, the output being 1,850,000 net tons, compared with 1,898,000 tons during the week ended May 17.

The anthracite market is beginning to show unmistakable evidences of a tendency to slow down. Demand has slackened and independents are preparing for cancellations. Stove continues to lead the van, but the call for egg, chestnut and pea is noticeably tapering off. While the output of hard coal is smaller than last year it is sufficient to satisfy immediate requirements. A slightly stronger note was apparent as a result of the mines being idle over the holiday.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
May 10	10,175,000	7,125,000
May 17 (a)	10,270,000	7,031,000
May 24 (b)	11,049,000	7,155,000
Daily average	1,842,000	1,193,000
Cal. yr. to date (c)	218,591,000	190,473,000
Daily av. to date	1,768,000	1,542,000

ANTHRACITE

	1923	1924
May 10	1,903,000	1,924,000
May 17 (a)	2,045,000	1,898,000
May 24	1,956,000	1,850,000
Cal. yr. to date	41,519,000	36,921,000

COKE

	1923	1924
May 17 (a)	411,000	189,000
May 24 (b)	415,000	159,000
Cal. yr. to date (c)	7,999,000	5,414,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Midwest Expects Improvement

There was a hopeful undertone to the mournful lay the coal trade in the Midwest region was singing just before June 1. A good many men were of the impression that the demand for coal was due for a slow but steady pick-up after that date. Stockpiles are still high but there is more indication of summer buying now than there was a week ago. The urgings of Secretary Hoover and others are having a certain effect.

Production in Illinois last week would have registered a slight improvement had it not been for the shutdown of two busy mines in the central Illinois field caused by a labor dispute. Indiana production also appears to have reached rock bottom and is ready to rebound. Both states are so low, however, that a little business makes a big showing.

In the Chicago region a steady though thin dribble of domestic business has continued, due to unseasonably cool weather. Smokeless lump and egg has had a small market at a mine price of \$3.25@3.50, which is an improvement of 25c., and mine run has reached that territory at \$2, but with no indication of a June 1 rise. Yards are taking the customary amount of hard coal for this time of year.

Conditions are unusually quiet at St. Louis. There seems to be no domestic business moving excepting in small quantities for current needs. Rain and cool weather have developed a little country business, but the storage of coal on the part of the consumer for next winter has not started, although indications are that it will pick up in June.

Kentucky Remains Somnolent

Demand for Kentucky coal at Louisville continues quiet, movement of western Kentucky coal being very slow, as retailers are not buying and small industrial demand is not heavy. Eastern Kentucky isn't getting much lake business as yet, as movement has been sluggish and is not expected to get well under way for another thirty days. Eastern Kentucky, however, is busier than most fields, due to low non-union scale of wages and low selling price.

The situation in the western Kentucky field remains unchanged, there being a generally slow demand for all grades, but with some improvement noted in stove sizes from the South. Screenings are scarce and selling at about the mine-run price, while large egg, block and lump sizes are a bit quiet. Strike benefits are now being rationed out to the miners in the affected portion of the field. The

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	June 4 1923	May 19 1924	May 26 1924	June 2 1924†
Smokeless lump	Columbus	...	\$6.25	\$3.45	\$3.50	\$3.35@3.65
Smokeless mine run	Columbus	...	4.25	2.25	2.30	2.20@2.40
Smokeless screenings	Columbus	...	3.60	1.85	1.85	1.75@2.00
Smokeless lump	Chicago	...	6.10	3.10	3.10	3.25@3.50
Smokeless mine run	Chicago	...	4.10	2.00	1.85	2.00
Smokeless lump	Cincinnati	...	6.25	3.50	3.60	3.50@3.75
Smokeless mine run	Cincinnati	...	4.10	1.85	1.85	2.00@2.25
Smokeless screenings	Cincinnati	...	4.00	1.75	1.60	1.50@1.75
*Smokeless mine run	Boston	...	6.35	4.45	4.40	4.35@4.50
Clearfield mine run	Boston	...	2.35	2.00	1.95	1.65@2.35
Cambria mine run	Boston	...	3.10	2.50	2.50	2.25@2.75
Somerset mine run	Boston	...	2.85	2.25	2.15	1.90@2.50
Pool 1 (Navy Standard)	New York	...	3.75	2.75	2.65	2.50@3.00
Pool 1 (Navy Standard)	Philadelphia	...	3.75	3.00	3.00	2.75@3.25
Pool 1 (Navy Standard)	Baltimore	...	...	...	...	...
Pool 9 (Super. Low Vol.)	New York	...	2.85	2.20	2.20	2.00@2.40
Pool 9 (Super. Low Vol.)	Philadelphia	...	2.85	2.20	2.20	2.00@2.45
Pool 9 (Super. Low Vol.)	Baltimore	...	2.55	1.85	1.85	1.80@1.95
Pool 10 (H.Gr. Low Vol.)	New York	...	2.35	1.85	1.85	1.75@2.00
Pool 10 (H.Gr. Low Vol.)	Philadelphia	...	2.30	1.85	1.85	1.70@2.00
Pool 10 (H.Gr. Low Vol.)	Baltimore	...	2.15	1.65	1.70	1.65@1.75
Pool 11 (Low Vol.)	New York	...	2.00	1.60	1.60	1.60@1.75
Pool 11 (Low Vol.)	Philadelphia	...	1.95	1.50	1.50	1.30@1.70
Pool 11 (Low Vol.)	Baltimore	...	1.95	1.55	1.55	1.50@1.65
High-Volatile, Eastern		Market Quoted	June 4 1923	May 19 1924	May 26 1924	June 2 1924†
Pool 54-64 (Gas and St.)	New York	...	1.85	1.50	2.50	1.40@1.65
Pool 54-64 (Gas and St.)	Philadelphia	...	2.05	1.55	1.55	1.45@1.70
Pool 54-64 (Gas and St.)	Baltimore	...	1.75	1.45	1.45	1.40@1.65
Pittsburgh sc'd gas	Pittsburgh	...	2.85	2.40	2.40	2.30@2.50
Pittsburgh gas mine run	Pittsburgh	...	...	2.10	2.10	2.00@2.25
Pittsburgh mine run (St.)	Pittsburgh	...	2.20	1.85	1.85	1.75@2.00
Pittsburgh slack (Gas)	Pittsburgh	...	1.55	1.35	1.35	1.30@1.40
Kanawha lump	Columbus	...	2.75	...	...	...
Kanawha mine run	Columbus	...	2.05	...	...	...
Kanawha screenings	Columbus	...	1.60	...	...	...
W. Va. lump	Cincinnati	...	3.10	2.10	2.25	2.00@2.50
W. Va. gas mine run	Cincinnati	...	1.70	1.35	1.35	1.35@1.60
W. Va. steam mine run	Cincinnati	...	1.70	1.35	1.35	1.35@1.60
W. Va. screenings	Cincinnati	...	1.40	1.05	.85	.85@1.00
Hocking lump	Columbus	...	2.60	2.40	2.40	2.25@2.60
Hocking mine run	Columbus	...	1.85	1.60	1.60	1.60@1.85
Hocking screenings	Columbus	...	1.35	1.40	1.35	1.30@1.50
Pitts. No. 8 lump	Cleveland	...	2.85	2.40	2.40	2.10@2.75
Pitts. No. 8 mine run	Cleveland	...	2.05	1.85	1.85	1.85@1.90
Pitts. No. 8 screenings	Cleveland	...	1.45	1.45	1.25	1.10@1.20
Midwest		Market Quoted	June 4 1923	May 19 1924	May 26 1924	June 2 1924†
Franklin, Ill. lump	Chicago	...	\$4.05	\$2.75	\$2.75	\$2.75@3.00
Franklin, Ill. mine run	Chicago	...	3.10	2.35	2.35	2.25@2.50
Franklin, Ill. screenings	Chicago	...	1.80	2.15	1.85	1.90@2.10
Central, Ill. lump	Chicago	...	2.60	2.60	2.35	2.25@2.50
Central, Ill. mine run	Chicago	...	2.10	2.10	2.10	2.00@2.25
Central, Ill. screenings	Chicago	...	1.85	1.90	1.60	1.50@1.75
Ind. 4th Vein lump	Chicago	...	3.35	2.85	2.85	2.75@3.00
Ind. 4th Vein mine run	Chicago	...	2.60	2.35	2.35	2.25@2.50
Ind. 4th Vein screenings	Chicago	...	1.80	1.95	1.95	1.90@2.00
Ind. 5th Vein lump	Chicago	...	2.80	2.35	2.35	2.25@2.50
Ind. 5th Vein mine run	Chicago	...	2.10	2.10	2.10	2.00@2.25
Ind. 5th Vein screenings	Chicago	...	1.55	1.80	1.60	1.50@1.75
Mt. Olive lump	St. Louis	...	...	2.85	2.85	2.75@3.00
Mt. Olive mine run	St. Louis	...	...	2.50	2.50	2.50
Mt. Olive screenings	St. Louis	...	...	2.00	2.00	2.00
Standard lump	St. Louis	...	2.35	2.15	2.15	2.00@2.35
Standard mine run	St. Louis	...	1.80	1.95	1.85	1.75@1.85
Standard screenings	St. Louis	...	1.50	1.80	1.65	1.50@1.70
West Ky. lump	Louisville	...	2.30	2.35	2.00	1.90@2.15
West Ky. mine run	Louisville	...	1.80	1.65	1.55	1.35@1.75
West Ky. screenings	Louisville	...	1.35	1.60	1.55	1.40@1.75
West Ky. lump	Chicago	...	2.35	2.25	2.25	1.75@2.00
West Ky. mine run	Chicago	...	1.45	1.60	1.60	1.50@1.75
South and Southwest		Market Quoted	June 4 1923	May 19 1924	May 26 1924	June 2 1924†
Big Seam lump	Birmingham	...	3.05	2.80	2.80	2.70@2.95
Big Seam mine run	Birmingham	...	2.05	2.00	2.00	1.75@2.00
Big Seam (washed)	Birmingham	...	2.35	2.20	2.20	1.75@2.25
S. E. Ky. lump	Chicago	...	3.25	2.25	2.25	2.00@2.25
S. E. Ky. mine run	Chicago	...	2.35	1.60	1.60	1.25@2.00
S. E. Ky. lump	Louisville	...	3.50	2.15	2.10	2.00@2.25
S. E. Ky. mine run	Louisville	...	2.25	1.50	1.50	1.25@1.75
S. E. Ky. screenings	Louisville	...	1.65	1.10	1.10	.80@1.15
S. E. Ky. lump	Cincinnati	...	3.05	2.35	2.75	2.25@2.75
S. E. Ky. mine run	Cincinnati	...	1.60	1.35	1.35	1.40@1.60
S. E. Ky. screenings	Cincinnati	...	1.55	.95	.95	.90@1.10
Kansas lump	Kansas City	...	3.85	4.50	4.50	4.50
Kansas mine run	Kansas City	...	3.25	3.50	3.50	3.50
Kansas screenings	Kansas City	...	2.60	2.50	2.50	2.50

* Gross tons, f.o.b. vessel, Hampton Roads.

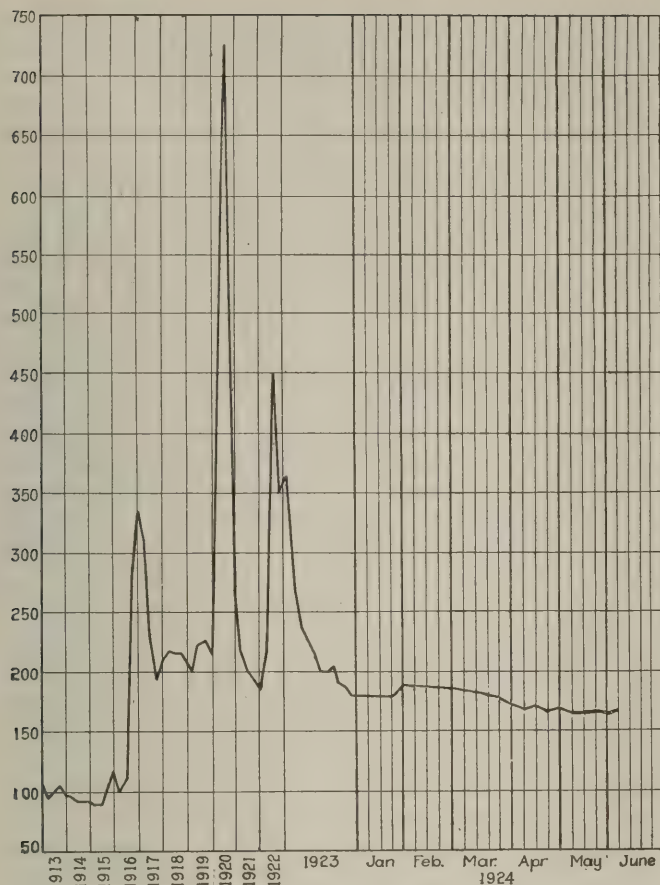
† Advances over previous week shown in heavy type, declines in italics.

‡ On strike.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	June 4, 1923	May 26, 1924	June 2, 1924†
				Independent	Company	Independent
Broken	New York	...	\$2.34	...	\$7.75@8.35	...
Broken	Philadelphia	...	2.39	...	7.00@8.10	...
Egg	New York	...	2.34	...	8.00@8.35	...
Egg	Philadelphia	...	2.39	...	8.10@8.35	...
Egg	Chicago*	...	5.06	...	8.00@8.50	...
Stove	New York	...	2.34	...	8.00@8.35	...
Stove	Philadelphia	...	2.39	...	8.15@8.35	...
Stove	Chicago*	...	5.06	...	8.00@8.50	...
Chestnut	New York	...	2.34	...	8.00@8.35	...
Chestnut	Philadelphia	...	2.39	...	8.15@8.35	...
Chestnut	Chicago*	...	5.06	...	8.00@8.50	...
Range	New York	...	2.34	...	8.30	...
Pea	New York	...	2.22	...	6.00@6.30	...
Pea	Philadelphia	...	2.14	...	6.15@6.20	...
Pea	Chicago*	...	4.79	...	6.00@6.50	...
Buckwheat No. 1	New York	...	2.22	...	3.50@4.15	...
Buckwheat No. 1	Philadelphia	...	2.14	...	3.50	...
Rice	New York	...	2.22	...	2.50	...
Rice	Philadelphia	...	2.14	...	2.50	...
Barley	New York	...	2.22	...	1.50	...
Barley	Philadelphia	...	2.14	...	1.50	...
Birdseye	New York	...	2.22	...	1.60	...

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	June 2 1924	May 26 1924	May 19 1923	June 4 1923
Index	169	167	169	215
Weighted average price.....	\$2.04	\$2.02	\$2.05	\$2.60

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

non-union, stripper and other operations in the field are not busy, in spite of the large number of mines that are down.

West Virginia operators discern a fundamental improvement in conditions, based on gradually increased production in some sections, but depression still prevails in many sections. Virginia mines are producing a little less coal than for the corresponding period of May and yet market losses are not any heavier than they have been.

Northwest Gets Busy

The one significant feature of the coal market at the Head-of-the-Lakes is the better temper which prevails among all dock men. It is not optimism exactly but merely the better feeling produced by more hustling for orders. Old stocks must be moved to avoid deterioration and fire losses. For the first time in months the coal market is really awake, and it is probable that business will be done. Duluth coal men predict that much of the anthracite trade which was lost at Twin Cities will be brought back into the fold. A high-spot survey has brought to light unusually light stocks in northern consumers' bins, and the trade looks for orders to fill soon.

The market is fairly stable at present prices. One significant increase during the week is of Pocahontas to \$7.25 for lump, \$5.50 for run of mine and \$4.50 for screenings. This shows that many docks expect consumers to use smokeless soft as an anthracite substitute next winter.

Receipts at Duluth-Superior docks showed marked improvement last week, when 25 cargoes, three of them hard coal, were landed. This compares with 18 the week before. Since the opening of navigation 591,660 tons of soft and 126,930 tons of hard coal have been landed.

Iron range towns have lately come into the market for lots of coal ranging from 5,000 to 20,000 tons, mainly for utilities. Bids on these contracts will be opened the first week in June.

There is very little business at Milwaukee. A moderate demand for anthracite and Pocahontas is all there is. Coal is coming quite steadily by lake. The receipts by vessel thus far since the season opened aggregate 131,908 tons of anthracite and 282,499 tons of soft coal.

Southwest Bestirs Itself

Operators began the last week in May to open up mines in Arkansas and take orders for semi-anthracite in anticipation of the reduction in freight rates effective June 5. A slight increase in activity is noticeable also in Kansas, where a few more mines, both shaft and shovel, have been reopened in the last week, and where others are expected to be reopened before the middle of June. The resumption of mining is partly due to the current demand and partly in preparation for the storage market, which will open soon, and for the threshing market, which will open in June. Kansas City prices are: Kansas lump, \$4.50; nut, \$4; mine run, \$3.50; screenings, \$2.50; Arkansas semi-anthracite lump, \$5.50@6; mine run, \$3.50; screenings, \$2; Henrietta (Okla.) lump, \$5.50; nut, \$3.75; mine run, \$3.50; screenings, \$2.50.

Colorado buyers were inactive during the week, despite the fact that everyone was expecting an advance in prices June 1. Mines worked on an average of 20 hours last week and the operators' reports show that 46 per cent of the working time lost was attributed to "no market." With the miners' resumption of work at the Broadhead mine all labor disorders have been eradicated for the time being.

In Utah the coal industry is marking time. Production figures show mines are working below 30 per cent of full-time capacity. Dealers are making an effort to get their customers to put in their winter coal now, but the response is poor.

Undertone Stronger at Cincinnati

June prices of smokeless at Cincinnati are up 25c. for lump and egg, and first of the month bookings are said to be heavier than May orders. While the prepared sizes are moving in good shape there is not the ready market for screenings, and some sales have been made down to \$1.50. The undertone continues to be stronger. Movement to the lakes is 35 to 40 per cent behind normal, but there is no rush to get coal for that movement. Utilities are not in the market as they might be but the closing of several large railroad contracts within the last two or three weeks shows that pressure that formerly kept driving the market down has been released. A slight recovery in the price of slack and run of mine resulted. There is little or no change in retail prices. River business continues good with a high stage flowing. Kanawha tonnages show an increase. Specialized coals are quoted as follows: Egg, \$2.50@3; block, \$3.25@3.75.

The trade continues rather dull in Columbus and central Ohio. Buying is limited, as neither retailers nor steam users are showing any disposition to stock up for the future. The weather has mitigated against a more lively domestic trade. Dealers have been making rather low prices in order to clean up and as a result quotations are irregular. Some smokeless grades, including Pocahontas, are being sold and there also is a demand for splints and Kentucky grades. Ohio-mined coals are extremely dull. Steam business is quiet as reserves in the hands of some of the larger users are still heavy. Contracting is not brisk, as most of the steam users are content to buy from the open market. One of the features is the shrinkage of distress coal due to the closing down of more mines. Lake trade is showing signs of becoming more active, but contracting for lake shipment is not strong.

The trade at Cleveland is pessimistic, seeing little immediate hope for material improvement. Inquiries are scarce, and producers are of the opinion that the mines may as well be closed completely as to operate only one or two days per week. Almost one-half of the mines in the eastern Ohio field are closed down indefinitely, and no attempt will be made to reopen until the market is much improved. During the week ended May 24th the eastern Ohio No. 8 Field produced 253,000 tons, or about 36 per cent of the combined potential capacity of the district, estimated at 700,000 tons. This is a gain of 5,000 tons over the preceding

week, but this increase is without significance as a market factor, because it was due largely to a slightly accelerated production of coal for shipment to the lake by operators with dock interests at the head of the lakes.

Demand for coal at Pittsburgh continues extremely poor. Steel mill operations continue to decrease, as buyers of steel are liquidating stocks. There are no signs marketwise of increased interest on the part of lake snippers. Wage reductions by independent operators in the Connellsville region, it is thought may influence the Pittsburgh coal market. Strip mines are crushing considerable coal, which accounts for increased offerings of slack.

The Buffalo market is still quiet, with not much prospect of early improvement. Demand seems even poorer than it was, as consumers continue to rely on their stock piles.

Pessimism Enshrouds New England

In New England the market for steam coal shows no sign of recovery. Prices drag along much as they have for the past 60 days and it cannot be said that the trade is at all encouraged over the prospect. In the textile centers, like Lowell, Lawrence, Fall River and New Bedford, there is a pronounced pessimistic tone, and from these sources and the shoe industry there is today almost no inquiry for coal.

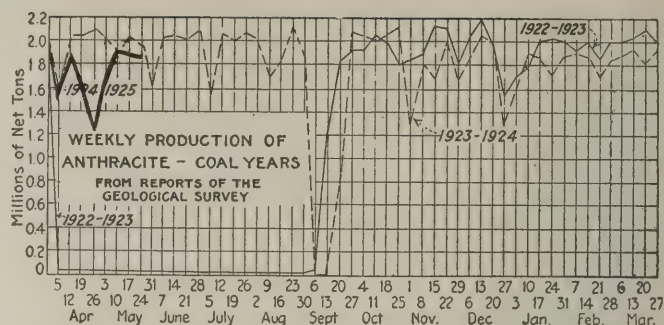
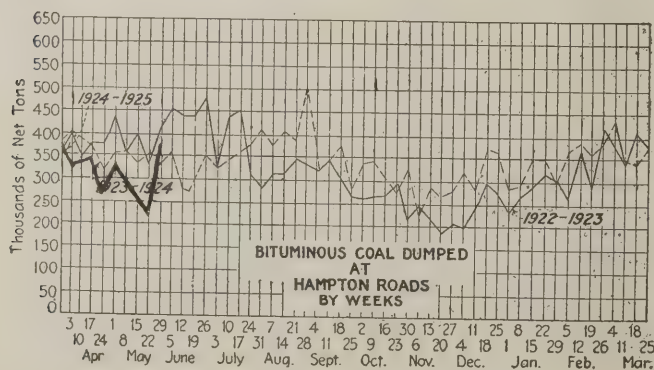
At Hampton Roads there is little change. Some days the spot market improves to a degree, but invariably thus far these periods have been followed by dull spells that bring down the average of both tonnage and price. No. 1 coals are still being sold down to \$4.35, with an occasional sale made at \$4.40, these figures being per gross ton f.o.b. vessel. A few agencies have set \$4.50 as an asking price; no sales are reported at that level. No. 2 coals can be had at prices down to \$4. Output fluctuates from week to week with the trend of prices, but practically all the time there are considerable accumulations at the piers.

All-rail there is the same stagnant market. Receipts week by week show heavy declines compared with other years, and there is today no rosy outlook for coals in central Pennsylvania so far as this territory is concerned. Via the New York and Philadelphia piers there is no noticeable improvement.

Inquiries Drop in Atlantic Seaboard Markets

There has been a falling off in inquiries at New York and the prospects of increased business during this month are not as bright as they were. Buyers continue to hold to the policy of caution which they have followed for many weeks. Receipts at the local tidewater piers increased to around 1,500 cars some days during the past week and there was an accumulation of coal, but not in sufficient quantities to lower prices. Demand was slow, however, and it required hard work to keep the coal moving. There were reports current that a 50,000-ton order for foreign shipment had been obtained by a local house but it could not be confirmed. Inquiry, however, points to some new business with South America.

Faint signs are discernible in Philadelphia that some consumers are inclined to take in a little stock, but even the most hopeful producer is not willing to admit that it is likely to become general soon. General industrial conditions are unsatisfactory, especially in textiles. Manufacturers expect a favorable turn soon, but the unseasonable weather all spring has held them back and they are waiting for warm weather to move their goods and get back to longer working time. The only real demand is for slack. The spot market remains unchanged as to price, and the market is firm at present figures.



Inquiries are beginning to come in at Baltimore for contract delivery over the late summer, autumn and winter. The competition in selling is still so keen and mines are still selling at such a low price to the jobbing trade that so far there is little response in price raise either in the open market or on contracts, which are being made at "ruinous rates." The spot market shows but little change, demand being moderate and competition keen. The export situation continues to drag, only seven ships with a total of but 25,399 tons cargo and 2,341 tons in bunkers loading from May 1 to 23.

Buying in the Birmingham market is very slow, with consumers indifferent and taking as little as they can get by with, as a rule. Slight price reductions on some grades as a result of wage adjustments recently made, has not stimulated buying so far, even on the grades affected, emphasizing the fact that the trade inactivity is not attributable to the price of fuel but rather to restricted industrial requirements and a disinclination to stock.

Anthracite Business Slowing Down

There are many indications of a slight slump in the New York anthracite market. Demand has slackened and some of the smaller operators and sales agents of independent coals are taking orders at less than last week's quotations. One producer announces prices for some of the domestic coals 10c. lower for June than for May and he is said to have orders booked for June and July delivery at these prices. Stove continues to lead in demand. Both egg and chestnut are accumulating in some quarters and pea coal is moving much more slowly. Retail dealers' yards are well filled. Independent operators are well booked ahead but with demand subsiding cancellations are looked for. Some shippers of independent coals had an oversupply of chestnut at tidewater which they were forced to load into boats in order to save demurrage charges. Demand for steam sizes has already slowed down considerably. Only the better grades of independent No. 1 buckwheat and rice are quoted at full company circular. Barley continues to be the most active of these coals. Hard-coal business at Philadelphia is slowing down. Retailers have few orders on their books for cellar filling and orders are just straggling in. There is still quite a shortage of stove and shippers are being urged for deliveries.

Coke Output Slumps Again

The general reduction of wages inaugurated by the independent coke operators in the Connellsville region to the scale of Nov. 10, 1917, is not proceeding as rapidly as was expected. This, however, does not mean that the reduction is any less certain to be general among the independents in operation, for not a few are entirely closed. Output of beehive coke again slumped during the week ended May 24, when 159,000 net tons was produced, compared with 189,000 tons during the previous week, according to corrected returns by the Geological Survey.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended May 17, 1924.....	913,407	135,650
Previous week.....	909,187	136,046
Same week in 1923.....	991,797	181,599

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
May 14, 1924.....	319,106	167,102		
Previous week.....	324,779	180,888		
Same date in 1923.....	18,419	2,776	23,761	15,653

Foreign Market And Export News

British Market Notes Stronger Tone; Inquiry and Output Better

The South Wales market has been slow in recovery by reason of a number of difficulties, chief of which is labor. Coupled with the labor trouble is the problematical effect of the new wages on prices and the strike in the Ruhr. The settlement of the wage question for the next twelve months is an encouraging influence, but fifteen thousand miners are still on strike, owing to a local dispute. The tone of the market has improved slightly due to an increase in inquiry in anticipation of the holidays. Exports also are expanding, though supplies are ample and prices are holding barely steady.

European inquiry on the Newcastle market has improved somewhat, though the market is in a state of great uncertainty, due to the same factors that have influenced South Wales. There has been considerable anxiety as to the possible result of the negotiations between operators and miners. The Norwegian State Rys. have placed orders aggregating 35,000 tons of steams at prices between 28s. and 28s., while two other contracts for 7,000 tons of best steams and 10,000 tons of steam smalls have been placed.

A cable to *Coal Age* states that the coal production by British mines during the week ended May 17 was 5,659,000 tons, according to the official reports. This compares with an output of 5,220,000 tons during the previous week.

Prices Stiffen at Hampton Roads, New Business Scarce

Demand for coal at Hampton Roads having reached rock bottom, the piers turned in the lowest monthly dumping record for a year, though there was a marked increase last week. Prices have stiffened somewhat due to shortage at the piers rather than to demand.

Foreign business, except for a sporadic movement to South America, is without feature, bunkers holding their own chiefly on account of old con-

tracts, with little or no new business reported. New England trade has slumped materially and the opening of lake shipments did not help trade here.

Supplies at the piers has been lower than for a great many months, operations in southwest Virginia and elsewhere having curtailed their output substantially because the market did not make it attractive to operate.

French Industrial Demand Holds; House Coal Orders Slacken

The French coal market is almost stationary. Orders for household coals have slackened at the French mines, but the demand for industrial fuels remains satisfactory.

Imports from Great Britain have been better of late, especially when the rates of sterling stood around 67@68 fr.; besides most of the f.o.b. prices at the shipping docks have been lowered, the result being that certain grades of British coals have been selling here at either equal or even lower prices than French coals. Since the last rise of sterling, however, the situation has changed.

The Belgian miners have accepted a reduction in wages and a strike has been averted. There is still much difficulty encountered in marketing the output, however. Although prices have not been officially changed, rebates of 10 to 20 fr. per ton can be obtained on sized products for transportation on barges.

Rail traffic has been good and freight is being maintained at 22 fr. Bethune-Paris.

Deliveries of indemnity fuel to the O.R.C.A. from the Ruhr for France and Luxemburg during April included 524,600 tons of coal, 729,400 tons of coke and 47,100 tons of lignite briquets, a total of 1,301,100 tons, or an average of 43,370 tons daily. During the first two weeks of May the daily average was 19,000 tons.

U. S. Exports of Coal and Coke During April, by Countries

	(In Gross Tons)	
	1923	1924
Anthracite.....	421,922	245,483
Bituminous.....	1,384,879	942,638
Exported to:		
France.....	175,518	78,551
Italy.....	60,478	109,433
Netherlands.....	19,239	
Other Europe.....	96,415	501
Canada.....	889,900	542,358
Panama.....	9,800	
Mexico.....	11,440	9,089
Br. West Indies.....	11,811	18,557
Cuba.....	51,713	28,020
Other West Indies.....	9,517	26,922
Argentina.....	11,553	25,881
Brazil.....	16,107	73,508
Chile.....		5
Egypt.....	2,569	
French Africa.....	9,019	17,298
Other countries.....	9,800	12,515
Coke.....	201,788	45,382

Export Clearances, Week Ended May 31, 1924

FROM HAMPTON ROADS	
For Brazil:	Tons
Braz. Str. Pocone for Pernambuco.....	4,826
Br. Str. Gilbraltar for Rio de Janeiro.....	5,645
Br. Str. Severnmede for Rio de Janeiro.....	5,355
For Canada:	
Nor. Str. Bratland for Kingston.....	2,000
Br. Str. Wearbridge for Three Rivers.....	6,279
For Chile:	
Dan. Str. Norslys for Iquique.....	5,679
For Italy:	
Ital. Str. Alberta Cavalletto for Porto Ferrajo.....	5,618
Amer. Schr. Orleans for Monopoli.....	1,009
For Venezuela:	
Amer. Schr. Fred W. Thurlow for Tucacas.....	1,522
For West Indies:	
Nor. Str. Wascana for St. Thomas.....	7,531
FROM BALTIMORE	
For Canada:	
Nor. Str. Gunnar Heiberg.....	3,579
For Italy:	
Am. Str. Alamo.....	2,317

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	May 24	May 31
Cars on hand.....	1,459	717
Tons on hand.....	86,910	40,568
Tons dumped for week.....	82,737	141,254
Tonnage waiting.....	30,000	5,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,375	768
Tons on hand.....	98,950	56,150
Tons dumped for week.....	78,034	112,826
Tonnage waiting.....	10,697	5,780
C. & O. Piers, Newport News:		
Cars on hand.....	1,356	1,618
Tons on hand.....	67,580	79,345
Tons dumped for week.....	54,855	77,671
Tonnage waiting.....	8,200	

Pier and Bunker Prices, Gross Tons

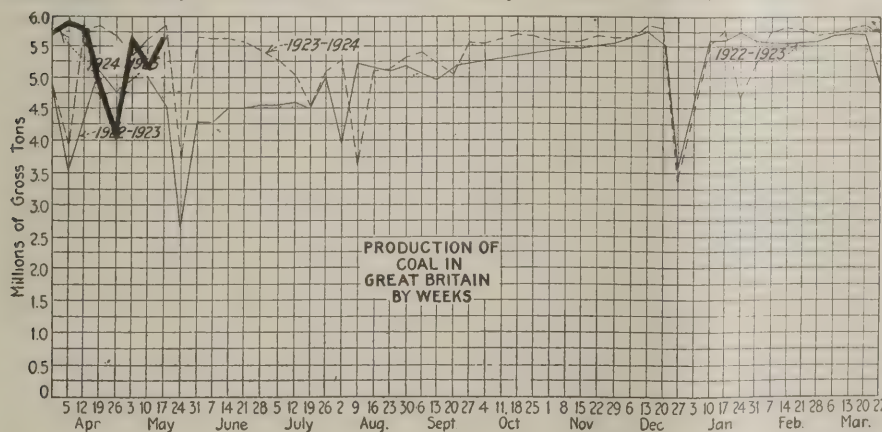
PIERS		May 24	May 31†
Pool 9, New York.....	\$4.85@ \$5.00	\$4.85@ \$5.00	
Pool 10, New York.....	4.60@ 4.75	4.60@ 4.75	
Pool 11, New York.....	4.40@ 4.50	4.40@ 4.50	
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05	
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80	
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55	
Pool 1, Hamp. Roads.....	4.35@ 4.40	4.40@ 4.50	
Pool 2, Hamp. Roads.....	4.20@ 4.25	4.20@ 4.25	
Pools 5-6-7 Hamp. Rds....	4.00@ 4.10	4.00@ 4.10	

BUNKERS		May 24	May 31†
Pool 9, New York.....	5.15@ 5.30	5.15@ 5.30	
Pool 10, New York.....	4.90@ 5.05	4.90@ 5.05	
Pool 11, New York.....	4.70@ 4.80	4.70@ 4.80	
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40	
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00	
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80	
Pool 1, Hamp. Roads.....	4.35@ 4.40	4.40@ 4.50	
Pool 2, Hamp. Roads.....	4.20@ 4.25	4.20@ 4.25	
Pools 5-6-7 Hamp. Rds....	4.00@ 4.10	4.00@ 4.10	

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to Coal Age		May 24	May 31†
Cardiff:			
Admiralty, large.....	28s.	27s.6d. @ 28s.	
Steam smalls.....	18s. @ 19s.	18s.6d.	
Newcastle:			
Best steams.....	26s.	26s.5d.	
Best gas.....	23s.6d. 24s.	22s. @ 23s.	
Best bunkers.....	23s.	22s.	

† Advances over previous week shown in heavy type, declines in *italics*.





News Items From Field and Trade



ALABAMA

Reports from Jasper, Walker County, state that the Deepwater Coal Co., recently organized by L. B. Musgrove and associates, is preparing to make drillings on the Black Creek seam with a view to locating openings for the development of the property.

The Etowah Investment Co. has leased coal properties from the Raccoon Coal Co., of Gadsden, and will make openings on lands located in the western part of the county.

ALASKA

Operation of a first-aid and mine rescue car to serve all the mines located along the Alaska R.R. in the Territory of Alaska has been arranged by Secretary Work of the Interior Department. A railroad car is to be turned over to the Bureau of Mines by the railroad and equipped with oxygen-breathing apparatus, oxygen tanks, first-aid material and fire-fighting equipment, in addition to living quarters for the safety men in charge. This car will be prepared to answer emergency calls. The plan of safeguarding lives of Alaskan miners was initiated by General Manager Landis of the Alaska R.R. and D. J. Parker, chief engineer of the mine-safety service of the Bureau of Mines, who is looking over the bureau's work in safety instruction in Alaska.

COLORADO

J. B. Elby, government geologist, of Washington, D. C., was in Denver late in May en route to western Colorado and eastern Wyoming, where he will survey coal fields and oil deposits.

ILLINOIS

The Inter-State Fuel & Power Corporation, 313 North Main St., Decatur, has been incorporated with capital of \$500,000 to mine and deal in coal and other fuels. The incorporators are M. Harvell, S. O. Harvell, and H. O. Hood.

A meeting of the stockholders and certificate holders of the Lovington Coal Mining Co., of Lovington, was held a few days ago in Decatur and \$20,000 of the necessary \$40,000 was subscribed. The work will be continued and it is believed that the mine will be reopened and operated.

Clarence Bean, for the past year superintendent of the two mines of the Jewel Coal & Mining Co. at Du Quoin, has resigned to be head of a mine of the Willow Creek Coal Co. at Terre Haute, Ind. Fred W. Price, formerly of the

Tamaroa, Little Muddy Coal Co., Tamaroa, has been appointed to succeed Mr. Bean with the Jewel concern.

Jewel No. 2 of the Jewel Coal & Mining Co., of Du Quoin, began operations last week. A new crusher was moved from Mine No. 1 to No. 2 and will be used at this time to crush the lump and egg coal into smaller sizes.

The Hart-Williams mine near Benton has been sealed up and probably will not be operated again. The mine, which is one of the oldest large mines in the state was operated for years by the Hart-Williams Coal Co. of Benton. The machinery and most of the equipment was taken over by Pollack Bros., of Herrin, largest junk and machinery dealers in that section of the state.

KENTUCKY

State Banking Commissioner James P. Lewis, Frankfort, has authorized the Defiance Coal Co., of Lexington, to sell \$100,000 of preferred stock in the state, under the blue sky law regulations.

It was reported from Owensboro on May 22, that United Mine Workers of District 23, who have been on strike since April 15, were to start receiving strike relief on Monday, May 26, announcement to this effect having been made by Lonnie Jackson, district president at Central City, who stated that the international finance agent would arrive on Monday to supervise distribution of supplies. Food and supplies will be issued from commissaries in various parts of the district, and about \$25,000 is to be expended in the first relief.

Abner Lunsford, of Stone, who has charge of Henry Ford's coal interests in Kentucky and West Virginia, was recently elected a delegate to the Democratic National Convention which will be held in New York in June.

MASSACHUSETTS

Boston has awarded a contract for 14,000 tons of semi-bituminous coal for the police, public buildings and other departments to the Metropolitan Coal Co. on proposals advertised twice. The coal for the public buildings department will cost \$6.32 a ton and that for the police and fire boats \$5.95. The Mayor asserts that a saving of nearly \$2,000 was effected on the second bids.

OHIO

The mines of the New Lexington Coal Co., the Silver Fox Coal Co., the Caledonia Coal Co. and mine No. 19 of the Sunday Creek Coal Co., in the vicinity of New Lexington, are resum-

ing operations, following a suspension in most cases of about six months.

The Chesapeake & Virginian Coal Co., Inc., announces the appointment, effective May 12, of Thomas R. Morgan, formerly sales manager of the Webb Fuel Co., as western manager, located at 1322 Union Trust Building, Cincinnati.

Ohio coal miners are being urged to produce more coarse coal and less slack as the result of a conference recently at New Philadelphia between coal operators and Ohio officials of the United Mine Workers. The conference was called by W. H. Haskins, Coshocton, operators' commission to improve Ohio coal in competition with West Virginia and Kentucky coal. Lee Hall, president of the Ohio miners, and G. A. Savage, secretary, are said to have agreed to circularize locals in an effort to improve the quality of coal. Half of the 21,000 Ohio miners are idle, but little relief will be felt until a huge reserve of stock is consumed, Mr. Hall said.

The Central States Coal Co., of Toledo, Chas. T. Harther, president, and S. T. Walbolt, general manager, advise that a reorganization of the Defiance Coal Mining Co., in which they are now financially interested, was completed in their office at Toledo, May 28. The following officers were elected: C. P. Harley, president; W. G. Jarvis, vice-president; Carel Robinson, secretary-treasurer. Mr. Robinson is associated with the Central States Coal Co. and manages the other mines in which that company is interested, viz: Rockhouse Coal Co., Blackey, Ky.; the Solar Coal Co., Conda, Ky., and the Bermuda Coal Co., at Chavies, Ky.

PENNSYLVANIA

Payment last week by the Glen Alden Coal Co. of state taxes amounting to \$922,231 to Auditor General Samuel S. Lewis brought the total receipts for the first year of the present biennium up to \$65,633,679.90. More than a year ago the Auditor General predicted that the receipts for the present appropriation year, ending May 31, would surpass \$65,000,000.

Work has been started by Maurice Sullivan, contractor, on the dismantling of the Sloan breaker and shaft of the Glen Alden Coal Company. The timbers and machinery are being salvaged. It will take several months to complete the contract.

The Bureau of Mines, Pittsburgh station, proposes to broadcast a message to the chapters of the Joseph A. Holmes Safety Association at 8:30 p.m. (daylight saving), June 6 and 20. A.

C. Fieldner, superintendent of the Pittsburgh Station, will deliver the first address, which will be in reference to the service being rendered by the Pittsburgh station of the safety association. Mr. T. T. Read, safety service director, who became safety service director June 1, will make the second talk, on the safety work of the Bureau of Mines.

The Baton Coal Co. (George S. Baton), First National Bank Building, Pittsburgh, has taken charge for the Union Trust Co. of the mines acquired at the sale by the receivers of the property of the American Coke Corporation several months ago. The properties consist of American mines Nos. 1 and 2 and beehive ovens at Linn, near Brownsville, and the Sunshine Mine at Martin, both in Fayette County. The mines at Linn are nearly worked out and the Baton company is withdrawing the pumps and will allow them to fill with water, dispensing with the services of the superintendent at that plant, William H. Hardy. The property will be left in charge of a watchman. None of the above mentioned plants has operated since being acquired by the Union Trust Co.

A four weeks' course in coal mining, for which 25 men will be accepted as students, will be given beginning June 16 by the Carnegie Institute of Technology, Pittsburgh, in co-operation with the U. S. Bureau of Mines experiment station. The course, the subjects for which will be prepared with the advice of a committee of coal operators, will include sessions each morning at the institute in mine laws and regulations, ventilation, gases, safety lamps, methods of working, explosives, timbering and mine arithmetic. Afternoon sessions will be held at the experiment station in mine rescue and first aid, coal-dust explosion demonstrations and permissible explosion demonstrations, with lectures. A special examination for firebosses, assistant mine foremen and mine foremen will be given at the station by the State Department of Mines at the close of the course, July 16, 17 and 18.

A class of 247 took the examination in Johnstown last week for first- and second-grade mine foremen certificates and 100 applied for fireboss certificates. The board of examiners is composed of Mine Inspector Nicholas Evans, of Johnstown; George W. Wilkes, of Windber, mine superintendent of the Berwind White Coal Mining Co., and Robert Jones, a miner, of Windber. The board was assisted by John I. Thomas and Thomas D. Williams, both of Johnstown. Additional examinations will be held at State College and in Pittsburgh following the close of the short courses in mining at Carnegie Tech. and State College on July 15.

TENNESSEE

O. P. Pile, Chief Mine Inspector, and the Examining Board will hold a mine foremen's examination in the Federal Building, Knoxville, June 3, 4, 5, 1924.

WASHINGTON, D. C.

C. Lorimer Colburn, who is promoting the Joseph A. Holmes Safety Associa-

tion work for the U. S. Bureau of Mines, will soon make a trip to Norton, Va.; Knoxville, Tenn.; Birmingham, Ala.; Baton Rouge, La.; Bartlesville and McAlester, Okla.; St. Louis, Mo.; southern Illinois and Vincennes, Ind., thence returning to Pittsburgh.

WASHINGTON

Examination and prospecting of six sections of land south of Wilkeson and adjoining that property, under the direction of Mel C. Butler, proved the continuation of the Wilkeson seams and also revealed three additional seams, making seven seams of high-grade of coking coal containing considerably over 25,000,000 tons. The Pacific Coke & Coal Co., will develop the property through a tunnel some two miles long which will cut all the seams on both dips. The company expects to produce 2,000 tons of washed coal per day. E. F. Lawson is manager of the company and Mr. Butler is engineer-superintendent.



Ira Clemens

President of the Clemens Coal Co., Pittsburgh, Kan., and one of the new vice-presidents of the National Coal Association named at the Cincinnati meeting.

WEST VIRGINIA

The Coal River Collieries Co. has increased its capitalization from \$2,500,000 to \$5,000,000 and the American Eagle Colliery from \$400,000 to \$500,000.

Construction work has been started by the Philadelphia & Cleveland Coal Co., the Logan Dock Co. and I. R. Ingersoll, of Cleveland, on a coal dock for the Ohio River at Huntington, to cost approximately \$600,000.

The following coal companies have been dissolved as corporations: Thomas Smokeless Coal Co., Plum Eagle Coal Co., High & Low Volatile Fuel Co. The Anchor Coal Mining Company has been dissolved by deed of sale. The New River Collieries company has withdrawn from the state.

The property of the Barbara Mining Company on Scott's Run in the Monongalia field was sold at public auction on May 24. This is a fully equipped mining plant operating in the Waynesburg seam. The sale included com-

pany houses, tipples, siding, trackage and other mining equipment and machinery.

D. C. Jones has been designated as receiver for the Carry-On Coal Co., a Huntington corporation capitalized at \$200,000, by Judge Thomas S. Shepherd in the Circuit Court of Cabell County. H. S. Brown, who with his wife, owns a controlling interest in the company, asked that a receivership be appointed in connection with a pending chancery suit against the company.

At a special convention of the miners of District No. 17 held at Charleston a resolution was adopted calling for abolition of the four subdistricts in the district, subject to a referendum of the members of the union in the district, in order to reduce operating expenses. At the same time a policy was formulated providing for the strictest economy possible in the conduct of the affairs of the district. Such action became necessary in order to meet conditions now confronting the organization in its effort to maintain its existence in northern and southern West Virginia, for with membership greatly reduced the union has not been able to pay any strike benefits where circumstances appeared to call for it.

The statement in *Coal Age* of May 22 that the Elkhorn Piney Coal Mining Co. had closed its Huntington offices was a mistake. The company has curtailed the personnel of its Huntington office but the office is still in operation. D. T. MacLeod, who resigned as of Jan. 1, 1924, has been superseded by George W. Mackie.

The Circuit Court of Monongalia County has sustained the exceptions to the answer of the defendant in the injunction proceedings of the Chaplin Collieries Co. against the Pursglove Coal Mining Co. involving the right of the defendant company to mine all of the coal beneath the Sewickley coal of the plaintiff company. This case, as has already been stated, involves the mining laws of West Virginia as well as the question of mine rights.

After a delay of about two months, the Bertha-Consumers Company has signed the Baltimore agreement. The contract between the company and the union was signed at Pittsburgh at a meeting between John H. Jones, president of the company, and Percy Tetlow and others representing the United Mine Workers. Inasmuch as the contract is effective at once, it is understood that President Jones contemplates a resumption of operations at the Bertha mine at Madsville in the near future.

Receivership proceedings having been instituted against the Beckley Pocahontas Coal Co. in Cabell county. A. P. Grady, of Huntington, has been appointed receiver by the court. Those familiar with the case are inclined to believe that the company will be able to right itself and that its affairs will be worked out satisfactorily. This company has its mines at Besoco, in Raleigh County, on the Stone Coal Branch of the Virginian Ry. as well as on the Chesapeake & Ohio Ry. There are about 2,000 acres of smokeless coal

under lease, with about 18,000,000 tons available. Under present equipment the property is able to produce from 18,000 to 20,000 tons of coal per month.

The Consolidation Coal Co. adopted a centralized system of purchasing, effective June 1, by which this phase of the company's business is conducted from the company's main offices in the Watson Building, Fairmont. This will eliminate the division purchasing offices at Somerset, Pa., Frostburg, Md., Jenkins and Van Lear, Ky., and Coalwood, W. Va., all of which are grouped in Huntington with A. T. Watson as general purchasing agent and F. C. Davis as assistant purchasing agent.

WYOMING

Miners for the Rock Island Coal & Mining Co. at Hartshorne struck May 20 when the company refused to permit them to go back to open-flame carbide lamps. Electric lamps had been adopted but ruled against by Ed. Boyle, mine inspector. The company has appealed to the federal court to enjoin Boyle from interfering with the safety program.

Promotions in the personnel of the Union Pacific Coal Co. have been made by President Eugene McAuliffe to fill the vacancy caused by the death of E. S. Brooks. George B. Pryde moves up from general superintendent to the vice-presidency and general management of mines, A. W. Dickinson is advanced from safety engineer to general superintendent and John A. Smith from engineer to safety engineer.

CANADA

Sir Stephenson H. Kent and Sir John Scott Hindley, British coal dealers, are in Montreal with a view of establishing in connection with local distributors a new company to deal with the Canadian trade. It will be known as the British Canadian Coal Co. and will be operated

in connection with the Canadian Industrial Coal Co., Ltd., Sir Stephenson Kent said in an interview: "We do not anticipate sending over sufficient quantities to appreciably affect the amounts received from American mines." He pointed out that the English collieries must have a market to enable them to maintain steady production. The mines being made much deeper than those of the United States, requiring large capital and heavy overhead charges, could not be worked on short time with low production without entailing a loss.

Following a conference in Toronto between Premier Ferguson and various interests concerned in shipping Alberta coal to Ontario, it was announced that Ontario and Alberta jointly would submit a new proposal to the Canadian National Rys. to the effect that two solid trainloads of Alberta fuel be sent eastward and that these trainloads be made a practical test of cost per ton of transportation.

At last account there was no indication of any termination of the deadlock existing between district No. 18 of the United Mine Workers, embracing Alberta and eastern British Columbia, and the Western Canada Coal Operators' Association. The miners have been on strike since April 1 and neither side is inclined to make any move in the direction of conciliation or the reopening of negotiations.

The Princeton, (B. C.) Colliery Co. has been incorporated in London, with a capital of £1,100, to take over and operate the Princeton Coal & Land Co.'s coal mines and town sites. This appears to be a reorganization with nominal capitalization. The Princeton Coal & Land Co. is capitalized at \$1,000,000, and for several years has been operating a small coal mine and developing prospects near Princeton, besides selling land in the town.

The Mineral Tax Act of the Province of Alberta has been disallowed by the

Dominion Government on the ground that it interfered with Dominion rights and was in conflict with Dominion policy and interests. The public lands of the western provinces belong to the federal government and the mineral rights are reserved when the lands are disposed of. The Alberta act provides for the collection of the tax by distraint upon the equipment and plant of the lessee, which often is the only security the federal government has for the payment of rent or royalties. The act was therefore declared *ultra vires*.

New Companies

The new Bevier Coal Co., Cleaton, Ky., capital \$100,000, has been chartered by John W. Price, John W. Bastin and R. S. Lytle.

The Paramount Fuel Co. of Illinois, with a capital of \$30,000, has filed articles of incorporation in Missouri, with headquarters in Kansas City and with a capital of \$10,000. The company will mine coal and sell coal and coke. The principal agent in Missouri is Julius C. Smith, of 524 Dwight Building, Kansas City.

The Valentine Coal Co., of Kansas has filed articles of incorporation with the Secretary of State at Jefferson City, for Missouri, with a capital of \$60,000 and headquarters in Worland. The company will carry on a business of mining, stripping and selling coal. A. A. Grimmel of Worland is the principal agent in Missouri.

The Missouri-Oklahoma Fuel Co. has been incorporated at Muskogee, Okla. with a capital of \$100,000. The incorporators are William McKinnon, of Kanima; E. H. Mills, of Springfield, Mo., and E. D. Holley, of Stigler, Okla.

The Vanzandt Coal Co. has been incorporated at Gadsden, Ala., with a capital stock of \$2,000 and will begin mining operations near Altoona. W. A. Booker is president and W. M. Booker, secretary-treasurer.

The Portage Coal Co., Kenmore, Ohio, has been chartered with an authorized capital of \$125,000 to mine coal and deal in coal and coke at both wholesale and retail. Incorporators are S. M. Ranger, B. R. Felt, D. S. Felt, S. H. DeLong and L. C. Wogan.

A Dominion charter has been granted to the McMaster Coal & Transportation Co., Ltd., Montreal, Canada, who engage in business as manufacturers, operators and dealers in coal and all its byproducts. The authorized capital is \$50,000 and the incorporators are Montreal lawyers.

Industrial Notes

The Pulaski Iron Co., of Eckman, W. Va., has completed arrangements for the installation of a "Rands" shaker loading boom to be used at the tippie of the company at Eckman. The contract for the installation has been awarded the Roberts & Schaefer Co., of Chicago.

Construction work has been started at Whitman, in the Logan county field, on a new steel tippie which will rank as one of the best in southern West Virginia. It is to cost approximately \$100,000 and will replace a wooden structure now in use. The tippie will be ready for operation about Sept. 1.

The Blackwood Coal & Coke Co., of Blackwood, Va., has contracted with the Roberts & Schaefer Co., for the complete installation of concrete storage bins and tippie at their new operation at Calvin, Va. The tippie will be complete with revolving dump and reinforced concrete storage bins of a capacity of 2,500 tons. In connection with the storage bins will be built a steel Marcus tippie.

L. D. Albin, formerly general sales manager of the Ingersoll-Rand Co., 11 Broadway, New York City, has been elected vice-president in charge of European sales of that company. D. C. Keefe, formerly assistant general sales manager, has been appointed to succeed Mr. Albin as general sales manager.



Courtesy U. S. Distributing Corp.

"Fording" Through a Mine Entry in Wyoming

This scene was taken in the Monarch mine. The seam reaches a thickness of 40 ft. so this picture gives only a partial idea of the depth of the deposit.

Traffic News

Buffalo-Twin Cities Rate Boost Effective July 1

The Wabash R.R. has given notice that the increase in rate on hard coal from Buffalo to the Twin Cities, amounting to \$1.16 per gross ton, becomes effective July 1. It was expected to go into force May 29, but it was not possible to get out the new tariffs in time. Retailers who specialize in all-rail hard coal have been rushing deliveries through in advance of the new rate, and are going to be pretty well stocked up. The dock concerns state that they do not expect to advance prices in the Twin Cities because of the virtual elimination of all-rail competition.

Obituary

Ray M. O'Connell, 27 years of age, died at his home at Delhi, a suburb of Cincinnati, on May 26. He had been in the coal business all of his business life. Was associated with the Western Coal Company and afterward a partner in the Southeastern Coal Co., resigning a year ago to go into business for himself. Early this year he was stricken with typhoid fever in Cumberland, Md. He had been out only a month when he took the boat ride at the convention of the National Coal Association, where he contracted a cold that turned into pneumonia resulting fatally.

W. L. Davis, attorney, of Lexington, Ky., died at his home there on May 22 after a short illness, of apoplexy. Mr. Davis has long been associated with Colonel Dudley, of the Kentucky River Land Corporation, which owns large acreages in the Hazard district under production of coal. With Colonel Dudley and others he was a large stockholder in operations in Perry and Clay Counties, Kentucky.

Recent Patents

Method of and Means for Extinguishing or Suffocating Explosion in Mines; 1,476,624. Hermann Kruskopf, Dortmund, Germany. Dec. 4, 1923. Filed July 7, 1920; serial No. 394,597.

Byproduct Coke Oven; 1,476,524. Z. H. Kevorkian, Fairfield, Ala. Dec. 4, 1923. Filed July 7, 1919; serial No. 309,192.

Peat-Fuel Machine; 1,476,407. Alexander McDougall, Duluth, Minn. Dec. 4, 1923. Filed Dec. 30, 1922; serial No. 609,788.

Apparatus for Loading Coal; 1,476,882. John A. Forsyth, Nemascolin, Pa., assignor of one-fourth to Clyde J. Smith, Uniontown, Pa. Dec. 11, 1923. Filed Oct. 19, 1921; serial No. 508,712.

Mining Machine; 1,476,726. Thomas E. Pray, Chicago, Ill., assignor to Goodman Mfg. Co., Chicago, Ill. Dec. 11, 1923. Filed Aug. 3, 1921; serial No. 489,517.

Loading Apparatus for Mining; 1,476,897. Nils D. Levin, Columbus, Ohio, assignor to the Jeffrey Mfg. Co., Columbus, Ohio. Dec. 11, 1923. Original application filed Oct. 22, 1910; serial No. 588,471. Divided and this application filed March 6, 1918; serial No. 220,818. Renewed April 30, 1923.

Association Activities

The Buffalo Bituminous Coal Association held its annual meeting May 27 and elected Harry F. Coxon, Fred A. Mohr and Gurnsey Camp, trustees, Harold B. Alderman and C. J. Renwick holding over. On the following day the new board, according to rule, selected from its own body the following officers: President, Harold B. Alderman; vice-president, Harry F. Coxon; secretary-treasurer, C. J. Renwick; delegate to the convention of the American Association at White Sulphur Springs, retiring President C. F. Westfall.

The Toronto Wholesale Coal Association held its annual meeting and luncheon recently and elected the following officers: President, Fred A. Fish, of the F. A. Fish Coal Co.; Vice-President, W. H. Cox, of the Cox Coal Co.; Secretary-Treasurer, K. Thompson, of the Dunlop Coal Co. Only routine business was transacted at the meeting.

Publications Received

Coal Resources of the Raton Coal Field, Colfax County, New Mexico, by Willis T. Lee, U. S. Geological Survey, Washington, D. C. Bulletin 752. Pp. 254; 6x9 in.; illustrated. Describes the geologic features and coal resources of the developed part of the Raton coal field.

Stone Dusting or Rock Dusting to Prevent Coal Dust Explosions, as Practiced in Great Britain and France, by George S. Rice, Bureau of Mines, Washington, D. C. Bulletin 225. Pp. 57; 6x9 in.

Central District Bituminous Coals as Water-Gas Generator Fuel, by W. W. Odell and W. A. Dunkley, Bureau of Mines, Washington, D. C. Bulletin 203. Pp. 92; 6x9 in.; illustrated. Covers work done under a co-operative agreement between the Bureau of Mines, Illinois State Geological Survey and the Engineering Experiment Station of the University of Illinois, with the hope of helping the gas industry during the latter period of the war and of promoting the use of Central District coals for gas making.

Bankruptcy Reform. The Merchants Association of New York. Pp. 116; 6x9 in. Report by the Committee on Bankruptcy appointed by the President in 1922.

Coming Meetings

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

Midwest Retail Coal Association. St. Louis, Mo., June 17-18. Secretary F. A. Parker, St. Louis, Mo.

Colorado and New Mexico Operators' Association. Annual meeting June 18, Denver, Colo. Secretary, F. O. Sandstrom, Denver, Colo.

American Society for Testing Materials; annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers, annual convention, June 23-27, Edgewater Beach, Chicago, Ill. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

First International Management Congress, Prague, Czechoslovakia, July 21-24.

World Power Conference, Wembley, London, England, June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

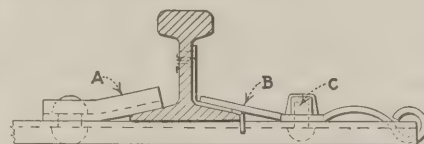
Rocky Mountain Coal Mining Institute. Summer meeting, Aug. 7-9, Rock Springs, Wyo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New Equipment

Another Metal Track Tie

For more than 14 years, many different kinds of metal ties have been placed on the market. S. M. Casterline, of Crafton, Pa., has lately designed a tie which, he claims, overcomes many of the disadvantages of other ties.

In the illustration, cleat A holds one flange of the rail and is riveted to the tie, which is of the usual steel channel construction. Strap B, fastened to the tie by means of a circular collar holds the other flange of the rail. In the strap is a longitudinal slot, so that when it is swung inward to extend over the flange of the rail, the upper end of the stud C projects through the slot. A track spike or any piece of wood or metal may then be forced through the stud, thus jamming the strap down in position and holding it there. It is claimed that one of these ties can be put in position or released in a moment's time with very little effort.



Boltless Mine Tie

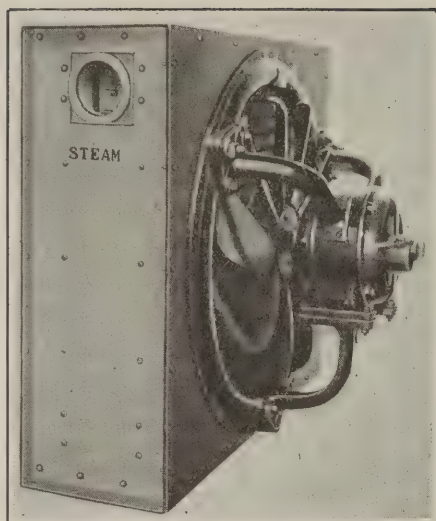
Cleat A holds one side of the rail and strap B the other. The end of the strap fits into the slot C and locks the strap in position.

Fan with Heating Unit

A new device has just been placed on the market by the American Blower Company, Detroit, Mich., for heating the air entering warehouses, offices and other buildings. Its light weight and rugged construction make it applicable to installations where ordinary heating units would be cumbersome and impracticable. Steam coils in the heater are made from copper and brass, which offer much less resistance to the heat. The arrangement of the tubes, it is claimed, is such that approximately five times as much heat is transferred to the air as is usual with similar heating devices.

The tubes are made of straight, seamless, copper and brass tubing, upon which is a helically wound copper ribbon forming a continuous fin. This fin is shaped so that a large part of its surface is in contact with the tube. The construction insures easy transmission of heat from the tube to the fin and from there to the air passing over the pipes.

Standard heaters are built to withstand a pressure of fifty pounds of steam, liquid, or any commonly used vacuum. All materials used are of non-corrosive metals insuring long service even under severest conditions. A disk type fan driven by a standard motor is part of the unit and is usually supplied with all orders.



Motor-Driven Air Heating Unit

This heater provides means for controlling the ventilation and temperature of the air in offices or warehouses. A fan circulates the air around steam heating coils designed to warm the incoming air and prevent drafts.

The most efficient way to install the heater is to place it in a steel housing designed to take in cool air near the floor, and discharge it about 7 ft. higher. This insures complete circulation of the air within the range and capacity of the fan.

Transformer for Electric Arc Welding

The American Transformer Co., 178 Emmett St., Newark, N. J., has just developed a new air-cooled welding transformer. The secondary coils are constructed of heavy drawn-copper strips and the terminals are braised to the winding at each turn. This arrangement obviates the necessity of

cast copper terminals clamped to the winding and has made it possible to design the transformer for 750 amps.

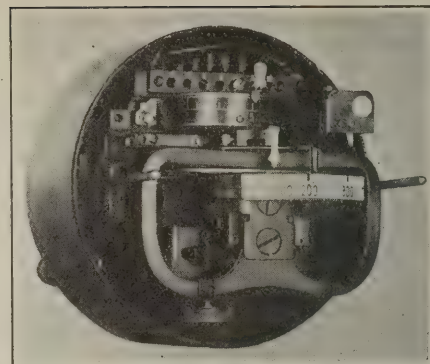
The primary circuit consists of two coils so arranged that the transformer may be used on 110-volt or 220-volt circuits. The secondary winding is split into five sections so that from 0.67 to 3.35 volts can be obtained. The transformer is rated for 1 kva. and is for use on 60-cycle circuits. It is particularly suitable for operation on lighting circuits and will no doubt be found very useful wherever high currents are desired.

Relay Indicates Current Flowing in Line

After an accident has happened to a power line or a piece of electrical machinery many have wondered why the protective equipment did not function to prevent the disturbance. Frequently an investigation showed that the protective relays did not function properly, were out of order, or were not even connected in the circuit as was supposed.

To meet such conditions the Westinghouse Electric & Mfg. Co. have recently placed on the market an improved-type induction relay, with an indicating scale which shows the value of the current flowing in the line. This new feature obviates many difficulties, and removes, beyond the question of a doubt, any confusion in a electrician's mind, as to whether or not current is passing through the relay and it is ready to trip a circuit.

There are other advantages of such an indicating relay, it shows the current flowing in a line and directly impresses the electrician or engineer with the difference between the actual current flowing in a line due to poor power factor, and the estimated current which one might think should be flowing. Unbalanced, three-phase circuits are



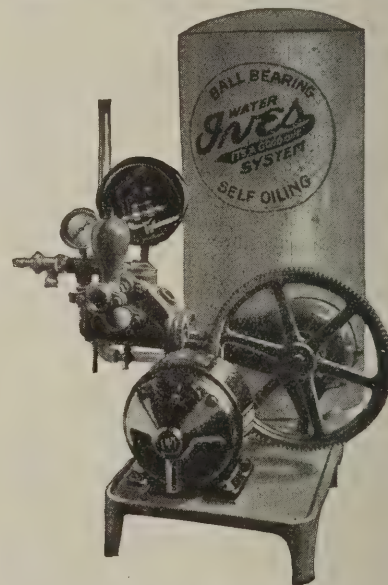
Instrument Protects Equipment and Discloses Unbalancing

Such a device as this takes much of the guess work out of properly setting overload relays. It immediately indicates any unbalancing of three-phase circuits when used in conjunction with two other similar relays.

very easily detected by this relay. This is especially important on three-phase, grounded-neutral systems. Many three-phase machines and transformers are now working under conditions where they cannot deliver their full or expected kilowatt capacity, because of unbalanced conditions, existing on the lines unknown to the electrician.

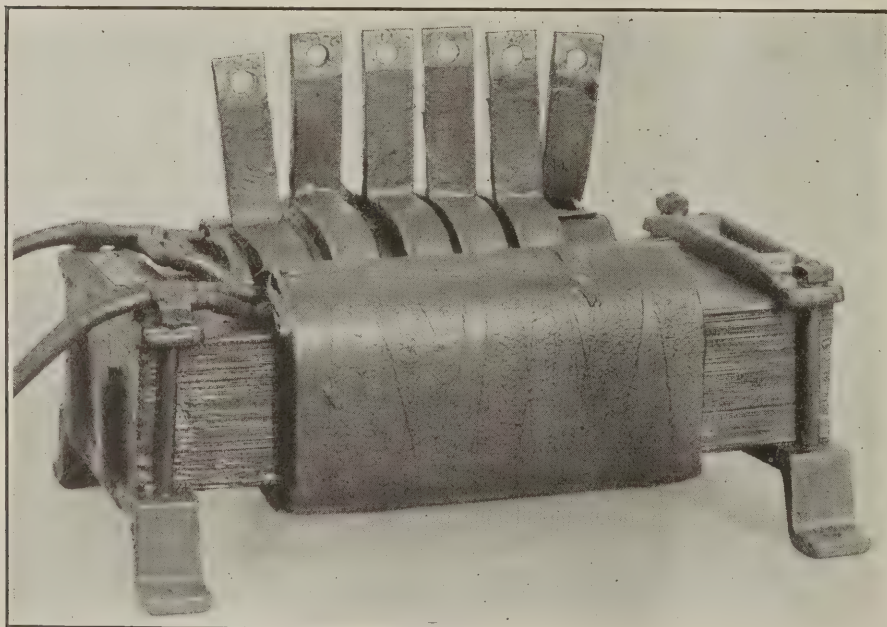
New Ball-Bearing Pump

The Ives Manufacturing Co., 203 Hanover St., Baltimore, Md., has recently placed on the market a direct-gear-driven ball-bearing shallow well pump. This unit consists of a single-cylinder, double-acting, brass-lined col-



Small Single-Cylinder Pump

Being brass-lined and having bronze valve seats this unit is quite practical for pumping small quantities of mine water.



Transformer with High-Current Secondary

There are no clamped or soldered connections in the windings of this transformer. Such a detail makes it particularly suitable for alternating-current welding, high-current testing and pipe thawing. Taps can be easily made to the copper lugs.

umn pump made in several sizes. It is compactly designed and accessible for repair. It is driven by an eccentric shaft working at all times in oil. Noiseless operation is obtained by the use of soft-rubber valves fitted on renewable bronze seats. The capacity of the pump is 120 gal. per hr., and it is driven by a 1/4 hp. high-torque motor with automatic pressure control.

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, President
E. J. Mehren, Vice-President

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. Dawson Hall
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Make a Scale in Haste And Repent at Leisure

NO ONE can afford to set a tonnage scale for mechanical loading until its technique has been perfected. If one is made now it will be little lower than that for hand loading. Once fixed no changes in machines or methods will be allowed to modify it, and the art of loading will be arrested in its youth. The operator will be left only with his regrets. The hasty provisions made when mining machines were introduced have hampered development seriously from that time to this. To this day there are only two scales, that for punchers and that for chain machines and the operator has no advantage if he introduces a shortwall or arc-wall machine, provides means for ready loading and unloading of the machine or affords a long working face. In consequence the operator has been slow to adopt the better classes of machinery and advanced methods of operation.

The union is today quite strong. We question whether at this juncture a change in loading machines as revolutionary as that between punchers and chain cutters would cause a revision of the tonnage scale. Consequently it is well to go slowly in forming a scale so that the industry can go rapidly in developing its loading machinery.

Wage Standardization

NON-UNION operations cannot but feel some alarm at the constant wage reductions. They must know that their employees will compare the wages paid in non-union mines with those current in the union regions. If the practice of lowering wages to meet every new contract made continues, the wage rates will fall below a level at which any working man can live. The non-union regions may then be overrun by the union as easily as was the Pittsburgh region in the nineties.

Information has been received that at least one company in West Virginia is paying \$2.88 per day to its underground daymen and \$2.80 to its surface employees. In one Pike County, Kentucky, mine, it is said, drivers are getting 35c. an hour, trackmen 45c. an hour, hand mining is 52c. and machine mining 42c. a ton. Compare these rates with those in the Pittsburgh regions where drivers and trackmen receive 93½c. an hour, where the pick-mining rate is \$1.1164 per ton (thin vein) and \$1.0311 per ton (thick vein) and where the rates for mining by machine and loading by hand are 94c. (thin vein) and 88.31c. (thick vein) in wide work with extra allowances for narrow work.

To all appearances the wage rate in non-union fields tends to decline and will continue to do so unless the non-union operators meet together and decide to stabilize the wage. The present cut-throat competition cannot fail to have an unfavorable reaction on the non-union regions.

You Can't Please Everybody

IT IS sometimes quite difficult to understand the Canadian viewpoint. One man will declare that American coal should be excluded from Canada as she has plenty of her own, another that it is to be regretted that the anthracite operators discriminate against Canada so woefully. As a matter of fact there is no such discrimination, Canada and all remote markets being served first for good and substantial transportation reasons.

Hearing these contrary arguments, one is disposed to believe that Canada argues for herself all the time. As a matter of fact the man who wants to exclude American coal is quite likely to be a coal producer or a Canadian Government engineer, and the man who condemns the slow receipt of anthracite is probably a coal consumer of Ontario. Their point of view is different and so their plans for Canada clash.

What of it! We have advocates in the United States of foreign markets for United States coal and we have those who believe that we ought to ship only manufactured articles, keeping our fuel at home. There are those who believe that the Canadian who has bought our anthracite for years has just as much right to receive it as the consumer in New York. Others contend that we have but little and should keep it for our own consumption and perhaps, in the last analysis, that it is Pennsylvania's coal and it should be kept in Pennsylvania. The miners it will be remembered tried to keep the coal at the mines till the needs of their own communities were fully satisfied.

In England also there are many viewpoints. At one time a tax was put on exported coal to prevent it from leaving the country. But on the whole most people are in favor of the foreign coal trade and of making it easy to get the return cargoes of ships engaged in the transport of coal.

Mr. Geddes shows a little acerbity at times about America's "big stick." Canada has in her time used her "big stick" also. She has trade that some people in the United States want and she can quite readily insist on getting what she wants in return for what we want. She has not been slow to do it. The problem must be settled with equanimity and good will. Our markets should be unrestricted.

If Alberta can displace anthracite coal in Manitoba and Ontario she surely is welcome to do so. Let the best man win. However, it would seem unfair to rest the situation on Sir Henry Thornton and the railroads. Why not for a change try to make the Alberta mines more efficient? Of course there is place for the inefficient operation serving a small local market, but we fear that Alberta has few, if any, mines with the most up-to-date equipment and till she has she must continue to have a relatively narrow market. The vision of Alberta men is on the development of resources. They might well narrow it to developing technique. Properly operated

mines will command their own markets. Economies in operation will do more for Canada than polemics about resources and national heritage.

Fallen in the Pit They Dugged

IN TIMES of coal plethora the operator will do anything to please. He will make all kinds of coal to meet the demands of consumers. As a result he will make sizes he can move only at an immense sacrifice. Once prepared to make that fine size he is likely to continue to make it—first because he has created a demand for it, secondly because he has created a desire on the part of those who have had it excluded from the size they have bought to get coal with the smaller size excluded, thirdly because both parties get to know they can burn that particular coal to advantage and doubt if any other coal would be as economical or desirable in price or quality, fourthly, because much money has been expended in preparing for sizing and the operator does not want to throw it away by ceasing to make the additional size, fifthly, because the consumer buying the finer size will not want to pay more for the mixed size and the consumer buying the larger coal will want to pay less if the coal is mixed. For these reasons, we may cry aloud for simplification of sizes without getting it. Once started it continues forever.

Some sizing is advantageous. Probably, too much mine-run coal is used; it would be better if almost all coal were separated into three or four sizes. Combustion would be better regulated and less coal would be lost on the grates. But the many sizes we now have are a ridiculous excess and serve no useful purpose, except to make marketing difficult. The manufacturer can make sufficient collars or shirts to suit the demand. If there is a shortage of "fifteens" he can put his factory to making that number and cease making "fourteen and a half," but the coal man must continue making all the sizes though perhaps he has sale for only one of them. There is a call for lump and to supply that size perhaps six sizes are made for which there may be little or no market or there is a call for some one of three kinds of screenings with a like result. If coal men could make coal of any size to order without also making sizes that are not desired there would be less harm in this meticulous sizing.

Faults and Mining Fractures

IN DISCUSSING the action of the longwall face a speaker at the Cincinnati Convention questioned whether the fracture below the "point of draw" was vertical or sloping. Knox and Statham have held the British point of view that the crevice was inclined at an angle of about 70 deg. and sloped forward to a point somewhat in the rear of the advancing face, that is over the gob, from which point it sloped back toward the coal face.

The interesting point about the British contention is that the crevice in the roof if thus inclined closely follows the slope of faults, many of which have been traced repeatedly in coal and metal mines. Most of these faults are inclined at 70 deg., and the line drawn from the coal face to the point of draw is about 20 deg. from the vertical or 70 deg. from the horizontal, a striking but perhaps misleading coincidence. No one has ever seen in nature, as far as can be learned, any

turn in a fault corresponding to the angular fracture in the roof of the coal which British theorists describe. Perhaps that is because no one has ever traced faults far enough below the surface. The suggestion, however, that faults are fractures like those in mine roofs is intriguing, and would be more so if the British had been able to make good their contention.

There is no reason why an absolute proof of the British point of view should not be attempted. Suppose a mine is opened in the lowest of several seams and the coal is removed so as to cause a longwall break extending up to the surface. There the locus of the points of draw could be carefully followed on the top of the ground. Openings could then be made in one or more intermediate seams, places being driven till the fracture was reached. The maps of the lowest and intermediate workings and of the surface would show whether the fracture was approximately vertical or sloped down to the coal face or to some line in front of that face. The work done would not be lost, but could be used to advantage in the future development of the seams. Perhaps this interesting experiment yet may be made where conditions favoring this sequence of development would make the operation profitable or at least not unduly costly.

The question is not an unimportant one. On it depends many of our conclusions as to the possibility of working extensive longwall faces without back filling. The problem may appear valueless and a mere abstract question of roof stress and breakage, but it has a distinct economical aspect and is worthy of elucidation.

Consolidation or Bankruptcy

CONSOLIDATION is being considered as a way of avoiding bankruptcy but unfortunately there are many concerns which are not yet convinced that the inventory value is not the true value. The money may have been invested and the investment may have been made in good faith, but the value of the mine is wholly different from the investment. If the coal is not clean and readily salable, if the equipment will not produce cheap coal it is immaterial if \$500,000 or \$1,000,000 has been invested. The headworks have been built for the coal beneath them, and the profit must be derived from that coal and not from the invested capital.

Estimates of value are made only with difficulty. Some will consider only the cost of equipment and unused development; others will base the estimate on possible profit, but that quantity greatly varies. In times of close competition a mine may be valueless; at times of coal shortage the mine may have real value. The true commercial value is hard to obtain. Most consolidations are made on the basis of valuations that do not represent the commercial but rather the inventorial value. Consolidations thus made in many cases have excessive capitalization. In fact a consolidation based on a really conservative estimate of value is hard indeed to establish.

However, consolidation whether with a watered or a true valuation is worth while. The consolidated company is able to keep such mines as it operates working full time. It can work those supplying the cheapest and best coal. It can use experience gained from tabulations in one mine as guides for the operation of another. It can reduce overhead and the cost of selling coal.



McDermid Tipple West of Edmonton

Alberta Seeks to Fill the Coal Bins of Canada

Would Seek Tariff to Keep Out United States Coal but
Would Like to Continue to Sell Coal in Spokane and Ad-
jacent Markets — Too Many Mines Cause High Costs

By M. D. GEDDES
Calgary, Alta., Can.

ALTHOUGH it is not generally known Canada, in coal resources, ranks second among the nations of the world. Unfortunately for her, however, her immense coal reserves are far removed from her present industrial activities and main centers of population.

What a different story there would be to tell today if the North American continent had been discovered by way of the Pacific instead of the Atlantic. Alberta with her coal supremacy would by this time have been a mighty hive of industry and wealth. No nation on earth, during modern times, ever became truly great unless it possessed within its borders an abundance of coal.

As determined by the geological survey of 1913, the total coal reserves of Canada, which includes the Northwest Territories, the Yukon and the Arctic Islands, are placed at 1,234,269,000,000 metric tons, of which Alberta is credited with 1,072,627,000,000, or over 85 per cent.

The figures, as taken from the report just mentioned, are as in Table I.

Quebec and Prince Edward Island, it will be noticed, have no coal so far as is known. The report shows the tremendous preponderance of coal in Western Canada which holds practically all the coal in Canada except what is contained in Nova Scotia. The entire quantity

in New Brunswick and Ontario, as shown by the report, would only last Canada five and a half years, as the present rate of consumption exceeds 32,000,000 tons annually.

The total world reserves are placed at 7,397,553,000,000 tons so it will be seen that out of every seven tons of coal in the world one is in the province of Alberta. To put this another way, Alberta has 15 per cent of the known coal supply of the world, over 70 per cent of all coal known to exist in countries under the Union Jack and fully 85 per cent of all the coal in Canada.

Table II gives the estimated coal tonnage in British possessions, other than Canada.

It has been figured that Alberta alone has sufficient coal to supply a hundred million people for 170 centuries. The coal deposits of that province cover an area

Table I—Probable Coal Resources of Canada

Province	Metric Tons
Alberta	1,072,627,000,000
British Columbia	76,035,000,000
Saskatchewan	59,812,000,000
Nova Scotia	9,719,000,000
Arctic Islands	6,000,000,000
Yukon	4,940,000,000
Northwest Territories	4,800,000,000
Manitoba	160,000,000
New Brunswick	151,000,000
Ontario	25,000,000
Total	1,234,269,000,000

**Table II—Coal Resources of British Possessions
Omitting Canada**

Countries	Tons
Great Britain and Ireland	189,553,000,000
Australia	165,572,000,000
India	79,001,000,000
South Africa	56,200,000,000
New Zealand	3,386,000,000
British Islands in the Pacific	75,000,000
Total	493,767,000,000

exceeding 81,000 square miles and the grades range from lignite to anthracite with the poorer grades greatly predominating in tonnage as is usual in all coal countries. Authorities tell us there are over 45 billion tons of anthracite, semi-anthracite, or high-carbon bituminous coals and this quantity at the present rate of consumption would last over 14 centuries before the low-carbon bituminous or lignite coals would require to be used. Quite a considerable quantity of the lignite coal is of extra high quality and as it is close to present railway lines, is being used extensively.

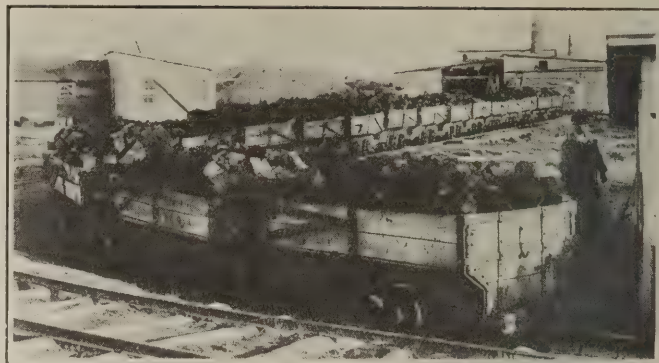
To an outsider it would seem that Canada could not possibly have any fuel problem, that she is absolutely self-contained on that score at least, yet the irony of the matter is that annually she is paying over a hundred million dollars to a neighboring country to purchase fuel and thus assisting in the commercial prosperity of a foreign land at a crucial time in her own development. The reason obviously is that the major portion of Canada's coal wealth is so far removed from present main centers of population that it does not appear to be economically expedient to use it as a main supply in Ontario and parts of Quebec. Then of course monied interests are well rooted in established mine holdings and allied industries in the present locality where the east gets its main fuel supply and naturally these powerful organizations are doing, and will continue to do, all they possibly can to block "Home fuel for Home fires."

F. W. Gray, coal-marketing expert of the British Empire Steel Corporation, an organization which holds controlling interests in Nova Scotia's coal mines, is quoted as saying: "By the summer of 1950 the larger half of Canada's population will be west of the Great Lakes, and what will take them there will be coal and the industries which must grow up about coal. Ontario's doom as the commercial leader of Canada, has been sounded."



Cutting a Good Seam at Pembina, Alta.

This is one of the better and more up-to-date mines of the province of Alberta. Note the shortwall machine and the electric cap lamps. Only the last word in efficiency can, and indeed ought to, justify an attempt to bring coal all the way to Ontario to compete with coal mined almost on its borders.



Mine at Cardiff, Alberta

The cars at this mine greatly resemble those of central and western Pennsylvania. The coal piled on the top of the cars is blocky and attractive and evidently not piled so as to provide maximum capacity. However, thus loaded there is less waste and less explosive dust on the roadways.

It is well known that the United States is getting a strangle-hold on some of Canada's natural resources, particularly her forests, owing to Ontario's dependence upon her for fuel. In looking at the coal map of the North American continent, it will be noted that the two major coal fields are, south of the Great Lakes commonly called the Pennsylvania field, and on the easterly slope of the Canadian Rockies in Alberta. Canada's main industries have been drawn as by a magnet toward the dominating coal field of Pennsylvania, so today are bunched in the lower peninsula, over 2,200 miles removed from the main coal bins of Canada.

This being the present situation, Ontario from an economic standpoint will naturally remain quite an extensive purchaser of American soft coal, but there is no reason why she should continue to do so in any way that will in the very remotest degree imperil other natural resources of the Dominion. That day has passed. Today Canada can be self-contained, although from an economic standpoint it is not advisable that she should, yet the stage in her development has been reached when no big-stick tactics have any right to intimidate her into negotiating treaties that are detrimental to her general progress. The time has come when Canada should call her soul her own.

Nova Scotians can take care of the coal needs of the Maritime Provinces and Quebec and reach out in portions of Ontario as well. Then in the extreme West, British Columbia can look after her own needs and be prepared at some later date to do a colliery business at least as far south as San Francisco, leaving Alberta with her enormous coal bins to supply the prairies, New Ontario, part of Central Ontario, and in addition steadily pour a stream of coal into Montana, Idaho, Washington and Oregon.

Although quite a large percentage of eastern Canadians claim to favor a reasonable amount of protection, which sometimes is a misnomer through unduly stretching the meaning of the word "reasonable" yet when it comes to putting the same theory in practice, but changing the location so that the westerner might become the beneficiary, the whole principle is considered void and meaningless. How human we are and prone to see merit in that which makes for personal gain with the other fellow footing the bill!

There is no doubt, however, that a large number of those who live in Eastern Canada are beginning to realize the national importance of Canada becoming more self-contained from a fuel standpoint. At the

sixth annual meeting of the United Boards of Trade and Chambers of Commerce of Western Ontario, held recently, a resolution was passed unanimously urging the Dominion and Provincial Governments and Canadian railways and others concerned to endeavor to make it economically possible for Ontario to use Alberta coal.

The main reasons advanced were that thereby it would be possible to avoid a repetition of the unfortunate conditions that have prevailed on several occasions when sufficient coal could not be obtained from the United States, and also that interprovincial trade would be stimulated. As a means of assisting the introduction of Alberta coal into Ontario, over 10,000 tons of domestic coal, as trial shipments, were sent east last fall at specially reduced rates. This coal was, in most cases, well liked, hence the resolution by the western Ontario Boards of Trade, a most representative body of business men in the territory most vitally affected. Another splendid sign of the times is that Premiers Ferguson of Ontario and Greenfield of Alberta, representing the main consuming and producing provinces, are consider-

"Two years ago the U. S. Bureau of Mines unofficially warned the Canadian Department of Mines that within a short time Canada would have to work out her own solution for replacing the anthracite now imported from the United States. No less than three bills were recently before the U. S. Congress to place an embargo on the export of anthracite to Canada. They did not pass, but the fact that they were introduced indicates the drift of public sentiment. This contingency ever hangs above us like a sword of Democles, and the Board considers it of the utmost importance that the use of coals of domestic origin should be more widely extended and that other native fuels should be more fully developed so that the resources of our fuel supply may be widened and diversified."

It is common knowledge that the United States anthracite supply which is found in an area of only 484 square miles, will at the present rate of consumption last only 80 to 100 years. This coal has given excellent satisfaction to Ontario and Quebec consumers, but the time is at hand when of necessity they must make a

Strip Pit at Drumheller, Alta.

An admirable opportunity for big stripping equipment, yet here the men are not even loading into cars but instead are using wheelbarrows, which could hardly be justified even at a local mine for supplying farmers. This mine is northwest of Calgary on the Red Deer River.



ing ways and means of overcoming, or at least greatly lessening, the present difficulty.

Continuing the same line of argument, the Dominion Fuel Board in its Interim Report, 1923, says:

"During the ten-year period from 1912 to 1921, Canada's bill for importing coal exceeded \$580,000,000. In the same period the Canadian coal-mining industry increased its output materially, but the value of the total production from our enormous coal resources was considerably less than the sum of our payments for foreign coal. It is not necessary either to underestimate the natural obstacles in extending the use of native coals, or to set the desirable but doubtful objective of complete fuel independence, in order to warrant a systematic search for practicable methods of permanently re-adjusting a branch of Canadian commerce which has for many years yielded one of the main trade deficits of our national balance sheet and which, with equal constancy, has drawn its increased volume only in minor degree from natural resources within the Dominion.

change and so far as possible that change should be from United States to Canadian coal.

In a small way Alberta is beginning to offset this and is supplying coal to small areas in the adjoining states of Montana, Idaho, and Washington, the chief market at present being the city of Spokane where Alberta coal today can be laid down 75c. per ton below the price of Utah coal. This market consumes about 100,000 tons of Alberta coal annually and is a growing market.

Although Alberta is so remarkably endowed with coal wealth, her average annual output is still under 6,000,000 tons. Table III shows what growth has been made during the past 30 years. It includes, however, a small portion of the southeastern corner of British Columbia, which in this case is included with Alberta shipments as its natural market and railway facilities are identical.

The coal statistics for Canada for the calendar year of 1922 published under the authority of Hon. Thomas A. Low, and prepared by the Mining, Metallurgical and

Table III—Output of Alberta and Part of
British Columbia

Year	Tons
1890	128,753
1900	518,253
1910	4,259,586
1920	7,851,760
The tonnage of the latter year was made up as follows:	
Kinds of Coal	Tons
Steam	4,363,082
Domestic	3,361,105
Anthracite	127,573

Chemical Branch of the Dominion Bureau of Statistics, in dealing with Ontario's fuel problem, says:

"The consumption of coal in central Ontario in 1920 was 13,331,000 tons comprising 10,385,000 tons of bituminous and 2,946,000 tons of anthracite coal, nearly all of which was imported from the United States. A total of 2,259,000 tons of United States coal was dumped at the head of the Lakes in that year. Of this quantity, 296,000 tons was anthracite and the rest bituminous. About 15,000 tons of western Canadian coal were also shipped into the area served by the ports at the head of the lakes.

"In 1921, the total consumption in central Ontario declined to 11,543,000 tons including 2,809,000 tons of anthracite and 8,734,000 tons of bituminous. The ports at the head of the lakes received approximately the same quantity of coal as in the preceding year. The total coal made available for consumption in that area was about 2,249,000 tons, of which 11,900 tons was Canadian coal, 260,890 tons was United States anthracite, and 1,976,000 tons was imported bituminous coal.

"During 1922, owing to the great strike in United States coal fields, the supply of imported coal obtained by central Ontario was considerably reduced and shipments of coal from the Maritime Provinces, particularly New Brunswick, were brought in to help meet the fuel needs of the province. Shipments from Eastern Canada mines amounted to 16,864 tons while Western coal shipped to Ontario points was not brought farther east than the head of the lakes. The total consumption of coal in central Ontario was 9,095,977 tons comprising 1,586,936 tons of anthracite and 7,509,041 tons of bituminous coal. At the head of the lakes, 2,019,794 tons of United States coal was dumped including 57,525 tons of anthracite and 1,962,269 tons of soft coal."

Now let us move westward to Manitoba. Up until about three years ago, that province used Pennsylvania anthracite almost exclusively. At that time, Winnipeg was faced with a fuel problem similar to the situation confronting Ontario today. The citizens of Winnipeg felt no other fuel than the best that could be imported from the far-famed coal fields of Pennsylvania could be expected to prove satisfactory in their rigorous climate. Increased prices, coupled with uncertain delivery, labor and freight difficulties paved the way for Alberta coal and now experience has demonstrated that they can get more heat with less money by using Alberta coal.

The same report on page 75, in dealing with the output and disposition of Alberta coal says:

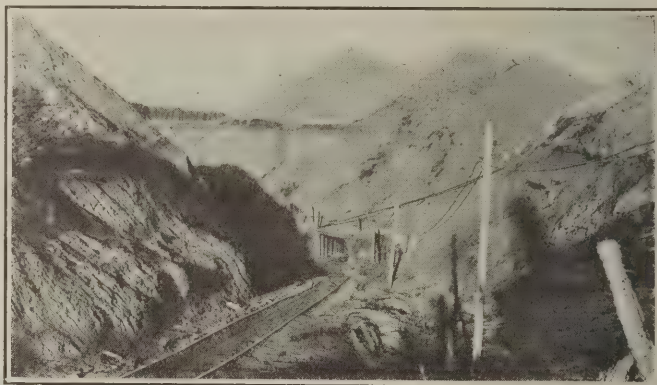
"Alberta retained in 1922 the premier position among the coal-producing provinces of Canada, a position reached in 1920 when the record output of 6,907,765 tons was produced. The production in 1922 was, however, only slightly in excess of the 1921 output and was also nearly one million tons below the 1920 peak, reaching a total of 5,990,911 tons. Anthracite, bituminous, and lignite coals are all produced within the province."

The following interesting figures are taken from a table in the same report which includes Alberta coal output from 1886 to 1922. In 1886 the output was 43,220 tons. With that as a basis, we will show how often it has doubled. In 1888 it was 115,124 tons; in 1893, 230,070; in 1903, 495,893; in 1906, 1,246,360; in 1910, 2,894,469; in 1918, 5,972,816; and in 1920 the banner year, 6,907,765.

The problem today is, how can Canada's vast storehouse of fuel be used to meet present needs? Alberta is turning out a coal well-suited for eastern domestic use at from \$4.50 to \$5 per ton at the mine mouth. The all-rail haul appears to be prohibitive under present conditions, but so it is with grain. The best solution seems to be rail to the head of the lakes, then water to Toronto.

Canada's coal deposits, and her railways are two of her resources that should, in the common interest of a greater Canada, be interlocked, thus making her more self-contained and less dependent upon the United States. This naturally calls for the lowest possible freight rates which in turn means real co-operation between railway companies, mine owners and government officials. To accomplish this, coal would require to be shipped from mine to treating plant at such times as the railways were slackest and in solid train lots.

By concentrating in this way, as many tons as the physical character of the roadbed will carry, providing locomotives powerful enough to haul the heaviest trains



Lignite Stripping in Saskatchewan

Apparently this is not a machine stripping. Eventually it got too deep for operation in the open and a mine was opened in the depth of the cutting. It would furnish a good opportunity for a big shovel provided the market would be reasonably steady the year round which probably is not the case.

and running them solid from division point to division point, the freight rate should be reduced to the minimum. In addition, the railroads have a lot of rolling stock usually idle for several months of each year and further they have large numbers of box cars that are past the useful stage for hauling grains, yet have years of usefulness for such purposes as coal haulage. These are some of the facts that should induce the railway heads to establish a rate that will permit large consignments of Alberta coal to be marketed in Ontario.

Many feel that under conditions as mentioned, \$6 per ton should be a fair price. The Alberta government freight supervisor wrote Sir Henry Thornton and other Canadian Northern Ry. officials and a quotation from one of his letters reads as follows:

"If we had a \$6 per ton rate in train lots from Coalspur to Toronto, there is no doubt but that Alberta coal could be put down there in competition with American coal and an extensive trade developed which would have the dual effect of keeping Canadian money in Canada and creating work for the unemployed in Alberta.

"The distance from Coalspur to Toronto via Port Arthur is 2,282 miles. A train of fifty 40-ton cars readily could be hauled over this entire route. Fifty 40-ton cars would be 2,000 tons at \$6 per ton which would be \$12,000 per train, \$5.26 per train mile.

"In Canadian Pacific Ry. statement, year ending Dec. 31, 1920, freight train earnings per train mile, lines west, were \$5.82, operating expenses per train mile, lines west, were \$3.58. This of course includes all kinds of trains, but if the average operating cost was \$3.58 per train mile, the actual cost for hauling this 2,000-ton train should be much less and should therefore provide a large margin of profit.

Anyone conversant with coal mining in Alberta knows that the cost of production is abnormally high. How to reduce this is an exceedingly intricate and difficult phase of the situation. In the first place, there are far too many mines in operation for the quantity of coal produced. Increased consumption would assist in cheapening production provided additional mines were not opened up. There are some 380 coal mines of one kind and another in operation in the province of Alberta. Of course, it is easy to open up a mine in many parts of the province as the coal outcrops along river banks and in numerous places farmers and ranchers can back their wagons or sleighs to the seam and

shovel a weathered soft coal right into their vehicles. In a larger way some of the coal companies, after scraping off some six or eight feet of surface soil, use steam shovels to load railway cars with coal. Professor Allen of the Geological department of the University of Alberta has made the statement that the sixteen largest coal mines in the province have sufficient capacity to supply the entire output required at present.

Thus, in a nutshell, is given the main reason for the excessive cost of production, excessive overhead, and yet how to adjust that to a reasonable minimum in a democratic country where everyone is free to acquire coal leases who feels there is a possibility of making a little over a mere living out of the operation, is a puzzle. The records show that mine operators on the whole are not making fortunes. Each year a lot of companies go out of business, but there usually is about a like number ready to take a chance on what seems to them a profitable venture. And thus it is that a long-suffering public pays a high price for fuel in the midst of plenty.

Miners' Wages and the Cost of Coal

Isador Lubin on behalf and in collaboration with the council and staff of the Institute of Economics has published a book on "Miners Wages and the Cost of Coal" which he denominates "an inquiry into the wages system in the bituminous coal industry and its effects on coal costs and coal conservation." It is not a muck-raking treatise but a sober, careful study of coal mining by an unprejudiced outsider. It must be admitted that at times outsiders get erroneous ideas. Mr. Lubin has not always escaped, but when that occurs it is Mr. Lubin's misfortune and not his fault and the facts he has gathered will be useful for those who know the coal industry well but do not have its statistics at their fingers' ends.

Mr. Lubin has gathered some exceedingly useful information. We are justified in regretting that he writes about mining 16- and 18-in. seams. Perhaps they are worked in the United States but it must indeed be rare. Those who know the industry well will be hard put to it to say where these low seams are being worked.

The author believes that the price paid for mining should bear relation to the sacrifice and time expended in producing a ton of coal. That is an excellent assumption but unfortunately neither the company that has expended its money nor the miner that has established his home has ever been known to pay much attention to it. The operators and mine workers establish a scale which Mr. Lubin says is for certain mines inequitable and which possibly is as inequitable as he declares it. Nothing compels the miner to accept it. He can move to some other district but he does not. Prices in the city vary from store to store but some go to one store and some to another.

Something besides financial advantage rules. John T. Ryan remarked about the varying wage scales in France. Others have spoken about it in England. Mr. Lubin has found it in the United States. It is found everywhere. It appears, nay it is, unreasonable, but the United Mine Workers of America will never change it. The union is not ready to depopulate any district, to close down any mine. The economics of the industry does both, but it would not do for the labor union to be as inexorable as economics. So the inequality con-

tinues and will continue and men will keep on making scales that assure them of their jobs be they good or bad. A job almost always appeals to a man and the closing of a mine or a factory brings its heartbreaks.

But this is beside the issue. It is not the part of the conscientious critic to quarrel with 0.5 per cent of a book when he approves 99.5 per cent, though that is just what he usually does. In 316 pages 5x8 in. Mr. Lubin has packed an astonishing quantity of information. The book is published by the McGraw-Hill Book Co., 370 Seventh Ave., New York City. A. M. Ogle read the first nine chapters. One wonders he allowed the author to say, as he does on page 14, that a "horizontal tunnel" is "sometimes called a drift or *slope*."

Much Heat Wasted in Furnace Walls

An insulated wall loses only about 40 per cent as much heat as an uninsulated wall and the savings through insulation aggregate approximately 480,000 lb. of coal per year for 1,000 sq.ft. of wall surface. At \$5 a ton for coal delivered, this would represent a loss of \$1,200 actually saved by insulation of the walls. Data for various insulators and refractories show that a layer 0.5 in. to 1.5 in. thick of the various insulators has an insulating value equivalent approximately to 9 in. of fire or silica brick.

The thermal conductivity of insulators varies with the temperature at which they are used, their density, the unevenness of the distribution of the pore spaces, the temperature to which the material has been subjected during manufacture and possibly with the elasticity.

The need for insulation increases without an increase in the temperature of the furnace. These facts were presented by Roberth Calvert, Lompoc, Cal., at the Heat Transfer Symposium of the Division of Industrial and Engineering Chemistry in connection with the meeting of the American Chemical Society at Washington. The heat losses by the industries of the United States, said Mr. Calvert, are equivalent to fuel costing approximately a billion dollars yearly. Part of the loss is carbon in the ash, part is heat that goes up with the draft and part is heat passing through the walls.



How Wire Rope Is Manufactured and Used and How Its Life May Be Prolonged in Mine Service

Physical and Chemical Tests Constantly Check Wire-Drawing Process — Saturated Core Acts As Cushion and Lubricant — Care of Ropes and Their Application to Mine-Hoist Problems

BY LAWRENCE W. BEVAN

WIRE rope was made some time prior to the destruction of Pompeii, which occurred in 79 A.D. for we find exhibited in the Musio Borbonico in Naples a short length of 1-in. diameter bronze wire rope which was excavated from the ruins of Pompeii. Beyond the fact that it was made of wires twisted into strand and the strand into rope we have no further information. Subsequent to this date there is no record of the existence of stranded rope until early in the nineteenth century.

However history records that prior to the year 1351 single wire was hammered to shape by smiths, but since that date it has been drawn by power. It may be worthy of note that the first wires were those of precious metals.

The application of wires to make rope is first mentioned in the construction of a suspension bridge in Geneva, Switzerland, in 1813. Such ropes as these, however, would not strictly be classed as wire rope today, for they were made by laying a number of charcoal-iron wires parallel to each other and binding them together by a serving of smaller iron wires which in turn were covered with yarn. In 1835 a cable of this type was made for the Freiburg Suspension Bridge in Germany with a span of 800 ft. in the clear. The supporting cables were composed of twenty bundles of wires of $\frac{1}{8}$ in. diameter laid parallel, the total diameter being $5\frac{1}{2}$ in.

Cables manufactured according to this principle, known as the Selvagee construction, have been applied in this country on the Niagara Suspension Bridge, Ohio River Bridge, Brooklyn, Manhattan and Williamsburg bridges in New York City. It is interesting to note that this same type cable will be used for the world's largest suspension bridge, with a span of 1,750 ft., which is now being constructed between Philadelphia and Camden. The main supporting cables will be of 30 in. diameter, and will contain 16,531 galvanized steel wires of $\frac{1}{8}$ in. diameter. The wires for these main cables if placed end to end would completely encircle the globe at the equator.

FIRST STRANDED WIRE ROPE USED AT MINE

The first so-called stranded wire rope was made in Germany in 1834 by a mining engineer by the name of Albert, who used a rope which was composed of iron wires, for hoisting ore in the shafts of the Hartz mines. This rope, fabricated with much difficulty, demonstrated its superiority over its hempen predecessor. In 1837 Albert, before the Engineering Society of Berlin, read a paper on the "Construction and Manufacture of Stranded Wire Ropes" in which he mentioned that ropes made of 4, 6 or 8 strands of four wires of 0.144 in. diameter were used.

In England in 1840 R. S. Newell was granted the first patent papers for "Improvements in the Manufacture of Wire Rope, and Machinery for Carrying Same into Effect." In these papers we find the first mention of the use of a central heart or core in the making of wire rope.

NOTE—Paper read at Anthracite Session of American Institute of Electrical Engineers. Head piece shows a small rope haulage system at the coal face. Such systems have largely supplemented mine locomotives.

In the year 1812 a partnership was formed by Erskine Hazard, father of Fisher Hazard, the founder of the Hazard Manufacturing Co. and Josiah White for the purpose of operating a mill on the banks of the Schuylkill near Philadelphia for the manufacture of wire and nails. These men built a bridge of wire over the river for the use of their workmen, and thus demonstrated its practicability for this purpose. To the best of my knowledge this was the first wire suspension bridge in America.

At this time no well-constructed machinery was in use for the manufacture of wire, so these two men exerted their inventive genius to produce equipment for the purpose. In the early '40's Erskine Hazard invented and made the first wire-rope machinery in this country.

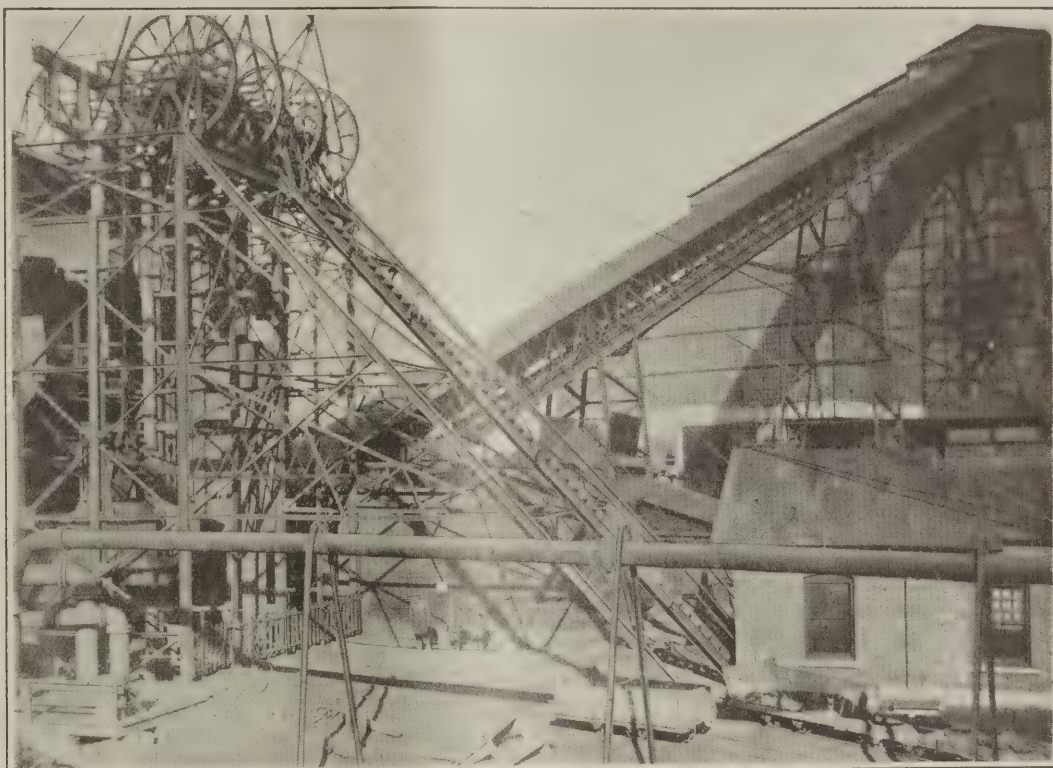
The first wire was made, of course, of wrought or charcoal iron, and it is worthy to note that the first successful attempt to use anthracite in the iron industry was by these two men in their wire mill. Historians

materials used in wire rope are divided into seven classes, iron, low-carbon steel, traction steel, cast steel, medium plow steel, plow steel and olympic steel. These materials vary in breaking strength from approximately 65,000 to 280,000 lb. per square inch. As purchased they must meet rigid specifications in order to insure the high quality demanded by the various users. All iron and steels as received are carefully inspected and before being drawn into wire they are thoroughly tested in physical testing machines and a complete chemical analysis made. In fact all materials entering into any process of wire drawing or wire-rope making are thoroughly tested and analyzed before use.

Iron and steel are received by the wire mill in coils of rods varying in diameter from No. 0 to No. 5 gage, i.e., from 0.34 in. to 0.22 in. diameter. These rods are as a rule covered with rolling-mill scale which is removed by pickling in sulphuric-acid baths until the scale is entirely dissolved. The rods are then given a lime

Fig. 1—Fast Frequent Hoisting

High headframes usually increase the distance between the sheaves and hoist drums and greatly lengthen the life of the rope. Such hoists as these are less severe on ropes because the rope is generally wound in single layers. Reverse bends and sudden shocks soon break the small strand wires.



write that "Cist, Miner and Robinson succeeded in sending two arks of anthracite to Philadelphia, via the Lehigh and Delaware Rivers. The cargo was bought by White and Hazard at \$21 per ton. The mill hands while experimenting with the new fuel kept stirring the coal, but it refused to burn. Finally, being disheartened, they threw a quantity of anthracite into the furnace, closed the door and quit work. A workman returning for a coat some time later found the furnace red hot. Hurriedly he summoned other workmen, and they succeeded in running off three separate heats of iron."

At a later date, with the introduction of the Bessemer process, and later the Siemens-Martin or open-hearth process, iron wire was replaced to a large extent by steel. It is apparent that with this change of material it was necessary to make changes in all processes incident to wire drawing.

It is only within recent years that English steels have been replaced by steel of American manufacture. The

bath to neutralize the acid. After this they are heated in bakers or ovens to drive off acid or hydrogen.

When cool, the rods are taken to the wire-drawing mill where without preheating the rod is passed through a steel die, and reduced in diameter. The rod is then taken to the annealing furnace or the patenting furnace and heated to relieve the effects of wire drawing and permit the rod to be further reduced in diameter. This heating leaves a certain quantity of scale which is then cleaned off in an acid bath as before. The rod is then lime coated, baked and taken to the wire drawer for further drawing. Cast steel, which is the material used in the majority of operations in the anthracite region, has a tensile strength 50 to 55 tons per square inch when the wire drawer receives it for the final drawing.

This rod is reduced in area approximately 75 per cent in a series of 5, 6 or 7 passes through the wire-drawing die and will finish not more than 0.001 in. from the required size, and have a tensile strength of 80 to 85 tons per square inch. It is well to remember

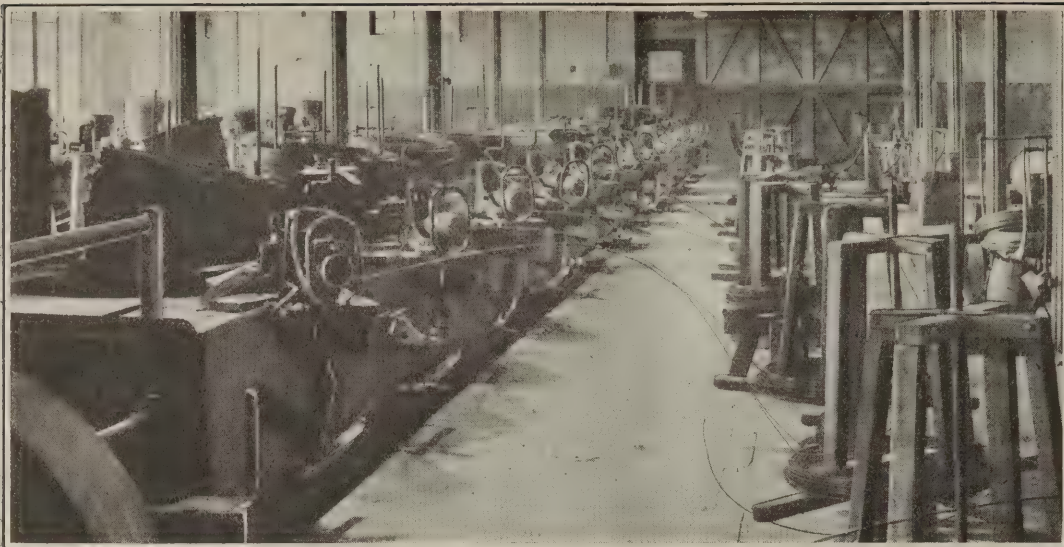


Fig. 2—Drawing Wire

These are the wire drawing benches where the steel is reduced in size before being twisted into rope. The tensile strength of the material is high and much power is required to pull the wire through the dies.

that the physical and chemical laboratories are constantly checking the material as it passes through each process. It may seem that the process just described is excessively long, but it is merely a good example of the usual procedure necessary for making the wire which goes into the manufacture of 1½ in. diameter rope. For rope of smaller diameter, say of ¾ in. diameter in which 0.019 in. diameter wire is used there is much more processing. For wire rope the wire sizes range from 0.009 in. in diameter to any larger size desired.

ROPE-CLOSING MACHINE COMPLETES PRODUCT

After the wire is drawn to the desired size it is spooled on bobbins and placed in a stranding machine, which twists 7, 19, 37 or any number of wires into a strand. The strand as it leaves the nozzle of the machine passes through a die and then on to a larger bobbin or spool which in turn is placed into a larger unit called a rope-closing machine. This device operates in the same way as a stranding machine, twisting the 6 or 8 strands into a rope. Through the center of the shaft of this machine a core of manila, heavily saturated with a good lubricant, passes and the strands are twisted around it. This core acts as a cushion and holds the grease or lubricant in reserve. This does not however, obviate the necessity of the subsequent

use of a lubricant when the rope is placed in operation.

It was previously mentioned that wire rope was primarily designed for mining operations, and it is therefore still used in enormous quantities in the anthracite and bituminous coal regions for hoisting coal, water and men, outside and inside the mines. A notable operation, which depends to a great extent on wire rope, is the Ashley Planes near Wilkes-Barre, Pa.

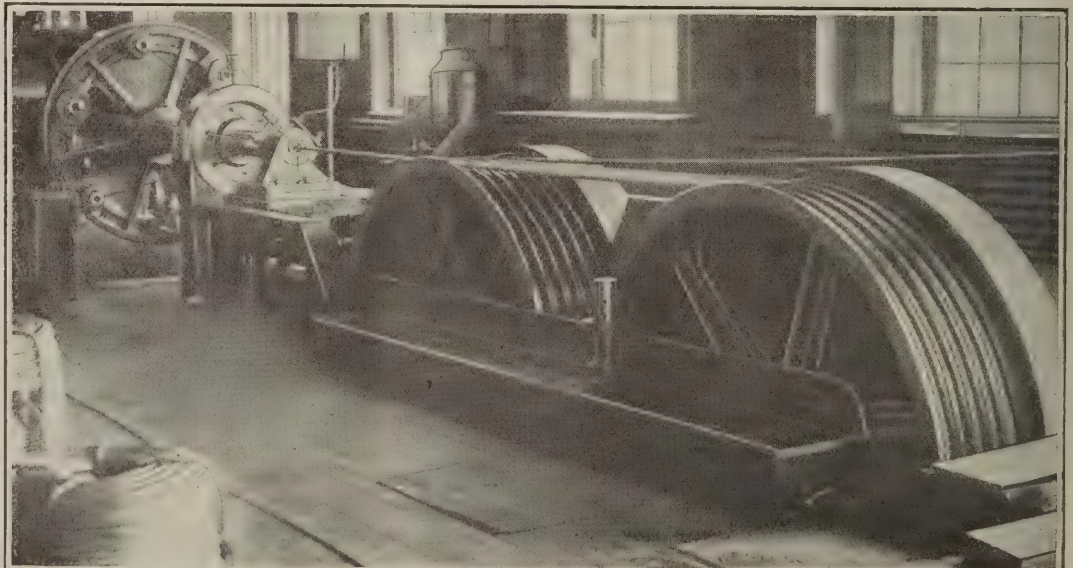
This hoisting incline consists of three planes with a total elevation of 1,025 ft. in about 3 miles, on which is hoisted 10,000,000 tons per year. The largest main cable on the middle plane, weighs 12 lb. per foot and is of 2¾ in. diameter. The main cables on the other two planes are of 2½ in. diameter. The three back cables or tail ropes are of 1½ in. diameter. The total weight of the wire rope used is 190,000 lb.

The question, "When has a wire rope reached the end of its usefulness, and when should it be removed?" has been much discussed. As the result of a study of this subject made by the Bureau of Standards the investigators stated in substance that a rope should be removed after a certain number of broken wires appear in each of the strands.

Tables have been prepared supporting this conclusion, but undoubtedly certain definite loads, speeds, head-sheaves, drum diameters and shafts of varying depth were used to arrive at the results. The report

Fig. 3—Rope-Closing Machine

Most steel ropes are now made with a core of manila. This material is saturated with a good lubricant and assists the external lubricant which should be applied occasionally after the rope has been placed in service.



is no doubt a useful guide, provided it can be applied where conditions are the same, or nearly like those from which these tables and figures were compiled.

However, each operation varies, in some cases considerably, sheave and drum diameters are not standard; therefore, it is quite necessary that for each operation a separate study be made to determine exactly the factor of safety so that with any number of broken wires or with a reduction in cross-section due to wear the remaining breaking strain of the rope may be known. It is obvious that, due to difference in mining conditions and operations, no set rule for the removal of the rope can be set down to govern each case.

In the catalog of wire-rope manufacturers, tables appear showing "Proper Working Loads" of wire rope of given sizes and grades. This proper working load in most cases is $\frac{1}{5}$ of the approximate breaking strength, or in other words, the factor of safety is 5. The proper working load must not be interpreted to mean tons of material which can be lifted, but the load should be figured to include the material, the carriage, the rope itself, the bending stresses, the stress due to starting, etc. Bending stresses should receive careful consideration from the engineer. In the anthracite mining field sheaves and drums of ample size have been employed in 90 per cent of the operations, so that the stress due to bending has been reduced to a minimum.

DANGEROUS STRESSES OCCUR IN REVERSE BENDS

Reverse bending, such as occurs with an underwind rope brings severe stresses on the steel causing an early deterioration by reason of a definite set given the rope, as it comes off the head sheave. The permanence of the set depends on the relation of rope diameter to sheave diameter. The smaller the sheave the greater the set. Obviously the set is not altogether overcome when the rope starts to wind on the drum in an opposite direction to the way it comes off the head sheave, hence the effect of the latter bend is more severe. Individual wires removed from ropes which had operated under conditions of reverse bending show under the microscope minute cracks, sometimes running in planes between the grains. In other cases the grains themselves are cracked. On mine hoists the distance between the head sheave and hoist drums is such as to favor the rope, but in some installations the bend is reversed in a few inches, thus causing a much earlier breakage of the iron or steel wires.

Wire rope may often fail due to repeated shocks being thrown on the rope, not one of which in itself would be sufficient to cause fracture. Suddenly applied loads approaching the elastic limit, even though at intervals days apart, eventually tire out the rope so that at some time or other when a heavy load, which ordinarily would not cause fracture, is suddenly applied the rope will break. The man in charge will be most positive that the load was much less than the rope should lift. The effect of these strains or over-strains can best be shown by microscopic examination of the metal.

The overlapping of the rope on the hoisting drums with the occasional slipping down of the top layer into grooves made by the lower layer will have two bad effects. First, it will cause jerks which increase the load on the rope by a quantity depending upon the slack between the drum and head sheave. In most cases this is small, but in time the wires will show the effect of these shocks not only because of the in-

creased load but also because a vibration is set up in the rope which usually settles at one point causing trouble later. Second, the inner wires will crush somewhat from the squeezing between the top and bottom layer and will assume a pear or bell shape. In this disturbed condition it is impossible for these inner wires to perform their proper function, and the outer wires will be forced to take more than their share of the load, also they will tend to take the form of the inner bell-shaped cushion thus causing abrasion on themselves. Overlapping, cannot in all cases be eliminated, and therefore the need for frequent rope inspection is essential.

All users of wire ropes appreciate the value of protecting them from mine or other injurious water, which corrodes the steel, but it might be well to state that as the sulphur water acts on the steel, hydrogen is

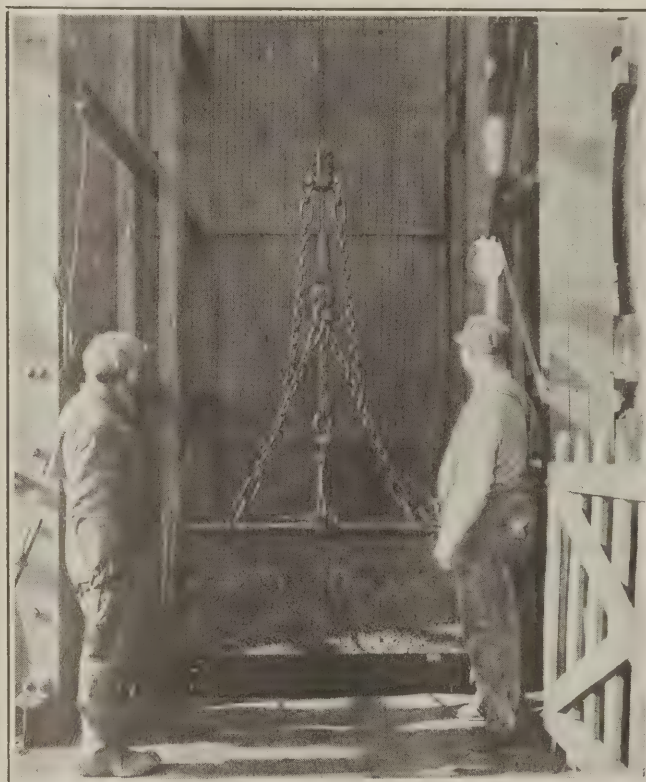


Fig. 4—Nothing Can Take the Place of Rope Here

The hoisting shaft is the neck of the bottle and much depends upon the steel cable. Here, as in other service, it is important to lubricate the rope properly. Accidents due to rope failure are extremely rare; occasionally, when an accident occurs and the headframe is wrecked, the rope is not broken.

liberated which replaces the iron in the steel, acting as a metal itself and remaining occluded. Heat of the correct temperature applied a definite length of time will drive off the hydrogen, but in the case of a wire rope in operation this is impractical, therefore it is imperative that the rope be protected by the use of some mineral compound which will resist the action of the acid and so prolong the life of the rope.

Where wire rope plays an important part in an industry, it is most essential that an inspector who is familiar with the construction and application of wire rope be employed. The duties of an inspector are too numerous to mention, but the mere fact that most mining companies recognize this need and have in their employ such a man, emphasizes the point that wire rope is a part of the equipment which requires expert knowledge, careful handling and the most rigid inspection.

What Kind of Rock Dust Should Be Used in Mines?

Fifty per Cent Should Pass Through a 200-Mesh Screen—A Smaller Percentage May Be Thus Fine Under Certain Conditions—Some Mines Need Seventy-Five per Cent of Non-Combustible—Effect of Methane

BY GEORGE S. RICE, J. W. PAUL AND R. R. SAYERS*

STANDARD rock dust for use in the rock dusting of coal mines might be defined tentatively as powdered mineral, light colored and free of carbonaceous matter and free silica, all of which will pass a 20-mesh screen while 50 per cent of it will pass through a 200-mesh screen.

Such dust may be prepared from limestone, gypsum, anhydrite or shale free of sand and flint. For the initial rock dusting of the average non-gaseous bituminous-coal mines enough standard rock dust should be applied so that the combustible content of the resulting mixture of rock dust with mine dust shall not exceed 45 per cent, a range somewhere between 35 and 45 per cent being the practical objective sought.

All entries, slopes or passageways and room necks should be rock dusted. Additional safeguards are: (a) Rock dusting rooms; (b) scattering of dust in vicinity of shots before firing; (c) placing of barriers in the mouths of panels, cross-entries and other key positions.

Redusting becomes necessary whenever the combustible content of the mine dust exceeds the permissible maximum. This should be determined by regular, systematic sampling, followed by a simple analysis of the samples for combustible content. A Bureau of Mines volumeter for measuring the density can be used for the determination of combustible content.

In gaseous mines from 5 to 10 per cent additional non-combustible is required for each per cent of methane present in the air current.

Specifications for size and character of rock dust to be used in coal mines as a means of preventing disastrous explosions have not yet been standardized by the Bureau of Mines, but so many inquiries have been received from mining operators and engineers who are considering adopting rock dusting for their mines that this memorandum has been prepared.

(1) *Size of Dust Particles.*—The finer the size of particles of rock dust, the more easily is the dust raised in the air with the coal dust to prevent the propagation of flame, if enough rock dust is used proportional to the kind of coal dust found in any given mine.

Only such particles of either coal or inert material as will pass through a 20-mesh sieve are considered to be dust. Thus dust—whether coal dust or rock dust—would include particles ranging from 20-mesh (roughly about $\frac{1}{30}$ in. diameter) to the finest microscopic size. However, mine road dust that passes through a 20-mesh sieve will vary widely in its proportion of the finest dust and correspondingly in its explosibility. From experience in tests at the Experimental Mine, the Bureau of Mines has adopted that percentage of dust by weight that passes through a 200-mesh sieve for the criterion of the most explosive size of any coal dust,

also of the most effective size of inert dust to limit an explosion.

Also, the Bureau's experience is that rock dust should be ground until 50 per cent will pass through a 200-mesh sieve, but a dust having a smaller percentage through 200-mesh may be used provided: (a) That at least 30 per cent passes through 200-mesh, and (b) that a proportionately larger quantity of the dust is used. For example, if the unit of weight of the finer dust required be represented by 1, the quantity of dust having 30 per cent through 200-mesh would be determined by the proportion:

$$30 : 1 :: 50 : x \text{ (} x \text{ being the quantity required of a dust of which 30 per cent will pass through a 200-mesh screen)}$$

$$30x = 50$$

$$x = 50 \div 30 = 1.7 \text{ or } 1.7 \text{ times as much should be used as of a dust of which 50 per cent will pass through a 200-mesh screen.}$$

These specifications are similar to those of the British standards of size as defined in their regulations, except in giving a slightly coarser dust. The British maximum size is 28-mesh, and although the criterion of the finest size is that passing through their standard 200-mesh sieve, this size corresponds to the size through the usual American standard screen of 250-mesh.

(2) *Character of Rock Dust.*—(a) As concerns composition and physical properties of the rock dust, less than 2 per cent combustible material is desirable, and it should not be as much as 10 per cent. If the inert dust contains any combustible material, 1 per cent increase in the quantity of dust should be used for each per cent of combustible material.

(b) Rock dust should be as light in color as possible, both to permit ready observation of freshly distributed coal dust from the regular coal production operations of the mine and to increase the illumination of the passageways which tends to prevent accidents arising from poor illumination.

(c) Rock dust should not contain an appreciable quantity of siliceous particles, and dust from sandstone and dust from sandy shale should not be used. Dust from pure limestone, dolomite, gypsum and anhydrite are preferable. The dust from roof shale free from gritty material is extensively used in Great Britain, but not all roof shales are suitable; often they are too sandy or contain too much combustible matter. The Bureau of Mines is prepared to advise operators as to the suitability of the material or rock that they propose to pulverize for coal mine dusting. Such advice may be obtained by submitting a sample of the material to the Bureau of Mines Experiment Station at Pittsburgh, Pa., where chemical, petrographic and physiological tests will be made.

(3) The quantity of rock dust that must be used for

*Chief Mining Engineer, Coal Mining Engineer and Chief Surgeon, Bureau of Mines, respectively. Dr. Sayers is also Surgeon, U. S. Public Health Service.

NOTE—The British and French methods of rock dusting are described in Bureau of Mines Bulletin 225.

initial dusting for any particular stretch of passageway depends upon: (a) The character of the coal, whether high volatile or low volatile; (b) the size of the particles of coal dust found on the road, ribs and timbers as determined under specifications (1); (c) the percentage of inert matter naturally present, that is, moisture and ash of the coal and ash of dust from the roof, partings and floor that has become mixed with the coal dust; (d) the quantity of road and rib dust in the specified stretch of passageway before rock dusting.

General information on factors (a) and (b) can be obtained by studying results of tests of various coals in Bureau of Mines, Bulletin 167, or by applying directly to the bureau.

Factors (c) and (d) can be determined only by systematically sampling the dust in that part of the mine to be rock-dusted in such a way that the quantity per linear foot of passageway can be estimated approximately. Practically, however, the way to start is to clean up a stretch of passageway and rock dust it, then from time to time sample the resulting mixture analyzing the sample thus taken.

(4) *Redusting*.—After the initial rock dusting, samples should be taken at regular intervals to ascertain how rapidly coal dust is accumulating, and from the analysis to determine whether or not additional rock dusting should be done and whether cleaning up is necessary before redusting.

FACTORS INFLUENCING RAPIDITY OF DEPOSITION

The rapidity with which coal dust is made in any mine varies with the friability of the coal, the method of mining, and, most important of all, on the spillage of coal in transportation whether by the coal escaping from leaky cars or by material in the "topping" being jarred onto the roadway. These factors taken with the character of the coal dust and the quantity of natural rock dusting make the quantity needed for the continued dusting of a particular mine or district of a mine difficult to estimate without some trial. Some parts of an entry must be dusted every week; in other parts of a mine redusting will last for several months. In British mines the quantity of rock dust used daily in any one mine varies according to the conditions and size of the mine from 5 in the smaller to 20 tons in the largest mines.

(5) *Maximum Permissible Percentage of Combustible in Road Dust After Rock Dusting*.—It is not possible, as indicated above, to state the maximum permissible percentage of combustible content in road dust applicable to all mines. The amount depends on many factors and ranges from 75 per cent for semi-anthracite to only 25 per cent for certain pulverized high-volatile dusts.

Conversely the minimum percentage of non-combustible content that will prevent explosion propagation varies from about 25 per cent for the least explosive to 75 per cent for the most explosive. If firedamp is present in any part of the mine, a greater percentage of rock dust must be used than in a mine practically free from gas. Therefore, it is not possible to lay down a hard and fast rule that will apply to all the different conditions and characters of coal dusts found in the mines of the United States.

The British law says the dust on floor, roof and sides throughout shall always consist of a mixture containing not more than 50 per cent combustible matter. In other

words, there must be 50 per cent of incombustible matter.

Tests in the Experimental Mine of coal dust from various mines of the United States indicate that although 50 per cent of incombustible material (total ash plus moisture) will prevent ignition of many natural mine-dust mixtures, with no firedamp present, it will not suffice if firedamp is present, and it will not prevent propagation of an explosion when strongly started, as by gas and coal dust at the face. To meet such contingency from 55 to 65 per cent incombustible matter is required to prevent propagation, and if 1 or 2 per cent of firedamp is present in the air current, 5 to 10 per cent additional incombustible must be used.

It must be remembered, however, that the British regulation sets a *maximum* of combustible matter in any part of a mine, and to meet this regulation it is found that the average combustible in the treated road dust of British mines will range from 40 to less than 30 per cent combustible, or conversely have 60 to over 70 per cent non-combustible.

ROAD DUSTS CONTAIN MUCH INCOMBUSTIBLE

Further, it must be remembered that the average natural road dusts in American mines, as determined by thousands of samples, contains usually over 20 per cent non-combustible (ash plus moisture) and sometimes 30 to 50 per cent, so that an additional quantity of rock dust equal to the quantity of coal dust present in a passageway (after it has been well cleaned up) may be sufficient ordinarily and sometimes a small quantity may suffice.

Subsequently, the quantity required to keep the roadways safe will depend on the control by the mine management of the production of coal dust. Rib and timber dust is much finer than road dust and contains less incombustible matter, consequently it requires a larger proportion of rock dust to make it safe against the propagation of an explosion; moreover, it is in a position from which it is easily brought into suspension as a dust cloud. In rock dusting effort should be made to supplant the coal dust on timbers and rib projections, then the coal dust which is subsequently made and carried by air currents till it falls on these places will tend to roll off, as the angle of repose of coal dust is less steep than that of rock dust.

(6) *Sampling*.—One of the greatest advantages of the method of rock dusting is that the danger or freedom from danger of explosion propagation through the agency of mine dust can be determined by sampling that part of the mine under suspicion and analyzing the samples. This more or less positive ability to determine the degree of safety during a period of some days or weeks is invaluable to the mine operator and the state inspector, as systematic records of the condition of any part of a mine can be made.

The method of sampling in a roadway requires further development. The Bureau of Mines has heretofore been using a special sampling scoop with screen and brush and has taken a sample of the dust about 8 in. in width across the roadway, on ribs and overhead timbers. All coal passing over a 10-mesh sieve is rejected in the mines. Before analysis the sample is dried, if necessary, and is then screened in the laboratory through a 20-mesh screen and the oversize rejected. This gives a fair sample of the dust at any one cross-section of the passageway. Investigations are now

being conducted to develop for such sampling a portable vacuum-cleaner device not requiring electricity for its operation.

To a certain degree such small samples are grab samples, but if they are taken at regular intervals along the passageway, they give a fairly accurate average for the distance examined. An official test of this was made at the Bentley Colliery, Yorkshire, England, in which a comparison was made of an average of the analyses of many small samples in a given stretch of entry with the analysis of a gross sample obtained from shoveling and sweeping up the entire dust in that same length of roadway. The ash content by the two methods agreed within a few per cent, so the many small samples were regarded as fairly representative of the dust in the passageway.

(7) *Analysis of Road-Dust Samples.*—A comparatively simple fire analysis will determine the total combustible of a mine dust except when limestone is used or other dust that loses carbon dioxide or water of composition. For such dusts these losses must be determined and added to the non-combustible material.

The Taffanel volumeter, modified by Fieldner, of the Bureau of Mines, is a device for quick determination of the combustible content. It is based on density of the non-combustible material. Tests have indicated that it is accurate within a few per cent.

(8) *Extent of Rock-Dusting Necessary in a Mine.*—Questions are repeatedly asked such as: How extensive is it necessary to carry rock dusting through the mine to prevent an explosion? Is it necessary to rock dust rooms? Is it necessary to rock dust entries? In the opinion of the Bureau engineers, it is necessary to rock dust all passageways that contain any coal dust

whatever. It is not enough simply to rock dust the rooms. Many of our most disastrous explosions have started in entry ways and even near the mouth of the mine, through ignition of coal dust by electric shorts from trolley wires or power lines or by explosions of bodies of gas forced into the entry from adjacent workings.

There is always the possibility of ignition of fire-damp from one cause or another. Therefore, it does not suffice to prevent *ignition* of coal dust in a particular locality; the dust must be so generally neutralized that it will prevent *propagation* of an explosion of a body of firedamp or of locally untreated or insufficiently treated coal dust.

The first step should always be to rock dust the haulage roads and dusting should be carried on into the cross entries, subsidiary entries and air courses. The next step is to rock dust the room necks and then gradually extend the rock dusting up into the rooms. Rock dust close to the face, although desirable is not so vital as thoroughly dusting in the entries, because an explosion starting in a room will die away on well rock-dusted entries.

(9) *Rock-Dust Barriers.*—The Bureau of Mines engineers believe that an additional measure of safety is to install rock-dust barriers at the mouths of all panels, cross-entries and other key positions, but the barriers should fulfill the specification suggested by the Bureau in Technical Paper 84 to insure operation. Barriers should not be regarded as sufficient in themselves or as the most important feature. General rock dusting is much more important; the barriers should be considered only as secondary defenses.

Deep Betteshanger Mine in Kent Shows Present-Day British Practice

AT A NEW MINE, the Betteshanger Colliery, now under construction by Pearson & Dorman Long, Ltd., in east Kent in the South of England, there are twelve seams; one 2 ft. 6 in. thick at 1,208 ft.; one 2 ft. thick at 1,504 ft.; one 4 ft. 5 in. thick at 1,813 ft.; one 2 ft. 10 in. thick at 1,926 ft.; one 5 ft. thick at 1,975 ft.; one 3 ft. 6 in. thick at 2,310 ft.; one 4 ft. 1 in. thick at 2,364 ft.; one 3 ft. thick at 2,403 ft.; one 2 ft. 7 in. thick at 2,513 ft.; one 4 ft. 6 in. thick at 2,562 ft.; one 2 ft. 3 in. thick at 2,592 ft.; one 7 ft. 9 in. thick at 2,632 ft. These seams divide themselves in two series each of six beds with an aggregate thickness in all of 44 ft. 5 in., the average thickness being 3 ft. 8 in.

The coals have a decreasing percentage of volatile hydrocarbons with depth. The six upper seams range in volatile matter from 28.66 to 18.47 per cent and the six lower seams from 16.85 to 14.03 per cent. One of the best analyses, says the *Iron and Coal Trade Review*, is that of the 4 ft. 6 in. seam at 2,562 ft. This is as follows. Volatile matter, 14.03 per cent; fixed carbon, 80.03 per cent; ash, 4.97 per cent; sulphur, 0.97 per cent; calorific power, 14,414 B.t.u., an extremely low-volatile bituminous coal.

The company has mineral rights covering nearly 60 sq. miles, but to Betteshanger colliery is apportioned 4,700 acres. A boring on the site of the shaft shows that at a depth of 875 ft. the greensand will be encountered with water at a pressure of 295 lb. At a depth of 960 ft. water will be found at a pressure of 112 lb. The coal measures will be reached at 975 ft.

From the experience gained in other parts of the field 2,000 gal. of water will flow into the shaft per min. In the upper chalk formations the water will be excluded by the cementation process, below that the water will be closed off by tubbing. The shafts will be sunk to a depth of 2,598 ft. starting operations, however, on a seam 3 ft. 10 in. thick at a higher level. The annual output is expected to be 840,000 short tons per annum.

The headframe is of twin-channel construction and 80 ft. high. It weighs 100 tons and has sheaves of 20 ft. diameter. The permanent plant will be used for sinking. The hoisting engine will have a pair of 36-in. cylinders with a stroke of 84 in. and a cylindro-conical drum increasing from 16 to 28 ft. The maximum speed in the shaft will be 72 ft. per sec. or 49.09 miles per hour, a complete wind taking 58 sec. During the sinking operation a parallel drum is to be employed.

It will be noted with interest that the shafts will be circular and 22 ft. in diameter in the clear. They will be lined with concrete, the pit bottom being so arranged that the whole output, or any part of it, can be hoisted through either shaft. The cages will be double decked with four cars on each deck. The capacity of the cars will be only 1,680 lb., a clear evidence that the British mines even where new and deep are not being provided with large rolling stock from the American point of view. The boilers will be up to the best standards, being of Stirling type with economizers and superheaters. They are designed for a working pressure of 200 lb. with a superheat of 200 deg. F. They will have chain-grate stokers and both forced and induced draft, the fans for that purpose being electrically and steam driven.

New Methods of Operation Reduce Production Cost

More Details Regarding "V" System of Mining with Conveyors —
O'Toole Machine Cuts and Loads 7,000 Tons in a Single Month — Little
Shooting Required — European Longwall Problem Not Like Ours

How Conveyors Have Lowered Cost of Mining

A COMPANY, having coal with a roof that will stand up without support over a span of 30 or 40 ft. expects to put in conveyors and to cut and shoot the coal face two or three times a day, said J. W. Bischoff, general manager, West Virginia Coal & Coke Co., Elkins, W. Va. at the Cincinnati Conference. Mr. Bischoff said that the longwall system or any long face had its advantages where conditions favored its use. It gives the advantage of close supervision and concentration of work with consequent reduction in the cost of haulage, ventilation and drainage.

Mr. Bischoff made his remarks in the absence of J. Dearing Christian, assistant to the president, Imperial Colliery Co., Burnwell, W. Va., and Everett E. Drennan, president, West Virginia Coal & Coke Co., Elkins, W. Va. He was somewhat hampered in making his remarks because as he stated "I don't suppose there is a man in this gathering that has not read the descriptions of our system of mining in *Coal Age*." His statements were therefore merely supplementary.

LARGE TONNAGES HANDLED

He explained that the coal at the mine operated by conveyors and the "V system" was 6 ft. thick, the bottom coal being 15 or 16 in. thick and the shale parting above it 4 in. to 9 in. thick. A machine is now being constructed for loading. This should be ready about the middle of this month. He said that no machine now on the market could be worked to advantage with the conveyor. All the coal loaded at the mine is conveyor-loaded, there being two installations each carrying 700 to 800 tons per day.

Mr. Bischoff said that the conveyors were kept running continuously, cars being kept at the head of each main conveyor at all times. The haulage locomotive can make a trip to the outside and back again in the time taken to load a trip of cars. These cars are never uncoupled. When the coal was loaded by hand each car carried 3 tons; with conveyor loading the capacity has been reduced to 2½ tons.

The cost of operation for all expenses except investment charges has been reduced 30 to 35 per cent. Before the change from hand to conveyor loading the output per man employed in and around the mine was 5½ to 6 tons; now it runs from 10 to 11 tons. The lower tonnage with hand loading was not due, Mr. Bischoff said, to any inefficiency on the part of the men, as they were all good loaders. The whole credit for the

increase in tonnage per man must be given to the new system.

Mr. Bischoff said also that even with irregular operation there would be no difficulty in maintaining the face. No posts or other timbers are placed between the conveyor and the face of the coal. As soon as the shot is loaded out, the face is cut and the conveyor is advanced 3 or 4 ft. The recovery was about 97 per cent. The life of the conveyor will probably be about five years. It may, outlast, however, the expectations of the company.

O'Toole Machine Cuts And Loads Fifty-five Tons in Thirty Minutes

A machine that cuts and loads coal from a 45-ft. longwall face and which has been in successful operation for about six months under a cover that has reached 750 ft. was the designation given by H. N. Eavenson in describing the O'Toole machine. The strata above the coal are of sandstone and slate. At first they break with difficulty, but after a fracture has been obtained the roof breaks quite satisfactorily.

Mr. Eavenson, in the absence of Col. Edward O'Toole, then introduced his son. Mr. O'Toole said the machine both cut and loaded coal. As his father was not entirely satisfied with it and as it is not yet on the market, he was not ready to describe its operation in detail. The cutter bar on the machine was 50 ft. long. It cuts the coal without shooting. The coal as it falls, is caught by a conveyor, carried to an entry and dumped into a string of cars hauled past the end of the conveyor.

DIFFICULTIES ENCOUNTERED

Being the first machine of its kind the machine has not been operated without difficulty. The best performances obtained from it have been 55 tons in 30 min.; 320 tons in 8 hours; 620 tons in 24 hours; 718 tons in 32 hours, 7,000 in a month. The difficulties of cutting, loading and hauling have all been satisfactorily solved, but the control of the roof still presents difficulties. When it is remembered that the space that must be kept open in front of the coal is 6 ft. wide and 45 ft. long and that the roadways increase that width it will be realized that under heavy cover a difficult problem remains to be solved.

Hydraulic jacks 6 ft. apart are used to advance the cutter bar each working on a screw which is 8 ft. long and is operated by the mechanism on the machine. When the cutter bar has progressed as far as the screw will permit, an arrangement enables a new hold to be taken. The jacks have, however, not solved the roof trouble. The coal mined is the No. 3 Pocahontas seam, but Mr.

O'Toole believes the machine would cut and load any other seam satisfactorily. The coal only occasionally has to be shot down, the weight of the roof shearing it as the cutter advances into it.

Conditions in Europe Much Different from Ours

George S. Rice said that a study of European conditions could not afford us much in the way of suggestion as to the use of longwall. In Europe the coal companies had really little choice. Room-and-pillar workings are well-nigh impossible of operation after the depth exceeds 1,200 ft.

For this reason you find little else than longwall both in England and on the Continent. Careful and close timbering is necessary. In Belgium and France it is found necessary to carry stringers parallel to the face on lines of props 3 ft. apart. Furthermore cross pieces must be laid on those stringers to carry the weight over the coal face, the ends of the stringers being set in the face of the coal. Temporary props are set up which have to be removed after the coal is shot down.

In most places in England the cutting machine works between a row of chocks and the face; the conveyor is placed behind the chocks, and back of this conveyor are the packwalls. With roof such as is found in Great Britain, Mr. Rice believed, it would be impossible to operate a longwall face without backfilling. The face could not be kept open. In fact the British engineers are unable to work on the end of the coal and they have, even with this precaution, to use strong breaker props and keep their packwalls close to the face. Conveyors are not by any means new in Europe. "In 1911," said Mr. Rice, "I saw shaker conveyors in the thin beds of Scotland. They work nicely in a pitching bed."

State Rys. Consume Two-Thirds Of Rumania's Coal

Coal production in Rumania in 1923, together with the amount of coal reported to have been consumed by the Rumanian State Railroads, according to a report by Acting Commercial Attaché Louis E. Van Norman, Bucharest, was as follows, in metric tons:

	Total Production	Consumed by State Railways
Bituminous coal.....	1,562,423	1,164,917
Lignite, superior.....	236,736	146,276
Lignite, inferior.....	328,923	270,528
Coal produced from the mines at the "Reshitza" Metal- lurgical Works — grades not specified.....	237,986	.....
Total.....	2,366,068	1,581,721

Practically all of the balance was consumed by industrial enterprises and private users in Rumania.

NOTE — Discussion of "Correlation of Mechanical Loading with Haulage and Mining Systems" at Cincinnati Conference and Exposition, American Mining Congress.



News Of the Industry



Wholesalers' Convention Indorses Move For Coal Institute

**Wadleigh Proposal Warmly Approved—Covel Says Tide Has Turned
from Oil Back to Coal—Snider Discusses Freight Problems—
Correction of Cost and Credit Evils Urged**

That the wholesale coal men are ready to co-operate in a movement looking to the organization of a coal institute which would take rank with such institutes in other industries in this country and Great Britain was evidenced by the action taken at the eighth annual convention of the American Wholesale Coal Association, held at White Sulphur Springs, W. Va., June 3 and 4. Following an address by F. R. Wadleigh, vice-president of the Tuttle Coal Corporation, New York, and formerly Federal Fuel Distributor, outlining the activities of the suggested Coal Institute, the convention unanimously approved and indorsed the establishment of the institute and referred the matter to the Trade Relations Committee of the association for action.

Tells Need of Coal Institute

Mr. Wadleigh pointed out the value the Institute, or Federated Coal Association, if that name should be chosen, would have in bringing about much needed solidarity, cohesion, co-ordination and co-operation in the industry, "and a realization of the value and importance of each branch of the industry to the whole, a knowledge of its own power, if and when united." Two important lines of work which should be taken up by the industry now, he said, are education of the public and its representatives, and research, economic and technical.

Discussing the research phase, Mr. Wadleigh quoted from an editorial in *Coal Age* bearing upon the necessity for greater information in the coal industry and referred to another article listing about 50 subjects needing particular study to advance methods connected with the production and distribution of coal.

Mr. Wadleigh's address was a feature of the first day's session and was followed by another outstanding speech of the convention, made by Borden Covel, president of the Northern Coal Co., of Boston, on "Oil Competition in the Coal Game." Mr. Covel spoke of the inroads fuel oil had made into the coal business of the New England states, but expressed the opinion that the tide had turned and that most of the former coal customers would return in the next four or five years. Giving many facts and figures on both sides of the ques-

tion as a result of a thorough investigation into the oil and coal situation, Mr. Covel summed up the advantages of coal burning as follows:

- (1) More stability in the price of coal and in production.
- (2) Railroad-car equipment now in



Charles L. Dering

Retiring president of the American Wholesale Coal Association, succeeded by H. K. Cortright, of Philadelphia.

excellent condition and likely to remain so.

- (3) Much less fire risk.
- (4) Storage of coal is more flexible.
- (5) Cost of installation is less in smaller plants.

In the discussion that followed Mr. Covel's talk the feeling that the peak of oil competition had been reached was reflected by most of those who took part. Dr. E. W. Parker, of the Anthracite Bureau of Information, Philadelphia, called attention to the fact that the oil refiners themselves were using coal rather than oil in the refining processes. W. C. Baxter, of Troy, N. Y., was one of those at the convention who felt that the impracticability of oil burning for household heating purposes made any prospect of falling off in this trade negligible.

Reports from the association's officers relating to the work done during the

past year occupied the remainder of the first day's program, which closed at noon in order to give the visiting members an opportunity to try out the famous Greenbrier golf courses.

Much of the discussion at the second meeting centered on freight rates, diversion and reconsignment. G. N. Snider, former coal traffic manager of the New York Central R.R. but now general manager of Dickson & Eddy, New York, in his address "Freight Rates—Diversion and Reconsignment," advised that all transportation problems be settled by direct dealings with the railroads as far as possible rather than by seeking relief, of which he felt there was little hope, through government bureaus. He suggested that perhaps the mass of appeals made to the Interstate Commerce Commission had strengthened the feeling that regulation has become a burden and worked toward petrification in the present structure.

Cochran Deprecates Squabbling

Ira Cochran, the association's commissioner, urged that as there were varying problems with regard to these transportation matters in the different sections, the coal leaders should stop arguing and study the coal and the railroad situation. E. S. Simpson, of Richmond, president of the West Virginia Coal Co., complained of a lack of commercial mind among railroad men, and said that reconsignment was not now flexible enough, that the railroads should be more liberal, not penalizing operator or wholesaler, but should work back to pre-war conditions. More elasticity was declared to be the present need by E. M. Platt, president of Platt & Brahm Coal Co., of Chicago, who said that he saw no reason for restricting the use of the facilities of the roads.

Mr. Platt was one of the speakers on Wednesday, his subject being "Costs and Credits." Speaking of the evils of excessive competition which have developed and the "extreme general disorganization that unquestionably exists in the coal trade," Mr. Platt said: "Neither operator nor distributor can hope to get on a firm basis of prosperity until these conditions have been corrected. . . . Manifestly if we could move back toward a rational reorganization of the industry, that would re-establish the distributing sales end of the business in its proper place—between the producer and the consumer, where it would naturally regulate production to a fair relationship of legitimate demand and consumption—these problems of cost and credit would solve themselves both for the distributor and the producer, and with

such a sales body functioning efficiently and adequately the producer could apply his energies and his abilities unrestrictedly to the problems of producing coal and getting a price for it that at all times would net him a profit in fair proportion to the hazards of the business.

"The distributor, on the other hand, if relieved of the handicaps of excessive competition should be able to develop an efficiency that would enable him to handle at a profit to himself the product of the operator better and cheaper than the producer could handle it himself."

Another speaker on the program was Owen Meredith Fox, associate editor of the *Black Diamond*, who spoke on "The Wholesaler of the Future."

Presiding during the convention until the election and installation of new officers at the closing session was President Charles F. Dering, of Chicago. After the report of the nominating committee was adopted, he turned over the gavel to H. K. Cortright, of the Cortright Coal Co., of Philadelphia, who will serve as head of the association for the coming year. Other officers elected were H. J. Heywood, of W. A. Gosline & Co., Toledo, vice-president; and G. H. Merryweather (re-elected), of the Waubun Coal Co., Chicago, secretary and treasurer. Ira Cochran, the association's commissioner, with offices in Washington, was reappointed, and he as well as the retiring officers was given a vote of commendation.

New Directors Chosen

Directors who will serve for the coming year are: G. H. Snowden, of the G. H. Snowden Co., Pittsburgh; W. H. Weller, Jr., U. S. Fuel Corporation, Birmingham; E. H. Hemingway, W. C. Mason & Co., Inc., Hartford; Benjamin H. Read, Lynch & Read, Baltimore; J. W. Dykstra, of J. W. Dykstra & Co., Detroit; W. B. Vaughan, Ransom Coal & Grain Co., Kansas City; F. S. Martin, of F. S. Martin & Co., Omaha; H. P. Smith, Midland Coal & Steel Co., Cleveland; C. C. Cole, Cole-Basinger Coal Co., Toledo; W. H. Prescott, Memphis Coal Co., Memphis, Tenn.; J. Edgar Long, J. E. Long Coal Co., Clarksburg, W. Va.; W. C. Mass, Galloway Fuel Co., Milwaukee; C. G. McGill, Wm. McGill & Co., Toronto; L. S. Platka, E. S. Adsit Coal Co., Burlington, Vt.; J. F. Irwin, of J. F. Irwin Fuel Co., Latrobe, Pa.; L. S. Leighton, Carbon Coal & Coke Co., Boston; G. N. Snider, Dickson & Eddy, New York; Arthur Kuppinger, Seaboard Fuel Corporation, Philadelphia; F. W. Legg, Logan & Kanawha Coal Co., Cincinnati, and R. J. Buck, Jr., Marcy-Buck Co., Inc., Watertown, N. Y.

The executive committee will be made up of G. N. Snider, L. F. Leighton, G. H. Snowden, J. W. Dykstra, H. P. Smith, Fred Legg and W. H. Weller, Jr.

The association's annual banquet, held on the evening of June 3 in the main dining room of the Greenbrier Hotel, was attended by about 125 members and their wives. Jay Johns, of Pittsburgh, chairman of the Convention Committee, was in charge of the dinner, which was voted an unusually successful affair. No attempt was made to discuss business problems, and

Toastmaster Noah H. Swayne, of Philadelphia, soon disposed of the few serious remarks he felt it incumbent upon him to make. Roe Fulkerson, editor of the *Kiwanis Magazine*, Washington, D. C., was the principal speaker, his subject being "Personality." "The battle of business," he said, "is not that of dollars but of personalities," and then made many amusing applications. Mr. Swayne also introduced Major W. R. Coyle, of Bethlehem, Pa., a charter member and former president of the association and now a candidate for Congress. Major Coyle, in his greeting, caused much laughter when, after referring to the response of the coal men during the war, he spoke of the adjustment in the coal industry to peace and said: "We are now almost at peace with the government."

A large number of the delegates to the wholesalers' convention left White



G. N. Snider

Now general manager, Dickson & Eddy, formerly coal traffic manager, New York Central, urged seeking remedies for coal ills through railroads rather than through the Commerce Commission.

Sulphur Springs Wednesday afternoon for Bluefield, W. Va., to attend the retailers' convention there.

Before adjournment it was unanimously voted to adopt the report of the Resolutions Committee which requested the Interstate Commerce Commission and the individual railroads to restore at as early a date as possible those reconsignment and demurrage practices which through long-established custom had built up proper and necessary trade practices in various parts of the country, and commended the Trade Relations Committee for its continuous good work during the past year, requesting that the committee continue its co-operation with committees of other branch trades to the end that some workable plan of universal inspection at destination, if and when required, may be put into practice. The resolutions also recommended that the association approve and indorse the establishment of a coal institute as presented by F. R. Wadleigh and refer this question to the Trade Relations Committee for action.

The work done by Ira C. Cochran, in the presentation of claims and the preparation of claims for presenta-

Safety Movement Gains Headway in Utah

It is stated that most of the coal mines of Utah are now using water to keep down dust in the cutting, loading and hauling of coal, according to a report of State Coal Mine Inspector John Crawford. Mr. Crawford said the recent orders of the Industrial Commission in respect to safety devices also were being complied with as rapidly as possible.

tion was highly praised. It is perhaps worthy of note that during the past year there have been over 400 individual claims for freight charge corrections and reimbursements prepared by, and in many cases presented by, Mr. Cochran, for the membership. He is ready to consider and handle an even larger volume of these matters in the future than in the past. The work of Mr. Johns, of Pittsburgh, in planning for the convention received much favorable comment.

The association again indorsed the plan of the Arbitration Society of America and expressed its appreciation of the work done by many of the officers and members during the past year in procuring the amicable settlement of trade disputes. The action taken by the Executive Committee and the officers of the association in relation to the U. S. Coal Commission and its report was approved and the officers of the association came in for high praise for their work for the organization during the past year.

North American Fuel Co. to Run on Open-Shop Basis

Closely on the heels of a resumption of operations at the Brady mine of the Brady-Warner Coal Corporation in the Monongalia field of West Virginia, comes an announcement by the North American Fuel Co., operating at Maidsville, in the same field, that its mine will resume operations on an open-shop basis and with the 1917 wage scale in effect. Operations will start as soon as the company can obtain possession of houses now occupied by miners identified with the union. The company has served notice on employees that they must either return to work or vacate company property. B. M. Chaplin, president of the company, says that the same course of procedure as employed by the Brady-Warner Corporation will be followed by the North American company and that miners would be evicted from company houses and the houses used by those who would work. The North American company, like the Brady-Warner Coal Corporation, declined to become a party to the Baltimore wage agreement.

Since the outbreak on May 22 at the Brady mine of the Brady-Warner Coal Corporation when 50 shots were fired, there has been no further trouble, inasmuch as the company is proceeding under a sweeping injunction. By May 24 nearly all the miners who had refused to return to work had been moved from company premises.

Pittsburgh & West Virginia To Segregate Coal

The Pittsburgh & West Virginia Ry. is said to be considering segregation of its coal properties. It owns 15,000 acres of coal lands in Allegheny and Washington counties, Pennsylvania, through ownership of the Pittsburgh Terminal R.R. & Coal Co.'s \$16,000,000 stock. The coal lands are estimated to be worth \$15,000,000.

The Pittsburgh & West Virginia Ry. owns sixty miles of main line in Harrison County, Ohio, easterly through Harrison and Jefferson Counties, Ohio; Brook County, West Virginia, and Washington and Allegheny Counties, Pennsylvania.

Properties of the Pittsburgh Terminal R.R. & Coal Co., the entire capital stock of which is owned by the Pittsburgh & West Virginia Ry., are located along the line of the Pittsburgh & West Virginia and the West Side Belt R.R., also owned by the P. & W. V.

Total coal holdings of the Pittsburgh Terminal R.R. & Coal Co. are estimated at 72,500,000 tons.

Franklin Coal Co. Charged With Unfair Methods

Unfair methods of competition in the marketing of coal is charged against the Franklin Coal Co., of St. Louis, Mo., in a complaint issued by the Federal Trade Commission.

It is alleged in the complaint that the concern offered for sale certain coal under the trade name of "Mt. Olive coal" and "Mt. Olive district coal." The complaint states that coal mined at Mt. Olive, Ill., or the immediate coal district in the region of Mt. Olive, known as the Mt. Olive section, which lies within the counties of Macoupin and Madison, is known to and designated by a substantial part of the purchasing public as "Mt. Olive coal." The complaint alleges that respondent's coal has a lower market value than Mt. Olive coal, and that the use by respondent of such misleading designation has a tendency to deceive the purchaser into the erroneous belief that its coal is the product of the Mt. Olive district, whereas it is alleged that the respondent's coal is produced in the counties of Clinton and Bond, in the State of Illinois, this district being wholly outside the Mt. Olive district.

Stone's Attitude Heartens Partisans of Trade Data

Those most concerned as to the trade-association statistical situation are much encouraged by the attitude of the new Attorney General. Mr. Stone has stated publicly that he is hopeful of a satisfactory solution of the matter. There is reason to believe that he recognizes that the policy of the department toward these figures has not been constructive. At the same time the Attorney General is not in a position, it is believed, to discuss his views in detail at this time because of their possible application to pending cases.

It now seems probable that a test case will be brought, although that step will not be taken in the immediate future. In the meantime, consideration is being given to expediting some of the pending cases in which certain important trade-association questions are involved.

Cleveland & Western Coal Co. Judgment Stands

The Supreme Court has refused to grant a writ of certiorari sought by the Cleveland & Western Coal Co. to review the judgment awarded against it to the Main Island Creek Coal Co., of West Virginia. The decision of the lower courts, awarding judgment of \$404,279 to the Main Island company therefore will stand.

The Main Island company sued the Cleveland & Western to recover \$6 per ton on 60,711 tons of coal delivered to the Cleveland & Western in 1919. The Cleveland & Western alleged that the arrangement was for an exchange of coal. It tendered coal to the Main Island company and upon refusal to receive the fuel sold it and tendered the money to the Main Island company. The Main Island company claimed the original deliveries were in the nature of outright sales and the District Federal Court so held. This decision will prevail through the declination of the Supreme Court to review the case.

Shipping Board Opens More Bids at New York

The United States Shipping Board at New York opened bids on June 5 for furnishing and delivering alongside vessels in that harbor on June 8, 3,300 gross tons of soft coal of a minimum of 14,500 B.t.u. There were five bidders, as follows: Rhodes Fuel Corporation, 5.18; Seiler Coal Co., \$5.43; Imperial Coal Corporation, \$5.14; Steamship Fuel Co., \$5.04; W. H. B. Haff, \$5.29.

Bids will be received until July 2 by the Quartermaster at West Point for furnishing 17,000 tons of birdseye coal, 1,400 tons No. 1 buckwheat and 1,200 gross tons gas coal.

Bids were opened on June 6 by the Quartermaster's Department at the U. S. Army Supply Base, South Brooklyn, for furnishing and delivering approximately 7,000 tons of soft coal to various forts and army buildings in New York, Pennsylvania, New Jersey and Delaware. More than thirty bids were received, quotations ranging from \$1.26 to \$2.34 per net ton f.o.b. mine, depending upon quality of coal and place of delivery.

Welsh Coal Seeks Canada's Anthracite Market

British and Canadian coal interests are trying this year to popularize Welsh and Scotch coal in eastern Canada so as to replace some of the American anthracite sold in that region. They claim they can sell the cross-water fuel at prices that will compare favorably with the Pennsylvania product. To companies are preparing to handle this traffic—the Canadian-Welsh Anthracite, Ltd., which is now building a \$200,000 crushing and sizing plant at Vulcan wharf, in Montreal, and the F. P. Weaver Coal Co., Ltd., which also will build a breaker at Montreal, according to the Department of Commerce.

During the year ending Feb. 29, 1924, Canada imported from the United States 4,950,000 tons of anthracite and 15,320,000 tons of soft coal. From the United Kingdom came only 211,300 tons of anthracite and 278,500 tons of bituminous coal. Those now engaged in the Canadian Welsh coal business are prophesying that during the present year they can at least double the import of British coal into Canada.

In parts of eastern Canada a real effort is being made to replace American anthracite with Canadian coke.

Bituminous Coal Loaded Into Vessels at Lake Erie Ports During Season to End of May

(In Net Tons)

Ports	Railroads	1924			1923			1922		
		Cargo	Fuel	Total	Cargo	Fuel	Total	Cargo	Fuel	Total
Toledo.....	Hocking Valley.....	1,422,987	40,881	1,463,868	760,562	21,622	782,184	617,287	16,103	633,390
	N. Y. C.-Ohio Central Lines.....	4,505	227	4,732	304,405	9,456	313,861			
	Baltimore & Ohio.....	234,923	7,975	242,898	305,272	9,561	314,833	823,958	17,125	841,083
Sandusky.....	Pennsylvania.....	276,743	7,832	284,575	387,362	10,244	397,606	488,143	11,655	499,798
Huron.....	Wheeling & Lake Erie.....	179,392	8,426	187,818	272,491	9,261	281,752	7,612	334	7,946
Lorain.....	Baltimore & Ohio.....	252,415	24,885	277,300	474,584	30,316	504,900	17,820	3,353	21,173
Cleveland.....	Pennsylvania.....	158,254	29,146	187,400	323,427	22,443	345,870	43,358	6,704	50,062
	Erie.....	56,556	1,917	58,473	266,874	10,458	277,332			
Fairport.....	Baltimore & Ohio.....	53,407	20,234	73,641	92,771	8,503	101,274			
Ashtabula.....	New York Central.....	191,531	22,488	214,019	844,358	40,764	885,122	31,083	5,757	36,840
	Pennsylvania.....	131,412	14,398	145,810	277,094	11,102	288,196	28,342	2,113	30,455
Conneaut.....	Bessemer & Lake Erie.....	294,959	43,446	338,405	524,636	26,974	551,610	24,744	194	24,938
Erie.....	Pennsylvania.....	66,026	14,089	80,115	101,209	11,801	113,010	23,575	6,685	30,260
Total.....		3,323,110	235,944	3,559,054	4,935,045	222,505	5,157,550	2,105,922	70,023	2,175,945
*1923 Storage Loading.....		182,060	4,940	187,000						

* Coal loaded into vessels in December, 1923, after close of navigation.

Compiled by Ore & Coal Exchange, Cleveland, Ohio; H. M. Griggs, manager.

Retailers, in Annual Convention, Decry Government Interference with Coal

Strong Resolution Deprecates Attempts at Bureaucratic Control—Senator King Deplores Burdensome Taxation That Handicaps Business—Association Officers All Re-elected

The business sessions of the seventh annual convention of the National Retail Coal Merchants' Association were brought to a close at the Hotel West Virginian, Bluefield, W. Va., late Thursday afternoon, June 5, with the election of officers and the adoption of three important resolutions outstanding among a dozen or more which the convention indorsed.

Regarding governmental interference with the coal industry a resolution was adopted calling upon the executive officers of the association to oppose by all legitimate means legislation tending to place the coal industry under governmental or bureaucratic control, and urging upon members of all branches of the coal industry the practice of such business ethics in their relations with one another that government regulation of the industry will be unnecessary.

Want Fewer Government Workers

Offered by Roderick Stephens, of New York, and adopted by the convention was a resolution urging members of the association to use their influence upon all citizens and other civic and commercial organizations throughout the nation to voice an insistent demand for immediate and continuous reduction in the number of government employees, both of the state and nation; and further, urging support of the movement by the discouragement of the assumption of additional governmental functions and responsibilities, and by encouragement of a heightened sense of responsibility by individual citizens as the only sound and permanent basis for the preservation of our liberty and for the growth and prosperity of the country as a whole.

A resolution calling for the rescinding of the ten percentum overload rule and the substitution therefor of a rule which will provide for a minimum of ten percentum less than marked capacity and a maximum of the marked capacity with the peak of the load not to exceed 12 in. above the side of the car was unanimously adopted.

The convention opened Wednesday morning, June 4, with more than 450 delegates and visitors in attendance. Two special trains, one from the East and one from the West, brought the delegation to the convention city. The convention was formally opened at 11 a.m., by Samuel B. Crowell, president of the association. The morning session was devoted to the appointment of committees and the hearing of reports by the officers. The outstanding feature in these reports was the splendid condition reported by the retailers considering recent reports of the state of the industry.

At the noonday luncheon, Clarence E. Ridley, City Manager, welcomed the delegates and visitors on behalf of the city of Bluefield, and H. I. Shott, editor of the *Bluefield Daily Telegraph*, ex-

tended the welcome on behalf of the people of southern West Virginia.

On Wednesday afternoon reports on trade relations were heard, President Samuel B. Crowell speaking on anthracite, and in the absence of Marshall Keig his paper on the bituminous situation was read by the resident vice-president, Joseph E. O'Toole.

A brisk and interesting report of the governmental relations committee was



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Samuel B. Crowell

President of the National Retail Coal Merchants Association. Mr. Crowell has been 38 years in the coal business, as an operator, wholesaler and retailer. He is now at the head of one of the largest retail coal companies in Philadelphia.

made by Roderick Stephens. Pointing out that since the last convention the committee had been working along familiar lines, except that there had been little to do of late in connection with general legislation, on account of the congressional oil deluge, complicated by a mud-slinging campaign of certain groups in the upper and lower houses of Congress, Mr. Stephens said much legislation aimed at the coal trade had been introduced, but no hearings had been held on bills of direct interest to the retail coal trade and no such legislation had advanced far enough to cause any concern. Mr. Stephens reviewed matters which had received the attention of the committee during the past year, among which were the U. S. Coal Commission, governmental activity in connection with the anthracite strike, the Federal Trade Commission, the Department of Commerce and the Government Fuel Yard.

Addresses by E. L. Greever, general counsel of the Pocahontas Operators Association, and George H. Cushing, editor of *Cushing's Survey*, brought the afternoon of the first day of the convention to a close. Mr. Greever spoke with reference to the Pocahontas coal

field and Mr. Cushing on "Ethics for Coal Men."

The annual banquet of the association Wednesday evening was featured by an address of Senator William H. King, of Utah. Senator King spoke on "What Policy Is Necessary for Business Revival." He opened with a recital of the burdensome taxation imposed by national, state and local governments, declaring a tax-ridden people cannot have prosperity, and said: "We want a government that lays its hand as lightly as possible upon the body of the individual, upon the liberty of the individual, and upon the purse of the individual." The speaker pointed out that among the things essential to the revival of prosperity was foreign trade and commerce. He urged a modification of the tariff law, denounced the child labor law and concluded with the statement that he applauded President Coolidge when he said we must enter the World Court and take part in the problems of the world.

Urges "Fight for Life"

Harry L. Gandy, executive secretary of the National Coal Association, and Francis R. Wadleigh, vice-president of the Tuttle Coal Corporation and former U. S. Fuel Administrator, were the principal speakers on Thursday. "These days are uncertain ones politically," stated Mr. Gandy, "in that there is an effort to increase the burdens of the government. On every hand there are schemes to broaden governmental activities and increase expenditures. This race of ours through centuries of effort, finally shook off the bondage of the state and made possible individual initiative and the private ownership and control of profits. Indeed if ever there was a time when American citizens should read their histories, this is the time." The speaker urged everyone engaged in the coal industry to exert his best efforts not only for the success of the industry but also in order that the industry may hold respect and confidence and continue its usefulness. "The fight for life," he said, "makes this necessary."

Mr. Wadleigh spoke on "The Coal Institute," making a strong appeal for the formation of the coal institute or some similar organization through which all branches of the industry could work in harmony.

On Thursday night the Pocahontas Operators Association, host to the 1924 convention, tendered a banquet to the delegates and visitors. Colonel W. S. Battle, of the Norfolk & Western Ry., presided as toastmaster and delivered a fine address, setting forth some truths affecting the problems of the railroad as related to those of the coal shippers. A cabaret entertainment was given in connection with the banquet.

On Friday, June 6, members of the National Retail Coal Merchants Association visited the Pocahontas coal fields in southern West Virginia. The party made the trip by automobile. Among the plants visited were those of the American Coal Co. and the Pocahontas Fuel Co.

The officers of the association, who were re-elected without a change, follow: President, Samuel B. Crowell, of Philadelphia; Resident Vice-President,



Joseph E. O'Toole

Resident vice-president, National Retail Coal Merchants Association, succeeds himself. Mr. O'Toole reports that during the year ten local associations affiliated with the national society, including the Baltimore Coal Exchange.

Joseph E. O'Toole, of Washington; Vice Presidents, Marshall E. Keig, Chicago; J. Maury Dove, Jr., of Washington; W. A. Clark, of Boston; W. L. Vail, of Toledo; Chas. B. Staats, of Albany; F. W. Schermes, of Kansas City. R. J. Wulff, of Brooklyn, N. Y., was re-elected treasurer of the association.

Board of Directors: Homer D. Jones, chairman, of Chicago; Elijah J. Barkume, of Detroit; Jos. H. Lucking, of Newark, N. J.; John S. McEwan, of Albany; Chas. B. Bodwell, of Manchester, N. H.; W. R. Fouguay, of St. Joseph, Mo.; J. Harry West, of Baltimore; A. Ashley Miller, of Chicago; John J. O'Connor, of Milwaukee; Wellington M. Bertolet, of Reading, Pa.; J. L. Browne, of Sioux City, Ia.; H. E. Davis, Woonsocket, R. I.; C. A. Elwood, Rochester; W. L. Montgomery, Harrisburg, Pa.; C. D. Taylor, of Kalamazoo, Mich.; James T. Tattersall, of Trenton, N. J.; John E. Loyd, of Philadelphia; C. Solon Kellogg, of Rochester; Roderrick Stephens, of New York city; F. S. Sager, of Norfolk; Ray Macy, of Indianapolis; Russell H. Jones, of Kenosha, Wis.; Robert S. Hayes, of Newport, R. I.; L. W. Ferguson, of Chicago; Luke D. Drury, of Richmond; G. F. Rogers, of St. Catharines, Ont., Canada.

President Crowell was retained by the association as chief counsel in the United States Chamber of Commerce, and after his election he urged that more men be appointed to this important duty. It was then on motion ordered it be left to the president to name whom he might on this committee.

Following the re-election of President Crowell delegates and members of the association gave him a big demonstration of their appreciation for his work during the past year. In accepting the presidency Mr. Crowell made an eloquent address. He spoke of the splendid success of the association, the fine spirit of co-operation extended him during his administration and then requested there be more effort put forth along this line during the coming year.

Says Railroads and Coal Men Should Bury the Ax

In his appeal for less antagonism between railroads and the coal industry, at the International Railway Fuel Association convention, in Chicago, May 29, F. R. Wadleigh, former Federal Fuel Distributor, pointed out some of the penalties that are paid for such mutual feeling, and indicated ways of removing those penalties.

"It seems to me," said he, "that railroad purchasing agents would obtain better results for their roads if they studied more closely the interests of the coal industry and made themselves better acquainted with its problems and relationship toward transportation. The coal industry should not feel antagonistic toward railroad-coal purchasers, but such a condition unfortunately exists.

"The practice consistently followed by some railroad-fuel purchasing officials of 'beating down' the coal sellers to the very lowest price in times of plentiful supply is not economic from a business standpoint, nor is it best for the railroads in the end. It, of course, antagonizes the coal seller and encourages him to 'put one over' on the railroads in any way possible; it makes for poor preparation and poor results. When there is a scarcity of coal the railroads are apt to suffer and be given the least consideration, not only in price but in quality of coal.

Coal Man Partly at Fault

"It is freely admitted that the coal man is partly to blame. His attitude toward the purchasing officer and his inspectors is not always calculated to bring about friendly feelings. He sometimes—too often indeed—looks upon the railroads as a dumping ground for his coal, a place where badly prepared or lower grade coal can get by, not perhaps realizing that we are all, producer and consumer alike, bound up in railroad transportation; that poor coal slows up train movement and thus hampers every industry, including his own.

"The American Railway Association has recently appointed a fuel committee; could it not study the subject of coal purchases and formulate purchase methods, with benefit to its members?

"I might suggest here the possibility of that association's formulating a standard contract form and general specifications for coal. Although some of our friends in the coal industry would object to such a move, I believe that it would, if properly carried out, inure to the benefit of both buyer and seller.

"Undoubtedly, the International Railway Fuel Association could do a great deal to remedy the existing conditions.



George H. Cushing

Philosopher of the coal trade. Mr. Cushing is "shocked by the hypocrisy of public men who preach ethics to coal men yet seek to plunder the industry for their own advancement."

It could at least appoint a strong committee, in which might be included representatives of the coal operators who are members of the association, to study the matter and make recommendations to the railroads and to the coal industry. There is no group more interested in the coal purchases of the railroads than the members of this association; their wide knowledge regarding both purchases and the use of the coal purchased should make their recommendations carry great weight. The coal industry would, I am sure, co-operate with them and give careful consideration to their recommendations.

"In this connection, it will interest all of you, I believe, to learn that there is a movement on foot to organize a Coal Institute (tentatively so named) which shall actually represent all branches of the coal industry, operators, wholesalers and retail dealers. With such a body this association might well co-operate on the subject of railroad-fuel purchases, as well as in other ways, to mutual advantage.

"Needed and effective co-operation between the railroads, their transportation, traffic, coal-purchasing officials, inspectors and the coal industry generally has been difficult owing to the lack of unity on the part of the latter. Had the coal industry a truly national and representative body, as well organized and operated, with the comprehensive functions of the American Railway Association, the interests of both could be signally advanced. It is hoped that the Coal Institute, if created, will be of great help in that connection."

New York Anthracite Circular Prices for June, 1924

(Gross ton f.o.b. mines)

	Broken	Egg	Stove	Chestnut	Pea
Philadelphia & Reading	\$8.85	\$8.85	\$9.00	\$8.85	\$6.00
Lehigh Valley	8.50	8.65	8.85	8.85	5.75
Lehigh Coal & Navigation	8.85	8.85	9.10	8.95	6.00
Pattison & Bowns	8.60	8.60	8.70	8.50	5.50
Hudson Coal Co.	8.70	8.70	8.70	8.70	
Lehigh & Wilkes-Barre	8.00	8.45	8.45	8.45	5.75
Lackawanna	8.00	8.45	8.45	8.45	5.75

No. 1 Buckwheat, \$3-\$3.15; rice, \$2-\$2.25; barley, \$1.50

Transfer of Mineral Resources Division To Census Bureau Meets Opposition

Reorganization of Federal Executive Departments Would Take Compilation of Coal Statistics from Geological Survey—Industry Has Six Months to Study and Acquaint Legislators with Its Views

By PAUL WOOTON
Washington Correspondent of *Coal Age*

The scheme for the reorganization of the executive departments of the federal government, which was submitted to Congress just before adjournment, meets with disapproval in coal circles, at least in so far as it proposes to transfer the Division of Mineral Resources from the Geological Survey to the Bureau of the Census. One of the major sections of the Division of Mineral Resources is devoted to coal statistics.

Under the reorganization plan the name of the Bureau of the Census is to be changed to the Bureau of Federal Statistics. In this bureau are to be grouped practically all of the statistical activities in Washington. Coal statistics are so dependent upon close association with the technical staff of the Geological Survey that to attempt to place them in the hands of isolated statisticians instead of geologists who have had statistical training has brought forth a determined protest. It would be just as sensible, it is contended, to set up a bureau of type-writing and have the typing for all of the government departments done in a single building.

Change Would Be Scientific Loss

The reorganization proposal may never be written into law, but the plan is now on the calendar of both the Senate and the House and can be called up for action soon after the convening of Congress in December. This has the advantage of giving industry six months to study the plan and to acquaint the legislators with its views.

The removal of the mineral resources work from the Geological Survey would mean a serious loss to the scientific work of the bureau through dissociation with current statistics. The two are held to go hand in hand and have been handled with entire satisfaction to industry during the thirty years that the work has been conducted by the U. S. Geological Survey. The Bureau of the Census has made a great success in the handling of many types of statistics, but in the case of coal and mineral statistics generally it has been found that they are compiled best by those who have to use them.

Every ten years the Bureau of the Census publishes as a volume of the decennial census an extensive report dealing with statistics of mines and quarries. This is a pretentious work. The volume dealing with mines and quarries in 1919 contained 443 compactly printed pages. It happens that because of the detail to the Bureau of the Census of Frank J. Katz, a geologist who has had long experience with the mineral resources work of the Geo-

logical Survey, these data were brought to a new plane of merit. Even then, however, the work is regarded as being far from satisfactory and it was only with great difficulty that Mr. Katz was able to bring the statisticians of the Bureau of the Census to accept even a portion of his program for handling these figures.

One of the leading economists of the country is on record to the effect that the 1909 Mines and Quarries report was worse than useless. He finally threw his copy in the waste basket so that his staff might not make use of figures likely to mislead them.

The point also is made that the creation of the Bureau of Federal Statistics will reduce greatly the amount of money which will be made available for statistical work. When most of the statistical activities are grouped together, the aggregate of their present expenditures will look large to the appropriations committees. The lump sum which would be made available for all of this work in all probability would be reduced. The coal statistics would be a small activity in a very large Bureau. Its proportion of the total made available to the Bureau almost certainly would be much less than is now expended in this connection.

Most of the arguments advanced against the transfer of coal statistics to the Department of Commerce apply equally well to those of other minerals. Long experience has demonstrated the advisability of having these statistics prepared by those who must use them in their daily work dealing with the technical and scientific phases of those industries.

OIL VERSUS COAL

All is not "pie" for the railroad that burns oil instead of coal, as was brought out often in the coal and oil symposium at the International Railway Fuel Association meeting in Chicago. It was shown that nearly every oil field is declining in production and price increases are expected. The steady increase in the "crackling" process to make more gasoline reduces the free burning quality of fuel oil and makes more carbon troubles. Among the disadvantages of oil firing not commonly considered, J. M. Nicholson, of the Santa Fe, pointed out that the average life of fireboxes is reduced 25 per cent by oil. The 1923 decline in steam-coal prices and the uncertainty of oil supply make the railroad oil market weaker than that for coal, it was said. Last year American roads burned 146,000,000 tons of coal and 54,000,000 barrels of oil, equivalent to about 15,000,000 tons of coal.

Two Investigations Into Cause of Glen Alden Mine Explosion Now Under Way

(Special Dispatch to *Coal Age*)

Scranton, Pa., June 9.—Two official investigations are now under way into the cause of the gas explosion at the Loomis Mine of the Glen Alden Coal Co., in Hanover township, last Friday, causing the deaths of fourteen men and injuries to seven others. The Department of Mines is conducting one of the probes under the direct supervision of its chief, James J. Walsh, and the Glen Alden company is conducting a separate inquiry.

It is probable that the direct cause of the gas explosions will never be known because of the fact that the men who were on the scene of the first explosion were killed instantly. The mine is known throughout the region for its gaseous condition and Mr. Walsh, the Secretary of Mines, is quoted as having described the operation as "the most gaseous mine in the world." Very little water is found in the workings.

The explosions occurred in the Mills vein of No. 1 shaft, which is 760 ft. below the surface. It is believed that the first blast occurred in the second south gangway, and that the second, a result of the first, occurred in an opposite gangway, known as fourth east.

After traveling from the fourth east gangway, the explosive gases struck an air bridge and when the two currents were mixed it was stopped. The air bridge, which is of concrete and used to carry the air traveling on one road over the air circulation on a road in an opposite direction, was demolished by the force of the explosion.

Damage to the shaft was slight, but it was reported that brattice work was torn down, timber and props blown to pieces and numerous rock falls and caves followed in the wake of the explosions. There was no fire following the explosions. The shaft and mines were closed the day following the accident, but the breaker operated preparing the coal produced by several other mines owned by the company. About an hour after the explosion the first body was brought to the surface. It was that of William Welch, a brattice man, of Hanover Green. Between 1 and 6 o'clock six other bodies were taken from the workings.

Shortly after six o'clock all members of the rescue squads were ordered to the surface and the air currents were changed. At 9 o'clock a rescue party of forty men under the direct supervision of H. D. Dimmick, vice-president and general manager of the Glen Alden company, entered the mine and remained until the bodies of the other seven victims had been recovered. After entering the mine the rescue party spent several hours in erecting brattice work to keep back the gases and to handle the air currents. It was almost 4 o'clock on Saturday morning before the last of the bodies had been recovered.

W. W. Inglis, president of the Glen Alden Coal Co., was on the scene of the disaster until all of the dead had been removed from the workings.

To Resume Safety Hearings; Bill Embodies Bain's Plan

Further hearings on mine safety will be held by the House Committee on Mines and Mining when Congress reconvenes next December, as the committee was unable to conclude its inquiry into this subject before adjournment of the spring session, June 7.

It is evident that the members of the committee have been deeply impressed with the advisability of strengthening the Bureau of Mines, both as to extending the authority of that agency and as to supplying it with an increased appropriation for research, field work and added personnel.

Tells Needs of Bureau of Mines

In a statement sent the committee to be included in the printed record of the hearings, in order to supplement his personal testimony, H. Foster Bain, Director of the Bureau of Mines, suggested four outstanding needs of the Bureau according to his views. These are: (1) Legislative authority to carry the Bureau's safety messages and field demonstrations direct to those most vitally concerned; (2) authority for the publication of a brief annual specifically on safety to be sent to the miners themselves; (3) authority whereby the Bureau may investigate the manufacture, transportation and storage of explosives as relating to safety; (4) such authorization for additional mine rescue cars and stations and mine safety instruction cars as Congress may appropriate for.

Director Bain emphasized the fact that the Bureau now has a small staff for testing apparatus and equipment and that it lacks a sufficient field force for demonstration. The gap in its work in explosives, his statement showed, is that the Bureau now can take into account explosives only after they reach the mine. He called attention to the fact that the manufacture, transportation and storage of explosives are not now regulated. The Bureau is now so behind in its research and tests, owing to lack of personnel, that it is not in a position to frame a code for underground electricity, the director reports.

Stresses Need of Education

Special emphasis was laid by the director on the necessity for carrying on a campaign of education among both operators and miners by personal contact. The Department of Agriculture, Dr. Bain pointed out, sends to the individual farm its message, and something of the same nature should be done with the results of the safety work of the Bureau of Mines, he suggested. "If our mines are to be made safe, the scientific and technical data available to the federal government must be brought home in understandable form to the ones who alone can make it effective," said Dr. Bain.

A model law on mining to serve as the basis for state laws, as had been suggested by several witnesses before the committee, does not meet the ap-

All Indiana Talks Merger

The air is full of merger stories, the latest being that broadcast about a possible consolidation of practically the entire State of Indiana. This movement, urged by the Miami Coal Co. and other important Indiana companies, has not taken any definite form yet, but feelers have been sent out from an engineering office to collect general information about the properties and their probable valuations and at least one general meeting has been held of the principals in the case. Financial backing has been tentatively promised, but such a consolidation is a long way from completion and offers at present only a basis for interested discussion. Meantime, most of Indiana is shut down and there is nothing bright in the outlook for the state. By autumn, when coal demand picks up, the hope of certain backers of the Indiana merger is that enough properties will be under single control so that a great many that have no business operating can be prevented from muddling the market for the others.

proval of Dr. Bain, who, in his statement, suggests rather that there be an agreement on the general principles and standards of safety with a flexible system of regulation and orders to be issued as the need arises. The suggestion offered by Chairman Robsion, of the committee, that a conference of governors of states in which coal mining is conducted be held, in order to agree on certain principles of safety and the removal of certain competitive conditions which now hamper advancement of certain phases of safety work, is indorsed strongly in the statement of Director Bain.

Wants Voluntary Co-operation

In view of the limitations of federal authority over state mine inspection and regulations, Dr. Bain suggests legislation providing for a voluntary co-operative system by which the Bureau of Mines, on invitation of a state, might send trained personnel to assist the state department, the expense of work of this character to be divided between the state and the federal governments.

The Bureau of Mines is limited by law to ten mine rescue cars at present, the statement shows, and in the near future will be able to use to advantage twelve cars. Three of the old cars are unsafe for rapid travel and should be replaced, it is stated. Provision for one new steel car to replace one of these wooden cars is made in the appropriation available July 1.

A further suggestion is that a third instructor be added to each instruction car. The Bureau next year will ask \$325,000 for safety work, an increase of \$63,000.

In line with the director's suggestions, the Bureau of Mines has submitted to the committee a bill embodying Dr. Bain's ideas.

Rumbles of Protest Rise Against Northwest Rates

Now that the long awaited decisions have been made by the Interstate Commerce Commission on rail rates into the Northwest, the expected protests are being heard from the losers—the rail shippers. Furthermore many Northwest consumers are beginning to raise their voices also because the decisions, ordering higher rail rates from southern Illinois and eastern Kentucky into effect Aug. 21, may logically cause higher prices of both dock and rail coal immediately after that. Certain dock spokesmen already deny publicly that there will be any increase in the price of dock coal by reason of the rate advantage the commission gives them, but the consumers are fearful.

The peculiar features of the decision against rail shippers have aroused much comment. Although the rate into the Twin Cities themselves has not been ordered up, the new zone lines arbitrarily drawn south of the Twin Cities make it impossible for rail coal to retain the present Twin City rate. Instead of drawing the usual rate line from Stillwater, Minn., westward, thus in effect defining the rail territory from the dock territory, the commission drew two such lines. One is the curve of the C. M. & St. P. Ry. from Stillwater south and west of the Twin Cities. All rail coal reaching this line or crossing it bound north or west must pay \$3.75 instead of \$3.47. The second zone line south of this is the line of the Chicago & Northwestern through Winona, Rochester and Mankato. Coal into this zone must pay \$3.55 instead of \$3.47 and coal reaching but not crossing this line is boosted from \$3.22 to \$3.35.

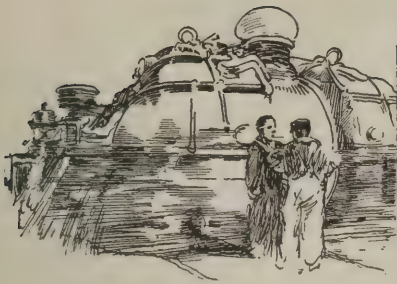
The effect of the decision in the case of eastward coal traveling all-rail to the Northwest is to raise its rate 53c.

"What can we do?" is the wail among the parties affected by the increases. A definite protest to the commission by interests not previously heard may soon be made. But a more potent solution lies in the possibility of Midwestern lines declining to take advantage of the increases they can make under the decision. There are many other possibilities through rail action that are being discussed heatedly. No general policy by railroads has yet been determined.

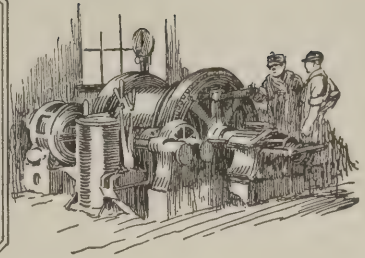
Coal Consumption and Power Output by Utilities Drop

Electric public-utility plants consumed 2,936,727 tons of coal during April, according to a report by the Geological Survey. This compares with 3,241,631 tons consumed in March and 3,326,631 tons in February. Fuel oil consumed by utility plants in April totaled 1,208,735 barrels, compared with 1,540,256 barrels in March and 1,543,594 barrels in January.

The average daily production of electricity by public-utility power plants during April was 158,400,000 kw.-hr., about 1½ per cent less than the daily output in March. The output for February, 168,300,000 kw.-hr., was the highest on record.



Practical Pointers For Electrical And Mechanical Men



How Flashing of Substation Generator Was Stopped by a Choke Coil

Feeder System Was Unusually Good — Short-Circuited Resistance Was Small — Choke Coil Modified the Steep Wave Front — Quick-Acting Breaker Also Necessary

NEARLY everyone working in the electrical department of a coal company has at some time or other been confronted with a report of electrical trouble concerning which everything seemed to be correct but the apparatus wouldn't function properly. Many a mine electrician probably at some time or other has been told, by an inside workman, about a piece of equipment which was properly connected and installed but still refused to operate satisfactorily.

It is sometimes interesting to hear a member of the electrical engineering department try to determine the cause of an electrical failure by conversation, over the telephone. Many times I have heard these engineers say, after such a conversation, "Everything is all right but it won't work." The usual result is a trip to the mine to get at the source of the trouble.

There are occasions, however, where the cause of an electrical breakdown is very illusive. I have in mind a particular case where difficulties were experienced rather frequently but it was a long time before a real cause was assigned to the troubles.

The direct-current generator of a standard type motor-generator set, manufactured by a reputable company, would occasionally flash over and seriously burn the commutator and brush rigging. This generator delivered 550-volt direct-current energy to a mine load consisting of locomotives, hoists and pumps. The motor was of the synchronous type and received its energy from a 4,000-volt, three-phase, 60-cycle circuit.

When the generator flashed over no one seemed to know the cause or what led up to the trouble. Frequently when the damaged parts were examined the commutator would be found to be badly pitted, the brush rigging burned and an insulator on one of the brush studs would be charred.

Just as soon as these parts were repaired the machine would be started and no other damage could be found. Later the equipment would be put in service on the same load as previous to the delay and everything would go fine until perhaps a month or possibly a

year, when the same trouble would be experienced again.

After each breakdown exhaustive tests were made for grounds, short-circuits and open-circuits. The field coils were checked, the wiring to the circuit-breaker and into the mines was traced. Insulation tests were made, yet nothing unusual was detected.

Conversation with some of the men in the mines disclosed the fact that the generator flashed over whenever a sudden overload was placed on the trolley lines. Whenever a short-circuit or ground occurred the most serious trouble was experienced.

Following this clue a survey of the whole direct-current system was made and some interesting conclusions were

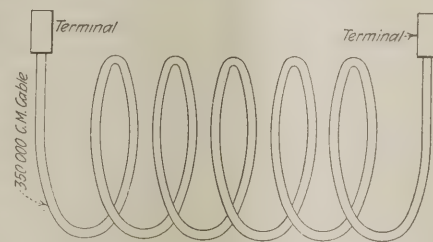


Fig. 1—Current-Limiting Reactance

Several turns of cable wound into the shape of a large choke coil caused the current to increase in value at a slow rate. This arrangement permitted the circuit-breaker to open when the current in the line was relatively small.

reached This particular mine is only one of many operated by the same company, however, it is the only one using 550-volt direct-current for inside service. The feeder wires and return circuits were in unusually good condition. All through the mine a very good voltage was always maintained. This was probably due to a fortunate circumstance. By error or intent the feeder system consisted of cables much larger than usually found around mines. The reason why I say there might have been an error on the part of some one laying out these distributing lines is that the cables looked as if they had been calculated for the usual 250-volt mine power supply.

Consequently, when an abnormal

overload occurred, due to a ground or short-circuit, a heavy current flowed through the system. The generator characteristic curves showed that the voltage compounded to a high value very quickly whenever the current in the line wires became excessive.

Obviously when a heavy load was suddenly applied the current tended to increase until it reached its short-circuit limiting value. It must be remembered that the cables were large and the short-circuit limiting resistance was therefore low. This fact, together with the rapid compounding characteristics of the generator caused the voltage and current to increase to very large values.

If we suppose that a short-circuit occurred at a point 1,500 ft. from the generator, even neglecting the compounding of the generator voltage, we can estimate the short-circuit current of the line. The resistance of 3,000 ft.—feeder and return—of 350,000 c.m. cable is approximately 0.09 ohms:

$$\frac{E}{R} = I \text{ or } \frac{550}{0.09} = 6,100 + \text{ amps.}$$

When we consider the fact that the instantaneous compounded voltage is much larger than 550 volts we can see that the current rises to a very great value.

Further inspection revealed that the direct-current circuit-breaker operated sluggishly, in fact, it seems quite possible that although it was set to open at 600 amps. the current probably could rise to 6,000 amps. before the circuit was actually opened. On 550-volt systems there is a tendency for the arc to hold to the breaker tips for a considerable period.

When the circuit is finally ruptured the current has increased to such a high value and the generator voltage is so high that the sudden collapse of the magnetic fields in the machine gives rise to a counter-voltage which causes a flash on the commutator.

The cause of these flashes is therefore due to several conditions. First, the short-circuit occurs near the machine; second, the generator compounds its voltage quickly, third, the circuit-breaker is slow in operating.

To correct these conditions it was not advisable to increase the circuit resistance, because of the greater power loss under normal operation, but a large choke coil was put in the line to cause the short-circuit current to build up slowly. A new quick-acting circuit-breaker was put on the substation control panel.

Since these changes were made there have been no further troubles. Fig. 1 shows the large choke coil which was

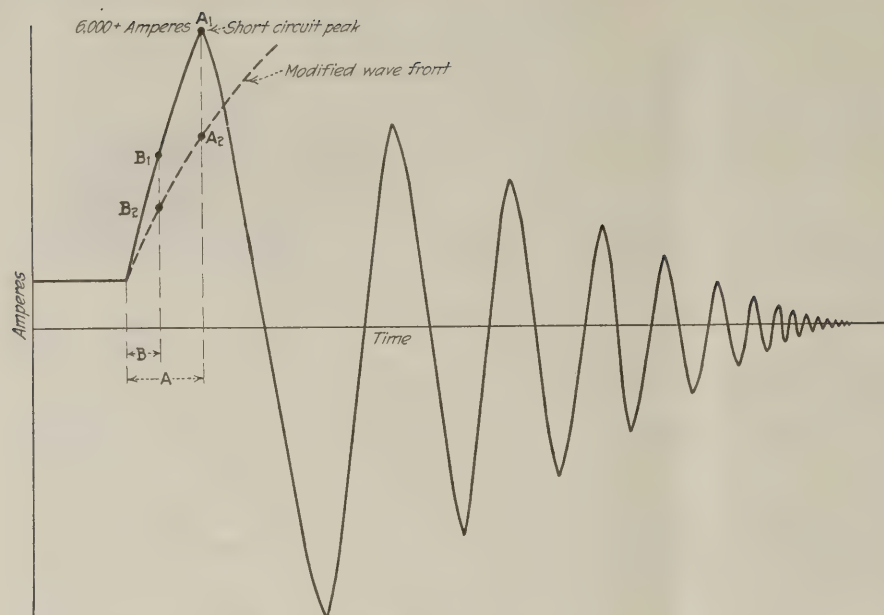


Fig. 2—How the Generator Flashes Were Stopped by a Choke Coil

The dampened wave represents the current surge before a choke coil was placed in the line. The modified wave front shows the effect of the choke coil. A_1 indicates when the slow-acting breaker opens and B_1 when the quick-acting breaker opens the circuit without a choke coil. A_2 and B_2

respectively represent the points where the breakers open the circuit when a choke coil is in the line. The coil therefore gives a time lag which delays the current and permits the circuit-breaker to open the line while the current value is low. In this way high currents are prevented.

made of several turns of 350,000 c.m. cable placed just outside the substation.

Fig. 2 shows what happened in the circuit before and after the changes were made. The slowly dampened wave represents the current curve and the counter current established in the system when the circuit is opened. If the time A represents the interval required for the current to reach its short-circuit value and if the sluggishly operated breaker takes this same amount of time to operate, then the conditions are very bad. The breaker

must then open the circuit when there are over 6,000 amps. flowing. Should the breaker open the circuit at the point B then the conditions are not so bad, because the circuit is opened when a much smaller current is flowing.

The dotted line shows the modified current wave front. Apparently even the same sluggishly operated circuit-breaker would now relieve the load on the circuit much better than before. A quick-acting breaker, which would function in time B , would relieve the machine of its load with little or no surge. E. B. CAMERON.

Welded Mine Indicator Made of Steel

The introduction and application of welding to mine repair service has rapidly spread. Those who at one time thought they had no particular use for welding equipment now find that they can no longer do without some form of welding device.

In the mine, where conditions at best are very bad, welded material effects great savings. One instance is the construction of road signs. Painted signs usually become black and dirty with dust, so at one of our mines we are building signs as shown in the illustration. The material used consists of sheet iron and the necessary hinges, all of which are welded to make the complete box.

Usually two or three electric lamps are installed inside the box and the word or words cut into the cover are always visible even at great distances. These lamps are frequently mounted in porcelain sockets which can be fastened to the base and made secure.

Depending upon the purpose of the box, letters are cut on the front. To guard against breakage and other loss a circuit is run to lamps which are located inside the box and the cover is locked on by a padlock.

The advantages of this arrangement are that the visibility of the sign does not depend upon the color of paint, lamps cannot be stolen, the sign cannot be broken and no unauthorized tamping is possible.

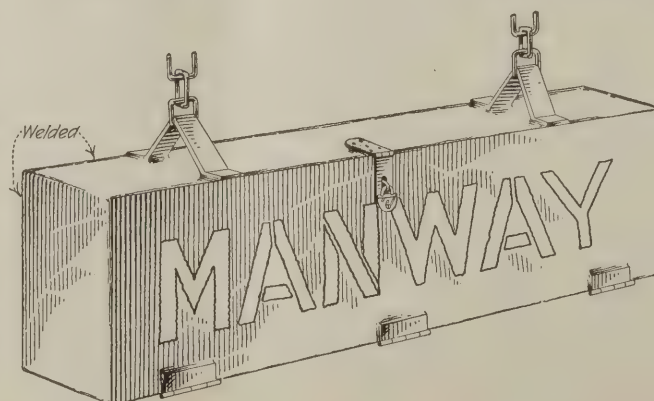
At another of our mines I have seen some interesting tool boxes made in this same manner. We also use similar boxes to carry materials which would ordinarily leak out of wooden boxes. Loose materials which must be transported about the mines in cars can be placed in the boxes and kept secure against pilfering and leakage.

Olyphant, Pa.

J. K. W.

Copper-Plated Carbon Brushes Usually Not Necessary

When pigtails were used on motor brushes it was considered necessary to copper plate the carbon to provide a good electrical contact for the shunt connection. With the present design of locomotive motor brush holder having a heavy braided copper shunt from contact tip to the box, shunted carbons have been discontinued, so that plating is unnecessary; in fact, it is objectionable on the better grades of carbon, as it tends to peel off in service and bind the carbon in the box.

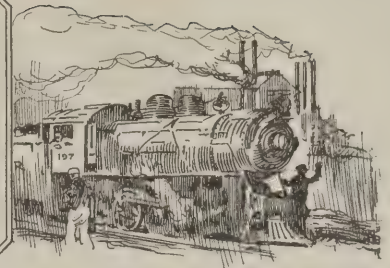


Welded Sign Box
for Mine

This sign is made by welding sheet-iron panels together and cutting the letters on the front or rear. Lamps placed inside the box cannot be stolen when a padlock is snapped on the cover.



Production And the Market



Dwindling Stockpiles Presage Renewed Activity In Bituminous-Coal Market

Customers long absent from the soft-coal marts are due to reappear soon. Those consumers who accumulated swollen reserves of coal in anticipation of a strike when the old union agreement expired and who have been relying on their stocks most of the time since are at last nearing the bottom of their coal piles. As a result, while the coal producer's face is not exactly wreathed in smiles, he is beginning to perk up and take a renewed interest. The long-awaited decision on rail rates to the Northwest has helped to clarify the atmosphere somewhat, though the usual howl of protest is coming from the interests on the losing side.

Sound Basis for Industrial Revival

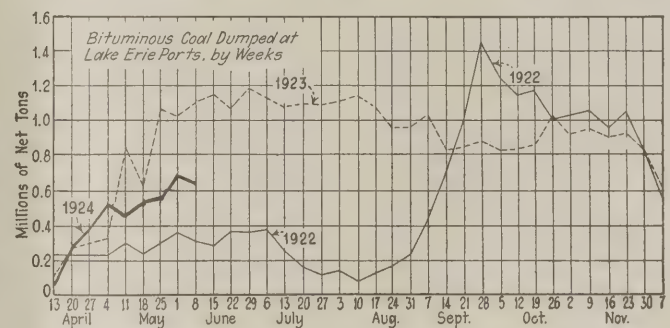
While there is as yet no noticeable recession from the policy of curtailment that has prevailed for some time in most industrial lines, due in some cases to overproduction in the latter part of last year and the early part of this year, with consequent heavy carry-over, basic conditions are pronounced as sound by industrial leaders, who give assurances that an industrial revival may be expected by autumn. The usual cautious policy of business during a presidential election year has hit the coal industry particularly hard, but the passage and signing of the tax-reduction bill, as well as the adjournment of Congress, undoubtedly will prove of benefit in hastening the expected upturn. Meanwhile the clearing out of surplus stocks in all lines will insure the basis for a lasting revival of industry.

Coal Age Index of spot prices of bituminous coal advanced 1 point during the last week, standing at 170 on June 9, the corresponding price being \$2.06. This compares with \$2.04 on June 2.

Activity has fallen off at Hampton Roads, dumpings of coal for all accounts during the week ended amounting to 318,918 net tons, compared with 371,564 tons

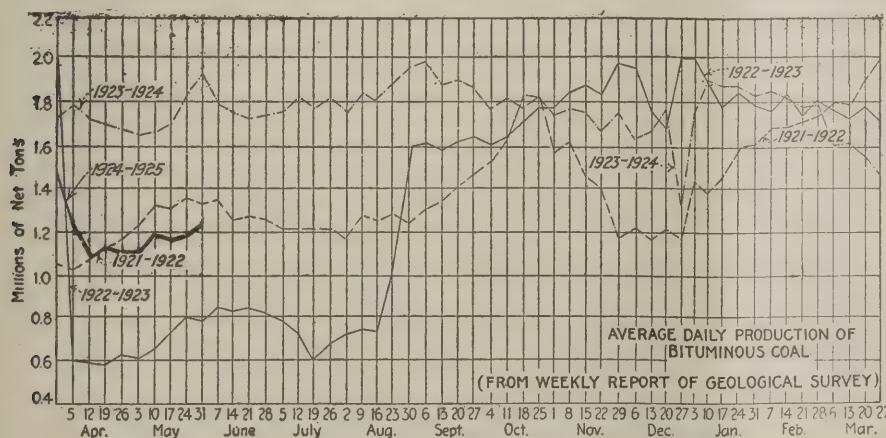
during the preceding week. Coal dumped at Lake Erie ports during the week ended June 7, according to the Ore & Coal Exchange, was as follows: Cargo, 619,115 net tons; fuel, 37,198 tons. The totals for the previous week were 625,440 tons of cargo coal and 39,640 tons of fuel coal.

Bituminous-coal production took a tumble by reason of the holiday during the week ended May 31, when according to the Geological Survey, 6,699,000 net tons was produced, a falling off of 464,000 tons from the output of the week ended May 24. Anthracite output



likewise declined sharply, for the same reasons, to 1,294,000 net tons, compared with 1,850,000 tons during the week before.

The lull foreshadowed in the anthracite market is now an actuality, demand having slackened and movement tapering off correspondingly. Circular prices were advanced June 1 by the companies and most of the large independents, the increases, which were not uniform, ranging from 10c. to 20c. on the sizes above pea, 10c. being the predominant rate of advance. Advance bookings by the large companies are taken to indicate a marked renewal of activity in the autumn.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
May 17	10,270,000	7,031,000
May 24 (a)	11,049,000	7,163,000
May 31 (b)	10,091,000	6,699,000
Daily average	1,904,000	1,241,000
Cal. yr. to date (c)	228,682,000	197,179,000
Daily av. to date	1,773,000	1,530,000

ANTHRACITE

May 17	2,045,000	1,898,000
May 24	1,956,000	1,850,000
May 31	1,606,000	1,294,000
Cal. yr. to date	43,146,000	38,215,000

COKE

May 24 (a)	415,000	157,000
May 31 (b)	395,000	137,000
Cal. yr. to date (c)	8,394,000	5,549,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Midwest Disappointed

June 1 came and went without stirring up the least bit of coal business. This disappointed a number of coal gentry in the Chicago region who had been looking forward to a slight improvement of industrial business even if there was no domestic demand—as there is not. Stagnation is so great that even Illinois and Indiana screenings have receded a trifle from the \$2 price, in spite of the small supply. A scattering few industrial and utility contracts were made after June 1, but practically every plant is either living on its storage or buying day-to-day coal at the abnormally low market. Railroad deliveries are about all there is. Few if any new railroad contracts have been made, but price agreements have been made by most midwestern lines and coal is being ordered on that basis.

Good smokeless mine run continues to reach the Chicago territory in a thin stream at a quoted price of \$2 with shadings here and there. This meets about all the domestic demand there is. Anthracite is slow indeed, in spite of definite assurance that prices are going to be nudged upward the first of every month the rest of the summer.

The southern Illinois field is still quiet, with very little doing and no great demand for any size. Screenings, which were in good demand recently, have eased up and some

mines are carrying no bills on all steam sizes. The strip mines seem to be making considerable headway and strip-mine coal is being sold as low as \$1.75 for mine run and crushed screenings have been sold as low as \$1.45. In the Standard district all sizes are unbilled and running time is light.

St. Louis business continues unusually quiet. The dealers are doing a little business for current needs on account of cold, rainy weather and here and there a little storage is being put in, but it is not a factor.

Price Tendency Higher in Kentucky Fields

Conditions over the week are unchanged from those of the weeks past, with the exception that eastern Kentucky egg is firmer as a result of some demand developing for 2-in. lump. There is a tendency in all state fields toward higher prices, but without much result. Some of the producers of high-grade Harlan byproduct coal in southeastern Kentucky are offering 2-in. nut and slack at \$1 a ton; straight mine run, \$1.50 @ \$1.65, 2 x 4 egg, \$2; and 4-in. block, \$2.10 to the jobbing trade, while some screenings can be had as low as 80 to 90 cents a ton.

Lake movement is beginning to help the Hazard field slightly. However, there are many mines in all fields of

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	June 11 1923	May 26 1924	June 2 1924	June 9 1924†	Midwest		Market Quoted	June 11 1923	May 26 1924	June 2 1924	June 9 1924†
Smokeless lump.....	Columbus.....	\$6.25	\$3.50	\$3.50	\$3.35@	\$3.65	Franklin, Ill. lump.....	Chicago.....	\$4.05	\$2.75	\$2.85	\$2.75@	\$3.00
Smokeless mine run.....	Columbus.....	4.25	2.30	2.30	2.20@	2.45	Franklin, Ill. mine run.....	Chicago.....	3.10	2.35	2.35	2.25@	2.50
Smokeless screenings.....	Columbus.....	3.60	1.85	1.85	1.75@	2.00	Franklin, Ill. screenings.....	Chicago.....	1.80	1.85	2.00	1.90@	2.10
Smokeless lump.....	Chicago.....	6.10	3.10	3.35	3.25@	3.50	Central, Ill. lump.....	Chicago.....	2.60	2.35	2.35	2.25@	2.50
Smokeless mine run.....	Chicago.....	4.10	1.85	2.00	2.00		Central, Ill. mine run.....	Chicago.....	2.10	2.10	2.10	2.00@	2.25
Smokeless lump.....	Cincinnati.....	6.25	3.60	3.60	3.50@	3.75	Central, Ill. screenings.....	Chicago.....	1.60	1.60	1.60	1.50@	1.75
Smokeless mine run.....	Cincinnati.....	4.10	1.85	2.10	2.00@	2.25	Ind. 4th Vein lump.....	Chicago.....	3.35	2.85	2.85	2.75@	3.00
Smokeless screenings.....	Cincinnati.....	4.00	1.60	1.60	1.50		Ind. 4th Vein mine run.....	Chicago.....	2.60	2.35	2.35	2.25@	2.50
*Smokeless mine run.....	Boston.....	6.10	4.40	4.40	4.35@	4.50	Ind. 4th Vein screenings.....	Chicago.....	1.80	1.95	1.95	1.90@	2.00
Clearfield mine run.....	Boston.....	2.60	1.95	2.00	1.65@	2.40	Ind. 5th Vein lump.....	Chicago.....	2.85	2.35	2.35	2.25@	2.50
Cambria mine run.....	Boston.....	3.10	2.50	2.50	2.00@	2.75	Ind. 5th Vein mine run.....	Chicago.....	2.10	2.10	2.10	2.00@	2.25
Somerset mine run.....	Boston.....	2.85	2.15	2.20	1.85@	2.60	Ind. 5th Vein screenings.....	Chicago.....	1.55	1.60	1.60	1.50@	1.75
Pool 1 (Navy Standard).....	New York.....	3.75	2.65	2.75	2.60@	2.85	Mt. Olive lump.....	St. Louis.....		2.85	2.85	2.75@	3.00
Pool 1 (Navy Standard).....	Philadelphia.....	3.70	3.00	3.00	2.75@	3.25	Mt. Olive mine run.....	St. Louis.....		2.50	2.50	2.50	
Pool 1 (Navy Standard).....	Baltimore.....						Mt. Olive screenings.....	St. Louis.....		2.00	2.00	2.00	
Pool 9 (Super. Low Vol.).....	New York.....	2.80	2.20	2.20	2.00@	2.40	Standard lump.....	St. Louis.....	2.35	2.15	2.15	2.00@	2.35
Pool 9 (Super. Low Vol.).....	Philadelphia.....	2.80	2.20	2.20	2.00@	2.45	Standard mine run.....	St. Louis.....	1.80	1.85	1.80	1.75@	1.85
Pool 9 (Super. Low Vol.).....	Baltimore.....	2.75	1.85	1.85	1.80@	1.90	Standard screenings.....	St. Louis.....	1.50	1.65	1.60	1.50@	1.70
Pool 9 (Super. Low Vol.).....	New York.....	2.50	1.85	1.85	1.75@	2.00	West Ky. lump.....	Louisville.....	2.30	2.00	2.00	1.90@	2.15
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	2.25	1.85	1.85	1.70@	2.00	West Ky. mine run.....	Louisville.....	1.75	1.55	1.55	1.35@	1.75
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	2.25	1.70	1.70	1.60@	1.70	West Ky. screenings.....	Louisville.....	1.35	1.55	1.55	1.40@	1.75
Pool 11 (Low Vol.).....	New York.....	2.00	1.60	1.65	1.50@	1.75	West Ky. lump.....	Chicago.....	2.35	2.25	1.85	1.75@	2.00
Pool 11 (Low Vol.).....	Philadelphia.....	1.90	1.50	1.50	1.30@	1.70	West Ky. mine run.....	Chicago.....	1.45	1.60	1.60	1.50@	1.75
Pool 11 (Low Vol.).....	Baltimore.....	2.00	1.55	1.55	1.50@	1.60							
							South and Southwest						
High-Volatile, Eastern	New York.....	1.85	1.50	1.50	1.40@	1.65	Big Seam lump.....	Birmingham.....	3.05	2.80	2.80	2.90@	3.10
Pool 54-64 (Gas and St.).....	Philadelphia.....	2.10	1.55	1.55	1.45@	1.70	Big Seam mine run.....	Birmingham.....	2.05	2.00	1.85	1.75@	2.00
Pool 54-64 (Gas and St.).....	Baltimore.....	1.90	1.45	1.50	1.40@	1.65	Big Seam (washed).....	Birmingham.....	2.35	2.20	2.00	1.75@	2.25
Pittsburgh sc'd gas.....	Pittsburgh.....	2.85	2.40	2.40	2.30@	2.50	S. E. Ky. lump.....	Chicago.....	3.25	2.25	2.10	2.00@	2.25
Pittsburgh gas mine run.....	Pittsburgh.....	2.20	2.10	2.10	2.00@	2.25	S. E. Ky. mine run.....	Chicago.....	2.35	1.60	1.60	1.25@	2.00
Pittsburgh slack (Gas).....	Pittsburgh.....	1.55	1.35	1.35	1.30@	1.40	S. E. Ky. lump.....	Louisville.....	3.50	2.10	2.10	2.00@	2.25
Kanawha lump.....	Columbus.....	2.80					S. E. Ky. mine run.....	Louisville.....	2.25	1.50	1.50	1.25@	1.75
Kanawha mine run.....	Columbus.....	2.05					S. E. Ky. screenings.....	Louisville.....	1.65	1.10	.95	.80@	1.15
Kanawha screenings.....	Columbus.....	1.65					S. E. Ky. lump.....	Cincinnati.....	3.10	2.75	2.50	2.25@	2.50
W. Va. lump.....	Cincinnati.....	3.25	2.25	2.25	2.00@	2.25	S. E. Ky. mine run.....	Cincinnati.....	1.65	1.35	1.50	1.35@	1.60
W. Va. gas mine run.....	Cincinnati.....	1.80	1.35	1.45	1.25@	1.50	S. E. Ky. screenings.....	Cincinnati.....	1.50	.95	1.00	.85@	1.00
W. Va. steam mine run.....	Cincinnati.....	1.80	1.35	1.45	1.25@	1.50	Kansas lump.....	Kansas City.....	4.00	4.50	4.50	4.50	
W. Va. screenings.....	Cincinnati.....	1.35	.85	.90	.75@	1.00	Kansas mine run.....	Kansas City.....	3.25	3.50	3.50	3.50	
Hocking lump.....	Columbus.....	2.60	2.40	2.40	2.25@	2.60	Kansas screenings.....	Kansas City.....	2.60	2.50	2.50	2.50	
Hocking mine run.....	Columbus.....	1.85	1.60	1.70	1.60@	1.85							
Hocking screenings.....	Columbus.....	1.35	1.35	1.40	1.30@	1.50							
Pitts. No. 8 lump.....	Cleveland.....	2.80	2.40	2.40	2.10@	2.85							
Pitts. No. 8 mine run.....	Cleveland.....	2.05	1.85	1.85	1.85@	1.90							
Pitts. No. 8 screenings.....	Cleveland.....	1.40	1.25	1.15	1.15@	1.25							

* Gross tons, f.o.b. vessel, Hampton Roads.

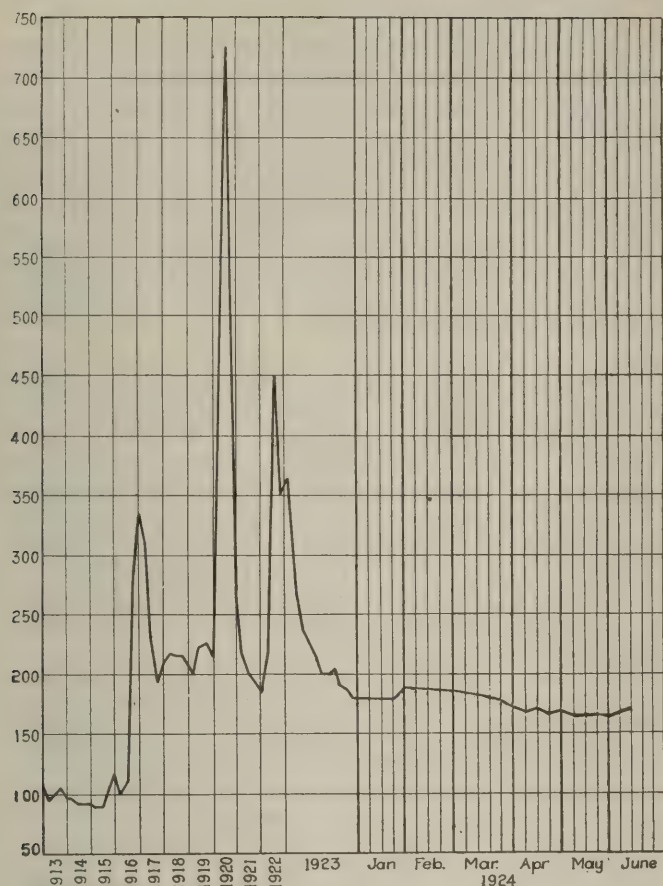
† Advances over previous week shown in heavy type, declines in italics.

‡ On strike.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	June 11, 1923		June 2, 1924		June 9, 1924†			
				Independent	Company	Independent	Company	Independent	Company		
Broken.....	New York.....	\$2.34			\$7.75@	\$8.35	\$8.00@	\$8.75	\$8.00@	\$8.85	
Broken.....	Philadelphia.....	2.39			7.00@	8.10	8.60@	8.75	8.70@	8.85	
Egg.....	New York.....	2.34		\$8.50@	\$11.50	8.00@	8.35	\$9.00@	\$9.25	8.45@	8.85
Egg.....	Philadelphia.....	2.39		9.25@	10.00	8.10@	8.35	8.35@	9.50	8.70@	8.85
Egg.....	Chicago*.....	5.06		8.50@	11.50	8.00@	8.50	7.68@	7.77	7.73@	7.81
Stove.....	New York.....	2.34		8.50@	11.50	8.00@	8.35	9.00@	9.50	8.35@	9.00
Stove.....	Philadelphia.....	2.39		9.25@	10.00	8.15@	8.35	8.70@	9.60	8.75@	8.95
Stove.....	Chicago*.....	5.06		8.50@	11.50	8.00@	8.50	8.03@	8.17	7.94@	8.14
Chestnut.....	New York.....	2.34		8.50@	11.00	8.00@	8.35	9.00@	9.25	8.35@	8.85
Chestnut.....	Philadelphia.....	2.39		9.25@	10.00	8.15@	8.35	8.75@	8.85	8.70@	8.85
Chestnut.....	Chicago*.....	5.06		8.50@	11.50	8.00@	8.50	7.90@	8.03	7.81@	7.99
Range.....	New York.....	2.34			8.30		8.60				8.70
Pea.....	New York.....	2.22		7.00@	8.00	6.00@	6.30	5.50@	6.00	5.50@	6.00
Pea.....	Philadelphia.....	2.14		7.00@	7.25	6.15@	6.20	5.75@	6.00	5.75@	6.00
Pea.....	Chicago*.....	4.79		7.00@	8.00	6.00@	6.50	5.36@	5.91	5.36@	5.91
Buckwheat No. 1.....	New York.....	2.22		2.75@	3.50	3.50@	4.15	2.25@	2.75	3.00@	3.15
Buckwheat No. 1.....	Philadelphia.....	2.14		2.75@	3.50	3.50		2.50@	3.00	3.00	
Rice.....	New York.....	2.22		1.75@	2.50	2.50		1.90@	2.25	2.00@	2.25
Rice.....	Philadelphia.....	2.14		1.75@	2.50	2.50		2.00@	2.25	2.25	
Barley.....	New York.....	2.22		1.25@	1.50	1.50		1.50@	1.75	1.50	
Barley.....	Philadelphia.....	2.14		1.15@	1.50	1.50		1.50		1.50	
Birdseye.....	New York.....	2.22			1.60	1.60		1.50		1.50	

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924				1923
	June 9	June 2	May 26	June 11	
Index	170	169	167	215	
Weighted average price	\$2.06	\$2.04	\$2.02	\$2.60	

This diagram shows the relative, not the actual prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

the state that are either down or badly in need of business. Some western Kentucky mines are offering solid-shot coal on a mine-run basis at \$1.35 a ton to the jobbing trade during the first half of June, and slightly higher prices on machine cut from underground mines. Some stripper coal is offered as low as \$1.25. Quotations of jobbers range from \$1.50 to \$1.90 but can be shaded somewhat. It is reported that some houses that have been quoting 6-in. block at \$2@2.25 are asking \$2.25@2.50, and there is an effort to get 15c. or 20c. a ton on egg and nut sizes, along with lump. Screenings are steady at around \$1.40@1.60, but in small supply. The strike situation in western Kentucky is unchanged.

Production continues to gain a little in the high-volatile fields of southern West Virginia. In the northern part of the state the output is not equal to more than half of the corresponding period of 1923 but in southern West Virginia production is averaging about 50 per cent and in some fields as high as 75 per cent. There has been no further gain in smokeless output.

Prices Off In Northwest

Shipments from the docks at Duluth-Superior last month totaled 13,728 cars, of which the majority came from Duluth, owing to the fact that docks were anxious to move Duluth coal because of the assessment on May 1. The shipments are some 2,000 cars less than in April, and it is asserted that the majority of the cars moved were railroad coal, so that little commercial coal went out.

Business is at the lowest ebb. Two price changes have taken place. Youghiogheny and splint run of pile have been cut to \$5, and Youghiogheny and Hocking screenings

are down 25c. to \$3.75. Docks report this an adjustment, but when it is considered that many are reported cutting 50c. to \$1 on contracts it looks very much as if the market is less than the list.

The movement of coal to the Head-of-the-Lakes continues. Twenty-four cargoes were received during the week, of which three were hard coal and the cargoes en route are reported as five with one of hard. Figures of receipts to May 27 show that nearly 1,000,000 tons have been received this year.

The Milwaukee market is still depressed and the prospect is that it will continue so until business in industrial circles picks up. Jobbers are hopeful for better things later in June, however. Prices continue unchanged with the exception of anthracite, which was given the usual 10c. monthly advance as is the rule during the summer period. Egg is now \$16.10, stove \$16.50, nut \$16.35, pea \$14. Receipts of coal by lake at Milwaukee up to and including May 31 were 131,908 tons of anthracite and 301,049 tons of soft coal.

The effect of the new rail rates to the Northwest, which, if they go into effect on schedule time, Aug. 21, will add 8 to 28c. to the cost of shipping in Illinois coal, is yet to be determined. There are many guesses at the situation. However, the docks stand to win, and it is expected that a heavier shipment to the docks will soon begin. It is reported a fight is to be made by rail shippers to get the increase into the Twin Cities to be set at less than 28c. This may delay the effect of the I.C.C. decision all year or longer.

Western Trade Is Spotty

Little summer storage is reported by operators of the Southwest. A few mines closed April 1 have been reopened. The Central Coal & Coke Co. recently signed a contract with the Frisco for Kansas coal that opened a couple of its shaft mines. The Missouri Pacific a few weeks earlier had contracted with the Western. Except for a limited stable industrial demand, the only other activity in Kansas mines is the result of a pre-season demand for threshing coal. A few Arkansas mines have been reopened in anticipation of a summer demand inspired by substantial freight reductions, but the demand itself has not yet materialized.

Prices are: Kansas lump, \$4.50; nut, \$4; mine run, \$3.50; screenings, \$2.50. Arkansas semi-anthracite lump, \$5.50 @ \$6; mine run, \$3.50; screenings, \$2. Henrietta (Okla.) lump, \$5.50; nut, \$3.75; mine run, \$3.50; screenings, \$2.50.

Dealers and buyers remain indifferent to Colorado coal despite the fact that operators announced another small advance in prices June 1. Colorado mines worked on an average of 22 hours last week and reports from the operators show 37 per cent time lost because of no market.

Utah operators are moving very little coal. Industries other than smelters are taking next to nothing. Mines are working two days a week with difficulty. Retailers have been doing a little better during the past week as a result of a cold snap, but the trade is not stocking up. Retailers demand price stability.

Hopeful Signs at Cincinnati

Lake buyers are still marking time at Cincinnati showing little or no disposition to rush the market with orders. The boost to \$3.75 a ton on smokeless, egg and lump, caught a number of jobbers and retailers unprepared for the change of pace in these lines. There has not been quite enough to go around and June orders have been enough to put the books ahead for a while so that local wholesalers have not been able to "pass on" the usual tonnage that boasted of being free. Nut too has maintained its strength and while \$2.50 is the circular in more cases than one it takes \$3 to get the standard Pocahontas. In the bituminous market a steady and better undertone is noted, prices holding their own. Operators in southeastern Kentucky are holding their prepared coals at 25c. a ton higher than the West Virginians, asserting that they want to make at least the cost of production.

A slightly better demand for steam grades is reported in Columbus. Buying by large consumers is more brisk, as a result of the depletion of reserves. Public Utilities and railroads are taking the larger part of the tonnage, but there is a fair business with iron and steel plants. Price for screenings are slightly stronger while mine-run quotations are unchanged from the previous week. There is no as much free coal available, as many of the larger operations have been closed. Domestic trade shows signs o

revival, though the volume is still low. Pocahontas smokeless grades and splints are the principal varieties desired. Kentucky grades also are in good demand. A large part of the tonnage being loaded at lower lake ports is from West Virginia and Kentucky mines. Little lake contracting is reported.

Extreme pessimism is the keynote of the Cleveland market. Industrial activity has slackened considerably and there is a dearth of inquiries for fuel. The only change in the market situation is a slight stiffening in slack and nut and slack of 5 to 10c. per ton, and this is explained as being simply a fluctuation arising from a rather transitory condition when demand for a particular grade strengthens for a day or so. It is estimated that the stocks laid by prior to April 1 will not be depleted until after the end of the month, and this offers some ray of hope.

The coal situation at Buffalo has not changed much. Consumption is pretty good, but a slowing up of industries of late and too many shippers and salesmen have made rough sledding.

General Depression Grips New England

In New England the market now is much the same as during mid-summer in the old days, except that buyers today have no prospect of any spurt in business in September and that even on contracts deliveries are not being accepted with usual regularity. While stocks are not unduly large, the curtailment in manufacturing is so general that reserves are not depleted as in normal times. Railroad traffic is much lighter, and all the public-service companies are felling the depression in all the industries.

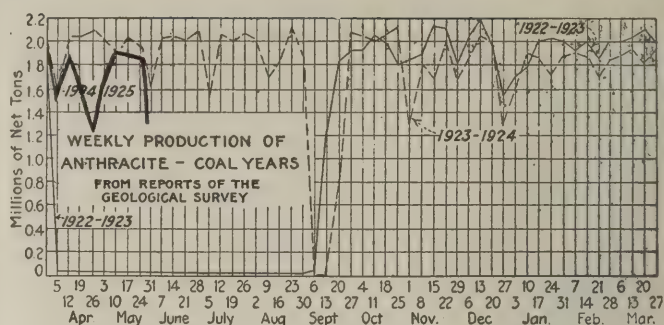
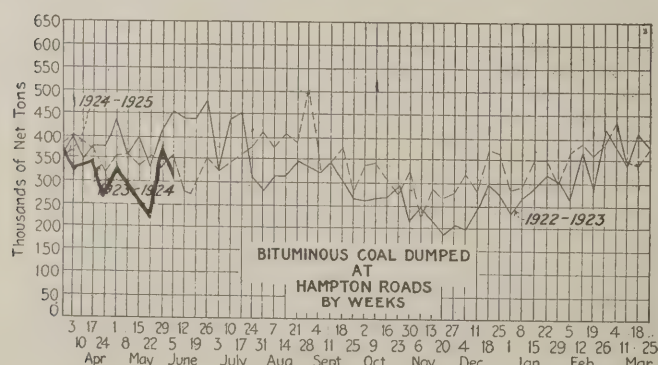
At Hampton Roads the accumulations of a fortnight ago have been somewhat reduced, the tonnage on hand at the three ports amounting now to little more than 100,000. Output is again being restricted rather rigidly, but it will take several weeks more of the same close-hauled policy to warrant any material increase in price. Reports show that small tonnages are changing hands on about the same price level that has prevailed for several weeks, namely, \$4.35@\$4.50 per gross ton f.o.b. vessel for No. 1 Navy Standard grade. No. 2 coals are to be had at prices down to \$4.10, and in some cases as low as \$4. The net return to some of the higher cost operations must be discouraging.

For distribution inland there is also only scattering inquiry. The nominal quotation for highest grade Pocahontas and New River still is \$5.50 per gross ton on cars, but occasionally there are signs of lower prices when buyers have the appearance of being interested.

All-rail from central Pennsylvania there is practically no change. A few cars of special sizes filtered through to tidewater territory, but a large proportion of the coal passing the Hudson River gateways is confined to destinations not much east of the Connecticut River.

Trade at Low Level in Eastern Markets

Demand continues slow at New York notwithstanding the efforts of various agencies to induce stocking. The feeling is growing, however, that business will be better soon. Stockpiles are shrinking and indications point to a restocking program soon. That coal continues to move at low prices is indicated in tenders received by the U. S. Shipping Board at New York on June 5 for furnishing and delivering alongside vessels that harbor on June 8, 3,300 gross tons of soft coal of a minimum of 14,500 B.t.u., the quotations ranging from \$5.04 to \$5.43 per ton. In some quarters a better inquiry is reported, but no immediate betterment is



expected until an improvement is noted in general business conditions. Receipts at tidewater during the week showed a wide range, going above 1,800 cars at times. There was no tendency, however, to cut prices.

Dullness persists at Philadelphia, though a number of shippers note a slight betterment in business. The hoped for improvement depends upon the industrial situation and there is no sign of betterment. The railroads show the effects of the slump in that the sidings hereabouts are choked up with empty cars. The fuel demands of the roads also are considerably lower, although they are taking a fair tonnage for stock. The spot price market shows no change and the tide market is nil.

The uncertain state of the export coal market at Baltimore is shown in the fact that not a ship cleared with coal for foreign delivery during the first week in June. The trade as a whole in fact is flat. The depletion of stocks through present demand exceeding production is now such a patent condition that both large consumers and coal men themselves are beginning to take sharper notice of a state of affairs that must develop before many weeks are past.

No coal is being bought at Birmingham except as actually needed for current use, and there appears to be no signs of any immediate revival. Transportation conditions are such that the railroads are taking minimum deliveries and shipments against commercial contracts likewise are rather light.

Anthracite Trade Slackens Further

Demand for independent anthracite has slackened further at New York and buyers hesitate before paying more than the larger company circular for domestic sizes. Egg and chestnut are moving considerably slower than stove, but producers are not experiencing any trouble in keeping down accumulations. Interest last week centered in the change in prices of company coals and of some of the larger independent producers. The increases were not at all uniform, ranging from 10c. to 20c. on broken, egg, stove and chestnut. There were no changes in steam prices. Receipts at tidewater were reduced somewhat by the cut in production due to the holiday of the previous week as well as petty labor troubles, at some of the mines. Notwithstanding the present lull in demand an active fall is looked for, the large companies being well booked up for several weeks ahead.

With the arrival of moderately warm weather at Philadelphia the slowing down has become more of an actuality with the retailers. As yet the operators have not felt much of it, as the retail men hesitate to hold orders for fear of embarrassing themselves when coal becomes scarcer. Prices at the mines went up June 1, the company shippers adding the usual 10c. to the sizes above pea, prices remaining the same under that size. Some of the independents made increases of as much as 20c. The leading retailers have added 25c. a ton to the retail prices. The chief demand is for stove, nut is accumulating faster in the yards than it is going out, while pea has shown signs of being a drug with the larger operators and they are putting some of it into storage.

Car Loadings, Surpluses and Shortages

	Cars Loaded—			
	All Cars	Coal Cars	Surplus Cars—	Car Shortage—
Week ended May 24.....	918,213	139,083		
Previous week.....	913,407	135,650		
Same week in 1923.....	1,014,029	192,092		
			All Cars	Coal Cars
May 22, 1924.....	331,012	170,333		
Previous week.....	319,106	167,102		
Same date in 1923.....	22,700	2,776	20,585	14,620

Foreign Market

And Export News

British Coal Market Unsettled; Output Declines Slightly

The Welsh coal market is very unsettled and in a generally unsatisfactory condition. The recent slight improvement has not been maintained, the absence of support having caused the market to relapse. The demand is slightly better though not up to the late winter standard. The operators consider present prices insufficient to meet working costs, so that the closing of more pits is regarded as inevitable. Shipments at the docks are much below normal. The Welsh miners are said to be dissatisfied with the new agreement which has been provisionally accepted by their leaders. Exports have fallen off sharply and prices are in favor of buyers.

The Newcastle market continues to be slack with prices low. In spite of the Ruhr lockout German coal is competing with British in the Baltic and the Mediterranean, especially in Italy. The Swedish state railways are asking tenders for 227,000 tons of steams for shipment from June to September. Operators have cabled tenders for 50,000 tons of steams for the Finnish state railways.

Output of coal at British coal mines during the week ended May 24, a cable to *Coal Age* states, was 5,436,000 tons, according to the official reports. This compares with 5,659,000 tons produced during the week ended May 17.

Business Slightly Better and Tone Firmer at Hampton Roads

Business at Hampton Roads shows slight improvement, with demand somewhat increased and supplies at tide-water increasing. Prices are holding firm, with a tendency upward, although no immediate material change is forecast.

Substantial movement to South America on contracts with the Brazilian government has been one of the

features of the trade. Coastwise movement shows a slight increase and bunker trade holds its own, with a lull in general shipping. The trade is resting on the oars, so to speak, and expects continued mild activity during the coming month.

The tone of the market is slightly firmer than the previous week, though the outlook has not materially changed.

French Market Reacts Mildly to Ruhr Mine Strike

Very little change is observable in the French coal market except for a slackening of orders for British coals and a diminution of shipments from the Ruhr, due to the rise of sterling on the one hand and the strike in the Ruhr mines on the other. The French collieries note an improvement in the situation as a consequence. Prices, of course, reflect an increasing spread between British and French coals as sterling rises. Belgian coals continue higher than the French, despite the rebates applied.

Deliveries of reparation coal to France by Germany during the first three months of 1924 were as follows in metric tons: January, 282,019 tons of coal and 67,329 tons of lignite; February, 307,754 tons of coal and 74,729 tons of lignite; March, 318,721 tons of coal and 17,847 tons of lignite.

Coke deliveries to the O.R.C.A. during the first three weeks of May averaged 9,250 tons a day. The strike in the Ruhr did not affect shipments to the extent that had been expected.

The O.R.C.A. was definitively constituted on May 16 in the form of a joint stock company with the same statutes as the late S.C.O.F. Mr. de Wendel is president of the organization and Colonel Pineau is the director. There are twenty-eight adherents now, and the Société Normande de Métallurgie is still to be heard from.

U. S. Imports of Coal and Coke

During April

(In Gross Tons)

	1923	1924
Anthracite.....	14,516	669
Bituminous { free.....	67,006	2,116
dutiabie.....	92,247	20,070
Imported from:		
United Kingdom.....	62,783	2,116
Canada.....	92,247	20,025
Japan.....	13	.....
Australia.....	4,210	.....
Other countries.....	.....	45
Coke.....	5,439	3,742

Export Clearances, Week Ended

May 14, 1924

FROM HAMPTON ROADS

For Africa:	Tons
Dan. Str. Kina for Dakar.....	7,604
For Brazil:	
Br. Str. Mercedes de Larrinaga for Rio de Janeiro.....	5,666
Br. Str. Tuskar Light for Rio de Janeiro.....	4,970
Br. Str. Wearpool for Rio de Janeiro.....	7,248
Br. Str. Saint Eede for Rio de Janeiro.....	6,112
Br. Str. Clumberhall for Rio de Janeiro.....	4,876
Braz. Str. Lages for Rio de Janeiro.....	6,585
For Canada:	
Amer. Schr. R. R. Govin for Windsor.....	1,210
Br. Str. Mayaro for Georgetown.....	511
For Cuba:	
Br. Str. Berwindmoor for Havana.....	9,266
Nor. Str. Ravnanger for Havana.....	5,026
For Newfoundland:	
Amer. Str. Cumberland Queen for Twillingate.....	567
For Peru:	
Nor. Str. Herakles.....	3,461
For West Indies:	
Nor. Str. Jacob Christensen for Fort de France.....	5,531
Nor. Str. Ida for Port of Spain.....	2,569
For.....	
Br. Str. Baron Kelvin for Quessant.....	4,995

FROM BALTIMORE

For Italy:	
Ital. Str. Columbia.....	2,168

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	May 31	June 7
Cars on hand.....	711	930
Tons on hand.....	40,568	56,291
Tons dumped for week.....	141,254	114,356
Tonnage waiting.....	5,000	10,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	768	779
Tons on hand.....	56,150	56,100
Tons dumped for week.....	112,826	87,381
Tonnage waiting.....	5,780	10,743
C. & O. Piers, Newport News:		
Cars on hand.....	1,618	1,546
Tons on hand.....	79,345	76,725
Tons dumped for week.....	77,671	83,011
Tonnage waiting.....	.....	3,975

Pier and Bunker Prices, Gross Tons

PIERS

	May 31	June 7†
Pool 9, New York.....	\$4.85@ \$5.00	\$4.85@ \$5.00
Pool 10, New York.....	4.60@ 4.75	4.60@ 4.75
Pool 11, New York.....	4.40@ 4.50	4.40@ 4.50
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55
Pool 1, Hamp. Roads.....	4.40@ 4.50	4.30@ 4.40
Pool 2, Hamp. Roads.....	4.20@ 4.25	4.25@ 4.30
Pools 5-6-7 Hamp. Rds....	4.00@ 4.10	4.20

BUNKERS

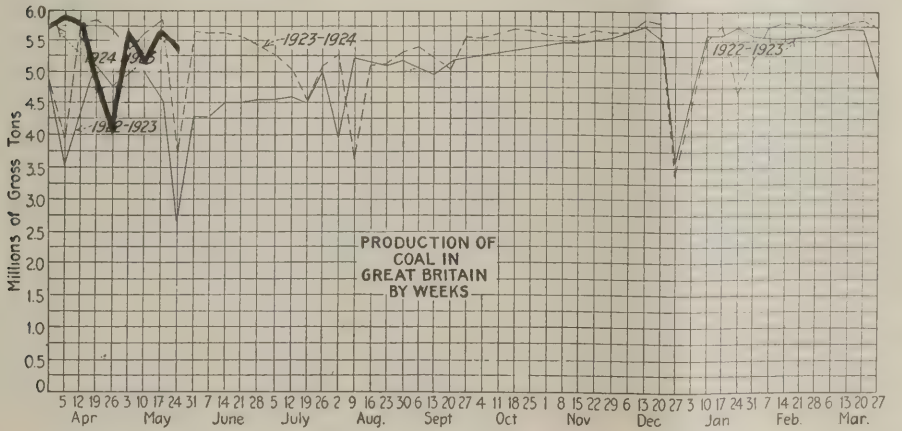
Pool 9, New York.....	5.15@ 5.30	5.15@ 5.30
Pool 10, New York.....	4.90@ 5.05	4.90@ 5.05
Pool 11, New York.....	4.70@ 4.80	4.70@ 4.80
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80
Pool 1, Hamp. Roads.....	4.50	4.40
Pool 2, Hamp. Roads.....	4.25	4.30
Pools 5-6-7 Hamp. Rds....	4.10	4.20

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to Coal Age

Cardiff:	May 31	June 7†
Admiralty, large..	27s.6d.@ 28s.	27s.6d.@ 28s.6d.
Steam smalls.....	18s.6d.	18s.6d.@ 19s.
Newcastle:		
Best steams.....	26s.6d.	25s.6d.@ 26s.6d.
Best gas.....	22s.@ 23s.	23s.@ 23s.6d.
Best bunkers.....	22s.	22s.

† Advances over previous week shown in heavy type, declines in italics.





News Items From Field and Trade



ILLINOIS

Drillers in the vicinity of Fairfield, while drilling for oil and gas, struck a 9-ft. seam of coal at a depth of 1,050 ft. This is deeper than any coal operated in Illinois. Just before striking the seam they drilled through a 5-ft. shell of very hard black lime and rock. The coal is of good quality and similar somewhat to that recently struck by drillers near Wayne City.

Robert M. Medill of Springfield, former State Director of Mines and Minerals of Illinois, and Attorney Lawrence Glenn, of Murphysboro, are operating the Hallidayboro mine of the Jackson Coal Co. as receivers.

INDIANA

The McDonald Coal Co. of Linton, has filed papers showing the final dissolution of the corporation.

The Big Four R.R. is building a spur from Somerville to Francisco, near Princeton, to connect the new Somerville mines with the main line.

Contracts for coal for county institutions have been awarded at Indianapolis to the Central States Coal Co. for Indiana No. 4 mine run at \$3.25, to the Rader Coal Co. at \$3.23, and the Dudley Coal Co. at \$3.68.

U. S. Lesh, State Attorney General, has submitted an opinion that the state must refund \$5,817 to Sullivan County for taxes on coal land which were paid back to farmers of that county under a Supreme Court decision. Coal was found under the lands, assessed for taxation and the coal companies leasing the land were taxed on the coal. Farmers who leased the land filed claims for refund of taxes, for which they said they had been assessed on the coal deposits.

A petition asking the appointment of a receiver for the Eureka Coal Co., Terre Haute, operating the Dixie B mine, in Vigo County, has been filed by John T. Aitken and Robert Aitken, stockholders, who allege mismanagement of the company by present officials and charge the property is being permitted to depreciate. The petition says William E. Eppert is president of the company and Charles H. McCalla the secretary. The company was incorporated in 1918 with a capital stock of \$500,000 and the petition charges the property now is worth about \$400,000. The mine has a capacity of about 1,000 tons a day.

KANSAS

The Central Coal and Coke Co. has resumed operations at two of its mines near Pittsburg. Reopening of the mines, closed since April 1, will furnish employment for 725 men and will provide a production of more than 2,000 tons a day.

Kansas miners have voted three to one for a special assessment to provide relief for members who are out of work. Announcement of the results of the referendum election was made at the district offices of the United Mine Workers.

KENTUCKY

The John P. Gorman Coal & Mine Co., Lexington, has taken over the property of the Elk Creek Coal Co. and will operate it as mine No. 2.

The Elkhorn Gas Coal Co., Pikeville, has changed its name to the Barrowman Coal Corporation and has increased its capital from \$50,000 to \$200,000 in amended articles filed at Frankfort.

A fair amount of coal is coming into Louisville from the Kentucky River mines by water of late. The two boats J. F. Butts and Margaret brought three barges each into the local port last week from mines near Beattyville, on the Kentucky River, picked up empty barges and made return trips.

The Louisville & Nashville R.R. on May 31 issued a statement at Middlesboro, denying rumors to the effect that there had been a disagreement between the Louisville & Nashville and the Southern Ry. and that the Southern was figuring on retiring from handling coal out of the Middlesboro territory because of differences over leased use of a certain section of railroad controlled by the L. & N. The company stated that the rumors were unfounded as the roads are co-operating nicely, and the lease arrangement has been satisfactory to all parties.

The Kentucky Utilities Co., which furnishes most of the mine power used in southeastern Kentucky and on the Virginia border, has bought all of the stock of the Old Dominion Power Co., of Norton, Va., announcement having been made by C. H. Dickey, manager on advice from New York, that the deal had been closed on May 31. The stock was held by the Wise Coal & Coke Co., Norton; New York Mining & Mfg. Co., New York, and J. L. Kimmerer. The property was assessed at \$280,000, but valued at \$1,000,000.

MICHIGAN

The Ford Motor Co. is shipping soft coal to its plant at Iron Mountain by way of Menominee. The transfer of the coal from vessel to cars is made over the dock of the West Coal Co. The steamers engaged in the trade belong to the Ford company.

MINNESOTA

That old-time firm, the Holmes & Hallowell Coal Co., St. Paul and Minneapolis, has been dissolved, the Holmes Coal Co. succeeding to the St. Paul end and the Hallowell Coal Co. to the Minneapolis part. The latter has moved its office from 158th Street South, to 214 Plymouth Building.

The decision of the I.C.C. on the Illinois rate case has seemed like a farce to coal men at Duluth. The rate from Illinois mines to the Winona and Mankato districts was increased 8 to 13c., and 28c. to the Twin Cities. This is farcical when it is considered that the differential which now exists on Twin Cities is \$1.20. On top of this the I.C.C. cut the rate of Illinois coal to Duluth 24c. on soft and 36c. on hard.

NEW YORK

W. A. Marshall & Co., Inc., New York City, announces the transfer of Edward H. Nicoll to the company's Philadelphia office, where he will be in charge of that territory. Frank R. Stuart has been transferred from the Johnstown office to the New York office in charge of line salesmen.

OHIO

The Southern Ohio Coal Exchange reported for the week a total production of 60,811 tons out of a full-time capacity of 646,583, from 441 mines reporting.

A called meeting of the Cincinnati Coal Exchange was held on June 6 at which the "Program of Progress" for the city was explained by Monte Goble, of the Fifth-Third National Bank. The coal men promised to aid to boost things along. The exchange is the largest subsidiary of the Chamber of Commerce.

Sealed proposals were received June 4 by the city Board of Purchase of Columbus for approximately 700 tons of 2-in. screened Hocking Valley coal to be delivered in amounts specified by the chief of the fire department to the various engine houses of the city. The

Franklin Builders Supply & Coal Co. was low with a bid of \$4.09. The Lewis & Noon Coal Co. was second low with a bid of \$4.30 and the Homer C. Gill Co. was a close third with a bid of \$4.36.

Heroism of Bernard Donahue, aged 40, of Belmont County, Ohio, at the time of the Benwood disaster in April, when 119 men lost their lives, has won executive clemency for him following conviction upon a charge of manslaughter. At the time of the Benwood disaster, Donahue, having a wide knowledge was called upon to lead a rescue crew. Disregarding the risk, Donahue made many trips into the mine until the rescue work was completed. He was sentenced to the penitentiary for killing an Italian girl while driving in an intoxicated condition. Governor Donahey granted a pardon upon Donahue's promise to abstain forever from the use of intoxicating liquors.

PENNSYLVANIA

A number of collieries in the Pottsville region will be given more efficient electric power with the completion of the East Penn Electric Co. power house at Pine Grove. The plant cost \$3,000,000.

Modern mining appliances have made possible the reopening of the Silver Brook workings. The workings were abandoned almost half a century ago, but it is possible that the success which has attended the new operation will result in the reopening of many more older workings in the region.

State foresters in the anthracite field express the opinion that the danger of forest fires is about over, due to the severe drenching given the earth by rains during May. More than five inches of rain soaked the trees and bushes and penetrated the fallen leaves during the month.

Dean Holbrook, of the mining engineering school of State College, was

the speaker at the recent graduation exercises of the Hazleton Mining Institute. Arthur Sandrock, a member of the Lehigh Valley engineering corps, took part in the program. Walter Fahringer, of Audenried, superintendent of the Lehigh & Wilkes-Barre Coal Co., presided.

The Bixler Coal & Coke Co., Pittsburgh, has been appointed Western Sales Agents for the Piedmont & George's Creek Coal Co.'s Washington No. 5 Mine and the R. J. Ross Coal Mines, Inc. These mines are located in the George's Creek district, in Maryland, producing a hard structure smokeless coal for domestic purposes.

By the terms of a general settlement of the coal land taxes of the Lehigh Valley Coal Co., reached and approved by Judge Bechtel, May 27, at Pottsville, the company is required to pay taxes on an assessment of \$12,000,000 hereafter instead of on \$5,000,000. This is a compromise, as the assessment originally made two years ago would have required the company to pay taxes on a valuation of \$24,000,000.

The University of Pittsburgh senior class in mining has returned from its underground surveying trip, which was in charge of Robert M. Black, professor of mining. The party spent two weeks at the limestone mine of the American Lime & Stone Co. at Bellefonte, which was selected for the survey because of the large opportunity it offers for problems.

It is reported that the mine fire at the Potts colliery, near Minersville, is raging afresh.

At a meeting of the Luzerne County judges as a court *en banc*, members of the Miners' Examining Board for the First Anthracite District, comprising Luzerne County, were reappointed and two men were named examiners in place of two who had died. George Kolar, of Freeland, was appointed to succeed Patrick McGuire, deceased, of Hazleton and James Owens, of Ed-

wardsville, was appointed in place of John H. Evans, deceased. The following were reappointed: Gustave Ulberich, of Wilkes-Barre; Michael H. Quinnan, of Pittston; Harry Cook, of Nanticoke; James F. Gildea, of Plains; John B. Thomas, of Dorrnceton; Alexander Patterson, of Hazleton, and James McGlynn, of Jeansville.

The following changes among colliery superintendents, effective at once, have been announced by the Pennsylvania Coal Co. George Huntley, superintendent at No. 9 colliery, is transferred to Butler colliery; James Johnson, superintendent at the Butler colliery, is transferred to Central colliery, and P. H. O'Brien, superintendent at the Central colliery, is transferred to the No. 9 colliery.

The Hazleton Machinery & Supply Co. has installed a heating plant in the new steel and concrete breaker of the Hazle Brook Coal Co. at Raven Run. This electrified plant will keep up production during the winter with the same speed as in summer, as the heating plant will prevent all difficulty arising from frozen coal. Another innovation will be the delivery of mine cars direct to the top of the breaker instead of at the base, the builders having taken advantage of the contour of the land.

A sale involving approximately \$140,000 was completed in Uniontown when 70 acres of Connellsville coking coal in German and Georges townships acquired from Samuel Stern by the Crawford Coal & Coke Co., of Connellsville. The property includes the old Break-iron tract in German township and the David tract in Georges township, adjoining the present holdings of the Crawford company. It also adjoins the Shoaf plant of the H. C. Frick Coke Co. J. R. Davidson, of Connellsville, is president; J. Q. Adams, of Uniontown, is vice-president, and Gaetano Corrado, of Connellsville, is treasurer and general manager of the Crawford Coal & Coke Co. F. T. Adams is a director.

WASHINGTON, D. C.

L. A. Snead Co., shippers of coal and coke announce the removal of their offices to 1117-25 Investment Building.

WASHINGTON

Examinations will be conducted by the State Mine Examining Board at the State Capitol, Olympia, on Aug. 4 and 5, for first and second class mining certificates. Those desiring to take these examinations may procure application blanks at the mine office in each of the camps. Applications must be filed with Fred J. Dibble, director of licenses, Olympia, at least 10 days before the date of the examination.

WEST VIRGINIA

The mine of the Kingston Pocahontas Coal Co. on Paint Creek has been reopened and is rapidly increasing production. Once the output reaches nor-



New Unloading Plant on Ohio River at Cincinnati

Island Creek Coal Co.'s steel elevators for the transfer of coal from barges to hoppers. The hoppers are of steel and concrete, equipped with shaker step screens for rescreening and preparing lump and egg coal for domestic use. The plant was constructed by Heyl & Patterson, of Pittsburgh, and can unload 400 tons per hour. The bucket has a capacity of 5 tons. Two belt conveyors carry the coal from the screening house to storage. Wagon or railway-car loading is possible from the chutes and hoppers.

mal, approximately 175 men will be given regular employment.

Since the signing of an agreement between the Bertha-Consumers Co. and the United Mine Workers the Bertha mine at Maiesville has resumed operations. This makes 11 mines operating in Scott's Run territory with an average production of about 900 cars a week.

Operations have been resumed at the Dartmoor mine of the Davis Coal & Coke Co. in the Barbour County field. This is one of the larger mines of the company which has not been in operation for a month or more. As a result of resumption several hundred men will be given employment again.

Walter H. Cunningham, secretary of the West Virginia Coal Association and also a well known mining engineer, has just prepared a map of southern West Virginia, showing the locations of mining districts, plants and creeks and also the separate and aggregate tonnage of the districts. Not only does the map cover southern West Virginia districts but also Tazewell County, Virginia, and the Martin and Pike County, Ky., mines.

The Virginian Ry.'s new electrically operated pier at Sewalls Point when completed will be the largest single coal-dumping pier in the world. It will be approximately 1,074 ft. long, 86 ft. wide and 74½ ft. above mean low water. The pier is to cost approximately \$3,250,000 and will have a dumping capacity of 3,600 tons per hour. The road also is making extensive improvements on the western end by electrification of the 133 miles between Mullens, W. Va., and Roanoke, Va.

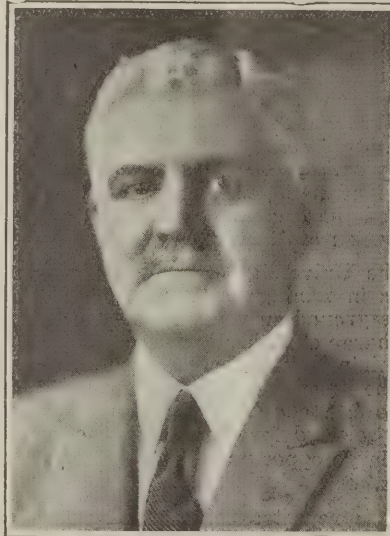
Lyda Davis, aged 27, a coal miner, and Guy Vincent, a farmer of Shinnston, must serve six years in the West Virginia penitentiary for the part they played in burning the tippie of the Ohio-Balkan Coal Co., at Dola on the night of March 17. Davis and Vincent were tried and convicted in the criminal court of Harrison County. Thomas Holt and Harry Leasure are now in the Harrison County jail awaiting trial for complicity for the same offence. It was alleged during the trial of Davis that he helped set fire to the tippie while in an intoxicated condition after meeting Holt and Leasure.

According to an official of subdistrict 4 of District 17, United Mine Workers, three suits have been instituted in the Circuit Court of Monongalia County against the Brady-Warner Coal Corporation, each for \$10,000 damages. The actions have been brought because of forcible entry of the company's agents into the homes of former employees, and forcible eviction of the plaintiffs and their families and removal of the household goods. Under a recent ruling of the West Virginia Supreme Court, coal companies have the right to regain possession of company houses when employment ceases, voluntarily or otherwise, after due notice, and without committing any breach of the peace.

UTAH

E. F. Taylor, of the state land office, will auction 120 acres of coal lands in Carbon County at an early date. The property includes lots land 2 southeast quarter of the northwest quarter of section 19, township 13 south and range 8 east.

J. J. Bourquin, engineer of the U. S. Bureau of Mines, has been appointed supervisor of operations of the Federal Coal Land Leasing act under the general direction of B. W. Dyer, district engineer of the Bureau of Mines and chief state mine inspector. His services, it is stated, will include the duties



Michael Gallagher

General manager of the M. A. Hanna Co., Cleveland, Ohio, and just elected a vice-president of the National Coal Association at the Cincinnati meeting.

of looking after the government's leasing operations and assisting in the work of state mine inspection. Mr. Bourquin comes from Pittsburgh, Pa.

Utah coal-mine operators will join with California retail coal dealers in a newspaper campaign to educate the California public to the advantages of using coal as a fuel in the home. Associated with the Utah operators, it is stated, will be mine owners in New Mexico and Wyoming. It is believed that this campaign will spread until it develops into a national movement. The campaign is the result of a conference held in Salt Lake City.

CANADA

To increase the available output of domestic coke, the British Empire Steel Corporation will soon erect a coke crusher at its plant at Sydney, N. S., capable of turning out about 20 tons an hour of coke of the proper size for domestic use.

The coal commission to investigate conditions in connection with the coal industry of the Province of Alberta has not yet been appointed. It is stated that it will not be named until definite information is received with regard to the transference of the natural resources of the province from the jurisdiction of the Dominion Government.

The commission is expected to deal with matters such as supplies of coal, mining methods and all questions pertaining to labor conditions.

Association Activities

The Fayette-Greene Coal Producers Association held a "Shop Talk" dinner meeting at the Summit Hotel, at the Summit, near Uniontown, Pa., at six o'clock Wednesday evening, June 11. The principal talk of the evening was on rockdusting by Captain Edward Steidle, of Carnegie Institute of Technology. Mechanical loading also was discussed. The discussion on rock dusting was under the leadership of Mr. William Z. Price, assistant superintendent of the Buckeye Coal Co. A large number of superintendents and mine foremen were present.

Recent Patents

Jig Mechanism; 1,477,006. R. A. Riley and H. O. Knapp, Pottsville, Pa. Dec. 11, 1923. Filed March 25, 1922; serial No. 546,723.

Pneumatic Coal Pick; 1,477,250. C. C. Hansen, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J. Dec. 11, 1923. Filed Feb. 1, 1923; serial No. 616,309.

Miner's Carbide Lamp; 1,477,431. Benson Davis, Roundup, Mont. Dec. 11, 1923. Filed Dec. 22, 1919; serial No. 346,446.

Mine Drill; 1,477,749. George Dobson, Sego, Utah. Dec. 18, 1923. Filed Aug. 19, 1921; serial No. 493,687.

Powdered Material Firing Apparatus; 1,477,824. A. J. Grindle, Chicago, Ill., assignor to Grindle Fuel Equipment Co., Harvey, Ill. Dec. 18, 1923. Filed Feb. 4, 1922; serial No. 534,241.

Spiral Separator and Method of Separating Materials; 1,477,849. Frank Pardee, Hazleton, Pa., assignor to Anthracite Separator Co. Dec. 18, 1923. Filed March 29, 1922; serial No. 547,451.

Industrial Notes

The Columbus Mining Co., of Allais, Ky., it is reported, is preparing to spend \$50,000 on improvements.

The Chicago office of the Hazard Mfg. Co., manufacturers of iron, steel and galvanized wire rope, removed May 1 from 552 West Adams St. to 32 South Clinton St.

Colwell & McMullin, New England representatives of the Conveyors Corporation of America, Chicago, will on May 1 locate in their new offices in the Park Square Building, Boston, Mass.

The Newark Wire Cloth Co. is now established in its new plant at 351-365 Verona Ave., Newark, N. J. The new building is 100 x 310 ft., covering approximately three-quarters of an acre in floor area.

The Cleaton Co., (Canada), Ltd., eastern Canadian representative of the Conveyors Corporation of America, Chicago, has moved to its new office at 1070 Bleury Street, Montreal, Quebec. R. E. Cleaton is president and N. Bannatyne, chief engineer of the organization.

W. A. Cather, formerly in charge of advertising and sales promotion for the Worthington Pump & Machinery Corporation, has been made sales manager of the Barrett Haentjens Co., makers of centrifugal pumps. He will be located at the company's plant, in Hazleton, Pa.

The Tompkins Fuel Co., with mines at Cedar Grove, W. Va., on the New York Central Lines, is building a new steel and frame tippie for its No. 5 mine. The tippie will be equipped with shaker screens, loading booms and picking table. The company expects to install at this same mine in the near future a new substation, probably motor-generator set, haulage motors and shortwall mining machines. The directors of the company, recently elected, are Harold P. Tompkins, president; Clyde B. Johnson, secretary; Roger W. Tompkins, general superintendent; Wm. G. Conley and Grant E. Tompkins.

Traffic News

Trunk Line Hearings on Proposed Advance in Rates

The Coal and Coke Committee, Trunk Line territory, will hold a hearing at 11 a.m. (daylight saving time), June 26, in room 401, 143 Liberty St., New York City, on a proposal to advance rates on bituminous coal from mines on the Buffalo, Rochester & Pittsburgh Ry. and the New York Central R.R. in the Clearfield district to stations of the Bush Terminal R.R. in Brooklyn, N. Y. The present rates is \$3.44, which it is proposed to increase to \$3.47.

The committee also will hold a hearing at 11.30 a.m. on the same day and at the same place on a proposed advance of 1c. per gross ton on anthracite (pea and smaller sizes) from mines on the Delaware & Hudson Co., Delaware, Lackawanna & Western R.R., Erie R.R., Lehigh & New England R.R., Lehigh Valley R.R. and New York, Ontario & Western Ry. to points on the New York, Chicago & St. Louis R.R.; as follows: Saybrook, Ohio, to Cleveland, Ohio; Swanville, Pa., to Springfield, Pa.; New York Central R.R. (West); Saybrook, Ohio, to West Park, Ohio; Swanville, Pa., to Springfield, Pa.

Five Cent Cut in Coal Rates on Chesapeake & Ohio

A 5c. reduction in coal freight rates from the fields served by the Chesapeake & Ohio Ry. will become effective on June 28, it has been announced by W. P. Tingley, traffic manager of the Jobbers and Manufacturers Bureau of the Huntington Chamber of Commerce. Mr. Tingley has just received a copy of the new tariff giving the rates affected by the reduction, which is calculated to effect a big annual saving to large consumers of coal in Huntington and Kenova. Agitation for the reduction was first started by Mr. Tingley several months ago when he conducted negotiations with the C. & O. It became assured several weeks ago following a conference with the Norfolk & Western R.R., which sanctioned the proposed reduction.

To Resume W. Va. Intrastate Rate Hearing June 16

After holding hearings in Fairmont during the latter part of May, the West Virginia Public Service Commission adjourned the intrastate coal hearings to June 16, probably at Charleston. Testimony adduced at the Fairmont hearing was largely of a technical nature dealing with rates, schedules, grades, division of territory and other matters entering into rate making.

A year or more ago the Public Service Commission put into effect new rates on intrastate shipments of coal and other articles but instead of decreasing rates it allowed an increase. The rate question has been reopened at the instance of the Domestic Coke Corporation, which operates a byproduct plant on an extensive scale in

northern West Virginia. A protest has been filed against the increase granted on state coal shipments, which it is claimed places an additional burden on industries, a number of which are located in Fairmont.

Obituary

James McGregor, formerly chief inspector of mines for British Columbia, died in Victoria, B. C., May 28. When a boy he went to work in the coal mines of Nanaimo, B. C., advancing himself to the position of manager of No. 5 Southfield Mine, Chase River, Vancouver Island. Subsequently he was elected to the provincial legislature and eventually was made inspector of mines for one of the interior districts. He was in the civil service for some twenty-five years holding the position of chief inspector at the time of his superannuation a year ago.

New Companies

The Old Cato Mining Co. has been incorporated at Henryetta, Okla., with a capital of \$25,000. The incorporators are C. E. Downs and Ben Meyers of Los Angeles and Gus L. Smith of Henryetta.

The Paris Coal Basin Mining Co. has been incorporated in Fort Smith, Ark., with a capital stock of \$25,000, with Ben Stroupe, president, and will develop a 40-acre tract near Paris. It will build six miles of railroad.

State charters have been issued at Harrisburg, Pa., to the following coal companies: Shamokin Colliery Co., Wilkes-Barre; capital, \$250,000; incorporators, Nat D. Stevens, 800 East Main Street, Nanticoke, treasurer; E. M. Chapin, Brookline, Mass., and Bruce F. Payne, Wilkes-Barre. Marwood Coal Co., Coraopolis; capital, \$15,000; incorporators, Fred R. Knight, Coraopolis, treasurer; Amos Gething, Coraopolis, and G. H. Baumann, Imperial. Schenley Fuel & Supply Co.; capital, \$10,000; incorporators, Robert Buka, Oliver Building, Pittsburgh, treasurer; Wilbur O. Nelson, Pittsburgh, and Guy E. Kneeder, Greensburg. Calumet Coal Co., Pittsburgh; capital, \$5,000; incorporators, Oliver Evans, 1047 South Negley Avenue, Pittsburgh, treasurer; Henry O. Evans and J. Garfield Houston, Pittsburgh.

Coming Meetings

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.

Midwest Retail Coal Association. St. Louis, Mo., June 17-18. Secretary F. A. Parker, St. Louis, Mo.

Colorado and New Mexico Operators' Association. Annual meeting June 18, Denver, Colo. Secretary, F. O. Sandstrom, Denver, Colo.

American Society for Testing Materials; annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers, annual convention, June 23-27, Edgewater Beach, Chicago, Ill. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

First International Management Congress, Prague, Czechoslovakia, July 21-24.

World Power Conference, Wembley, London, England, June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

Rocky Mountain Coal Mining Institute. Summer meeting, Aug. 7-9, Rock Springs, Wyo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New Equipment

Rerailer That Holds Itself Firmly in Position

Probably few petty mishaps occurring in or about the mines are more exasperating than derailments. While seldom serious in character these "accidents" often tie up the mine or a portion of it for more or less extended periods. When a trolley locomotive jumps the track an adequate ground connection is seldom afforded so that the machine may pull itself back onto the rails.

In order to render mishaps of this kind less serious the I. H. Edelblute Co., of Pittsburgh, Pa., has recently developed and placed on the market the rerailer a top and bottom view of which is shown in the accompanying illustration. These rerailers are built and used in pairs. Each has two broad wings that straddle the rail and guide the wheel onto it.

At its upper or narrow end this device is fitted with a cam that grips



Top and Bottom of Rerailer

Note that the underside of the device where it straddles the rail is curved longitudinally. Consequently as the wheel is guided onto the rail the rerailer rocks forward easing the wheel down with a maximum drop of $\frac{1}{4}$ inch.

the ball of the rail, and prevents the rerailer from being pushed in the direction of car or locomotive travel. The portion of the rerailer resting upon and supported by the rail is curved longitudinally so that when the weight of the wheel reaches a point above the rail it tilts the rerailer forward and downward easing the wheel down onto the rail with a maximum drop of $\frac{1}{4}$ in. After a locomotive, car or an entire trip has been retracted by this device a slight bump with a hammer or wooden block on its forward end releases the grip of the cam and allows the rerailer to be lifted from the rail.

This replacer has been designed especially for use in mines. It measures 17 $\frac{1}{2}$ in. long and is 15 in. wide across the board end. It can be placed between the wheels of any car or locomotive without interfering with brake rigging, sand pipes or other parts. It is not necessary to place the low or broad end of these replacers on a tie, neither need they be spiked in place as the cam grips the rail firmly holding the device securely in position. When replacing a locomotive the rerailer may

be set upon the rail in contact with a wheel giving a sufficiently good return circuit to permit the motor to climb the track under its own power.

These replacers are made of high-carbon, manganese-alloy steel and are specially annealed. They are amply strong to resist the rough usage that devices of this kind always receive and are guaranteed against breakage in service.

Self-Acting Mine Door

Among the interesting pieces of mine equipment shown in model form at the exposition in Cincinnati was the mine door recently placed on the market by the Ventilating Service Co. A photograph of the model there shown is presented in the accompanying illustration.

This door is double and is gravity operated. In its installation two posts are set, one upon either side of the heading or track. On these the doors are hinged, turning on roller bearings in such a manner that as they open they rise. Their own weight thus causes them to close after the trip has passed.

The part of the door extending across the track is hung by rollers from the upper portion of the frame in such manner that it may telescope with that part of the door on the opposite side of the hinge post. It is returned to normal position by the counter-weight plainly visible in the illustration. In this model the portion of the door outside the post is shown in skeleton form only. In any actual installation a plate will be fastened to the frame seen in the illustration. This fills up what might be termed the wing and prevents flow of air past the side of the door.

In operation a locomotive or trip traveling at any speed up to 15 miles per hour strikes the buffers on the inner edges of the doors, forcing them open and allowing the trip to pass, after which the doors return to their normal position by gravity. Now suppose that for any reason it is necessary to stop and reverse the travel of the trip before it has entirely passed through the doors. Stopping the trip

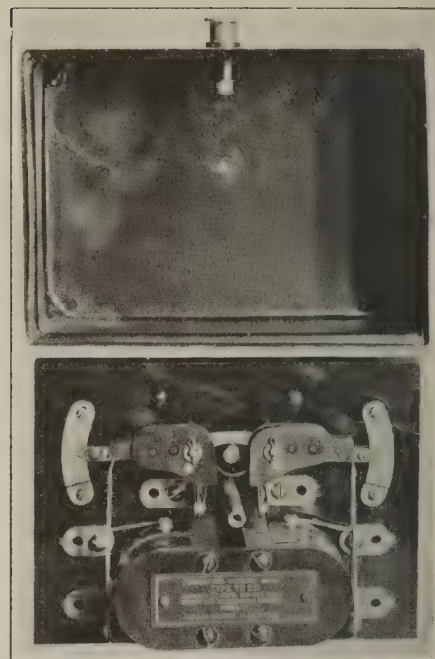
will not interfere with the door in the least. When it starts to back up, however, trouble might be encountered if the door were not built so that it can telescope and slide out of the way. This provision renders the door immune from injury by any movement that the trip can make while passing through in either direction.

This door is normally constructed to close against a water gage of 2 in. It can, however, be built to operate against any air pressure likely to be encountered in mine ventilation. One of these doors has been in successful use for more than six weeks, being subject meanwhile to the action of an eight ton locomotive. It is claimed by the builders that this device is simple, light, efficient, cheap and easy to install, and that its action is positive and sure, obviating the services of a trapper and relieving the locomotive crew from all responsibility for either opening or closing it. This in turn renders it impossible that a door of this kind will ever be left open to short-circuit the ventilating current.

Temperature Relays Heats in Same Ratio as Motor

A new thermal overload relay, designed to follow more closely the heating curve of the motor, has been developed by the General Electric Co. and will soon be on the market. This device is designed to afford better protection against overheating of the motor. It is made in both single and double pole types.

The relay contains two heating elements, one of which is a thermostatic strip controlling the motor circuit. The other element is enclosed in a metal block which, when heated, tends to increase the temperature of the thermostatic strip by conduction and radiation. The thermostatic strip corresponds to the copper in the motor, carrying the same or a proportional amount of current. The metal block contains the other heating element which corresponds to the iron in the motor, which has relatively high thermal capacity. The heating of both these elements combined thus corre-



Thermal Relay With Heating Characteristics Similar to Motor

This device consists of two elements, one functions to trip the motor circuit when the winding of the motor gets overheated and the other stops the motor when its frame gets too warm due to overload or single-phasing.

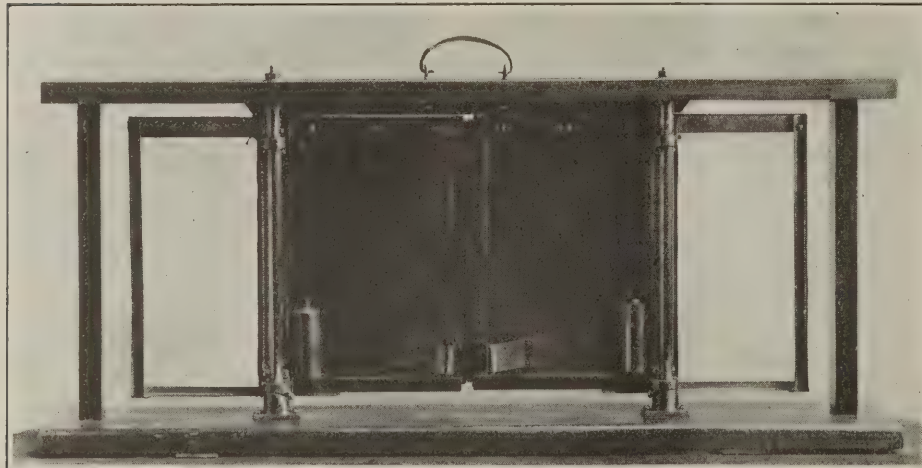
sponds closely to the actual heating in the motor, thus protecting it while in operation.

During conditions of ordinary loads on the motor, the heating of the thermostatic strip, due to the heat generated in itself and the heat absorbed from the metal block, is insufficient to produce enough deflection of the strip to stop the motor. In case of an overload which would damage the motor if permitted to continue, the heat absorbed by the thermostatic strip from the metal block is sufficient, when added to the heat generated in the thermostatic strip itself, to stop the motor. When the motor is subjected to an excessive overload, the heating effect of the thermostatic strip itself predominates and its deflection will effect the opening of the motor circuit within a short time.

Another feature of the relay is that it will inherently take into account the previous heating of the motor, by reason of the fact that the heat stored in the metal block is a measure of the heat stored in the motor.

Portable Welding Outfit With Many Taps

The Welding Metals Mfg. Co. of Cleveland, Ohio, has just placed on the market a portable electric welder enclosed in a substantial case and intended for production and maintenance work. It is now being made in capacities ranging from 50 to 150 amp. One outfit is made for use on 110-volt circuits, and another for 220-volt circuits. The resistance unit is arranged so that six different current taps can be taken from it. The 110-volt unit weighs 165 lb. and the 220-volt unit weighs 190 lb.



Model of Door That Is Opened by Locomotive and Closed by Gravity

Gravity closes this door when it has been opened by a passing trip. Should the trip stop and reverse its direction of travel before it has passed through the door no harm is done as the door plates may telescope within the frame. They are returned to their normal position by the counter-weights after the trip has gone by.

COAL AGE

McGraw-Hill Company, Inc.
James H. McGraw, *President*
E. J. Mehren, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. Dawson Hall
Engineering Editor

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Number 25

Wrong Kind of Publicity

COAL operators continue to believe that they can help the coal industry by defaming the union, but a knowledge of human nature will readily show how hopeless is the task. A man is responsible in public estimation for all the faults of his family. Suppose his boy acts discredibly, will denunciation of the boy restore the father's reputation? Not an iota. The better plan is to keep silent, hoping the public will forget.

The less said about Wallins Creek, Herrin and Cliftonville the better. The union was to blame, but the miners are part of the coal industry, and the public makes no fine distinctions between the employer and employee. After all to defame the union is defensive propaganda, and that never attains its object.

The propaganda that succeeds is not negative. It blackens no one. It simply relates what good is being done, and it tells these things not when the industry is being attacked but rather when the public is receptive to good impressions. Propaganda is most successful just when it seems least needed. When the public is in kindly mood, work on its feelings; when the public is sullen stay away, for even the best of explanations will be useless. Approached when angry Old Man Publicus will round on the interrupter with a testy "You're all alike." He isn't prepared to weigh the matter.

Just now the best way to establish the industry in popular estimation is by ending the frequent explosions that kill so many men and so powerfully impress and harrow the public mind. The industry can do nothing more constructive than to prevent these terrible holocausts. The coal mining industry by showing itself willing to rock dust its mines and to urge legislation demanding such rock dusting and by spreading the good story of its philanthropy in this matter can do more for the industry than by pages of negative propaganda.

There should be no skeletons in the coal industry's closet and if there are they should not be paraded. To publish pages about such skeletons is not constructive propaganda, however it may delight those who write it or please those who are thereby "defended." The merit of a statement lies not in its pleasing but in the effect it creates.

Time for New Laws

MINING laws passed with the best of intentions to assure safety are liable at some time later to have the opposite effect. Thus the mining law of Pennsylvania in its General Rule No. 25 declares that "All holes before being fired shall be solidly tamped the full length of the hole," the clause having reference only to gaseous mines. It has been found, however, that with air spaces less powder will do the work, do it better and will be less likely to break down, or blow down, at the back of the hole. Less powder and more

efficient operation means less danger. But there is the law requiring tight tamping and which prevents even the use of rock dust unless the dust is tamped so tight as to lose its cushioning effect. The industry needs new regulations and so far it cannot get any relief except by legislation.

In Great Britain the regulations are made and modified by authority duly constituted for that purpose by Parliament, and in Massachusetts, New York, New Jersey, Pennsylvania, Ohio, Wisconsin, California, Oregon and Washington and perhaps other states safety rules for other industries than coal are prescribed by administrative boards. It would seem better to leave matters of this kind to properly instructed and well-informed departments than to legislators who know nothing about the industry and who are afraid to make up their minds regarding something they do not understand. So much contradictory testimony assails them, the worth of which they cannot assess. Accordingly they do nothing which is perhaps better than inconsiderate action.

Probably some hardy person, coal operator or mine worker, will endeavor to oppose the use of electric safety lamps, rock dusting, electric shot-firing and other improvements when a new code is proposed and the legislators not knowing mining are likely to be moved by the opposition, but a commission would not make up its mind on the counting of noses but on a clear knowledge of the facts. Abuse might follow it, but it would certainly achieve more than the legislature which has allowed regulation to drift so that some legal provisions are now absolutely opposed to safety.

Are More Houses Needed?

OPERATORS are finding that it takes more houses to shelter their men than in former years. Rents in most cases have not gone up, but wages have. Consequently the mine worker finds the rent far from onerous. Some do not have to work as much as a whole day to earn enough to pay the rent for a month. Contrast that with conditions in the cities where 25 per cent or more of the month's wages is given to the landlord. For this reason there has been no disposition for employees to crowd as they do in the cities to save rent. The tendency is rather in the other direction.

In early days also there were more unmarried men or men who had wives across the seas. Now owing to the immigration laws we are not getting so many foreigners and another employee is more likely to mean another tenant. The demand for a house for every adult man is here, and here to stay. The accommodation once obtained will not be readily foregone, and the restrictive bars to immigration that would let in men with more modest requirements are not likely to be much lowered.

The only possible release for house shortage other than by new construction will come from the use of

more machinery, especially for loading and as a result of a concentration of the mine workings. The situation is indeed difficult especially in mountainous regions. There, what little space could be found at one time now is filled with garages. In fact a garage usually needs to be on the most desirably level ground where the owner of the machine can maneuver safely. This erection of garages has monopolized in many villages all the building space and in many cases garages have been built till sites have played out.

In some of the mountainous regions coke ovens have been pulled down to make way for houses, the ovens not having been used for years. This leaves the space formerly occupied by ovens, wharves and coke roads available for house erection. When there are not such spaces or where the coal company is not definitely certain that it will not have to use the ovens later, then there is no way of erecting dwellings except by excavating sites for both houses and roads; the steam-shovel and retaining-wall work often costing more than the erection of the houses.

Making of Anthracite

IN THIS issue is given a brief statement of John Roberts' views on the origin of anthracite. Very interesting and convincing does his story appear. Whether it is a true picture of what happened it is difficult to determine. It is puzzling to understand at first how large areas could have become heated between 500 to 550 deg. C. until one comes to Leonard Silver's theory that coal when heated between 400 and 500 deg. C. gives out heat from its own decomposition and so autogenous carbonization takes place.

Coal, of course, has not anything like the heat-giving qualities ascribed to it in commercial language. When asked the number of British thermal units in a pound of coal we glibly say 10,000 or 14,000 but that figure is the number of units of complete combustion. The thermal units that the coal itself by its internal chemical action can emit is greatly less. Many people do not know that coal has any such exothermic quality. Mr. Silver believes the coal might emit enough heat to extend its own carbonization so that given a nucleus heated to 400 or 500 deg. the carbonization might be extended without the presence of air somewhat as a fire is extended when air is present.

Unfortunately for Mr. Roberts' theory we are met with variations in the quantity of volatile matter in anthracite. The Bernice semi-anthracite and that of Forest City and the anthracite of Dauphin County, Pennsylvania have more volatile matter than that of the Middle and Southern Anthracite fields. The semi-anthracite of Arkansas and the Pulaski County field of Virginia are also instances of incompletely carbonized. Is it possible that these semi-anthracites reached only 400 deg. or a little more and that the exothermic action of the coal could be extended but without any marked rise of temperature above that given?

It is, of course, possible to believe that a slightly different quality of vegetal matter is the cause of the difference in volatile content. However, there are so many evidences of gradation in the volatile matter of anthracite and semi-anthracite that even Mr. Roberts' well-conceived thesis will not serve to convince those who hold, as most of us do, the metamorphic theory.

Many bituminous seams have been in places subjected to temperatures which coked or anthracitized

them. In those places the coal must have been in the exothermic stage. Why did not the action extend all over the seam as Silver has assumed it did in the case of beds now completely anthracitized?

These are the problems Mr. Roberts has to meet, but they are not any more or any less difficult than those the advocates of the metamorphic theory have failed to explain. We are still a long way from answering that riddle of the carbonizing ages.

Handcuffed to Precedent

TWENTY or thirty years ago the woods stretched down to the mine villages. Mills and mines alternated in the valleys. The scream of the saw mingled with the low boom of the tippie. The miners and the lumberjacks met in the barrooms and battled for supremacy. In the stream sawdust mingled with the ochreous waters from the coal mine. The shacks of the lumberjacks were occupied by miners and when the miners left, lumberjacks took their places whenever the men were themselves not lumberjacks and miners both, for the industries recruited from one another. When the ponds froze so that the mills shut down the millmen went underground and when the market for coal sickened the miners piled lumber in the mill.

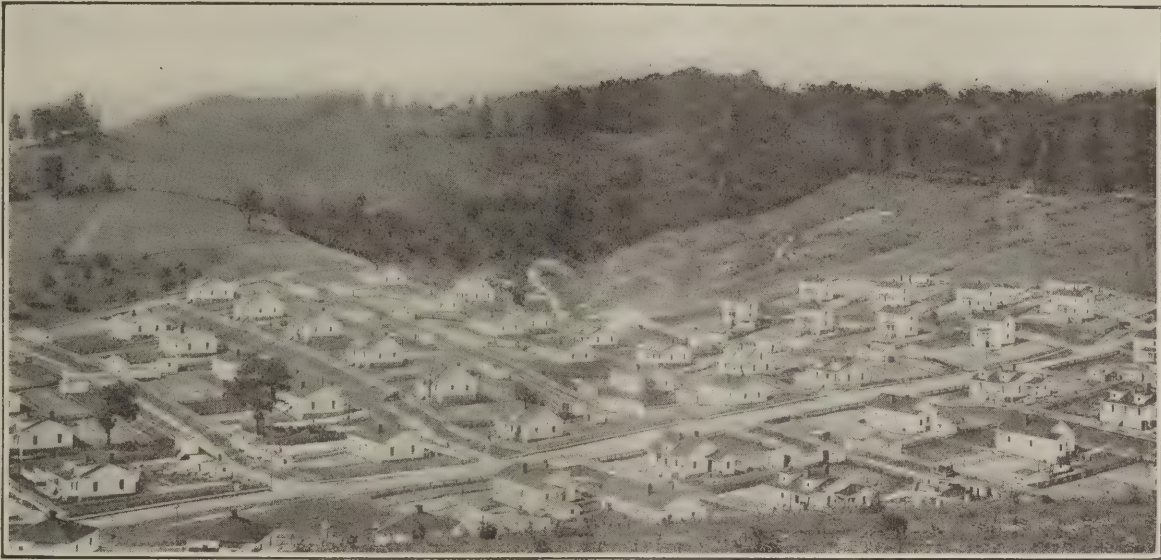
In those days wood was cheap in some sections—\$4.50 per thousand f.o.b. mill—and paint relatively dear, so at first none and later few painted miners' houses, and the only color that adorned them was that of the dogwoods, buttonwoods, maples, hemlocks, firs and oaks that covered the hills. These made attractive bungalows out of the meanest of shacks. In many places, of course, houses had been placed even so long as forty or fifty years ago in serried rows. They needed decoration, but America had then hardly awakened to the value of beauty in utilitarian structures. Some will say it has not realized that value yet in any large measure.

The economic argument was the only one that appealed and that was more than dubious, for lumber was so cheap and the mines were so transient, being abandoned as soon as they were driven to the dip or the hauls became lengthy. Consequently painting was by no means common and was done in a perfunctory way when attempted.

For a while the industry was handcuffed to a precedent which it followed even after rope haulages, electric locomotives and big pumps extended mine life.

Times have changed. Today lumber at the mines nearly everywhere has to be shipped in, and even where it can be obtained from a mill by truck or wagon it is extremely expensive. It pays to preserve it with paint. That has been conceded. It pays to keep it painted. That is the next concession. Many have made it, but a few still hope for the best and leave the repainting for the future. The methods of painting in most cases need amending, as witness the water-paint on some houses, and the uncovered knot holes and flaky coatings on others.

No longer set among trees, no longer screened by nature the modern mining home is a ghastly thing unless kept painted. Lack of paint is half of squalor. Paint is half of cheerfulness, cleanliness and content. A freshly painted house delivers its message of thrift and hope everywhere and stamps a town with an attractiveness that keeps the roster of the company filled with the names of the best workers in the region.



Village of Rachel, W. Va.

Coal Industry Has Awakened to the Value of Paint

Inferior Paint Increases Painting Cost 75 per Cent—Why Ready Prepared Paints Are Preferred—Paint Guns Save Labor—Anyone Can Sling Paint Widely but Not Well—The Underground, a Land That Paint Forgot

BY ALPHONSE F. BROSKY
Assistant Editor, *Coal Age*, Pittsburgh, Pa.

FOR many years coal mines, being at the source of timber supply, painted nothing—not even the houses or tipples. Now the coal operator is beginning to paint everything, even his cars and the steel underground. The mine needed paint more than the surface but the practice of not painting was so well established that even today what would be painted for outside use is left unpainted for the severer service underground. Even the painting of surface buildings is neither sufficiently understood nor assiduously maintained.

How apparently simple, yet in reality how extremely difficult to most coal companies is the proper protection of building surfaces. When conversing with the man in charge of maintenance of mine property, the subject of paints and painting usually proves a tender spot. It is one of his principal burdens. This is wholly unnecessary, for neither the making of good paints nor their successful application are lost arts.

The requisites for successful maintenance of equipment by painting are few in number and are within the command of every coal company. In the order of their importance, these are: (1) The selection of a paint of proper quality and of a composition suited to the nature of the surfaces to be protected and to the conditions of exposure; (2) careful conditioning and

preparation of the surfaces to be painted; (3) application of the paint by experienced men who know how to use it; (4) adequate and intelligent supervision; and (5) regularity in applying paint to all surfaces subject to deterioration from the action of the elements. All these factors are well known, yet they are not always given due consideration. This may be judged from the difficulties and failures in the painting of equipment, dwellings and other buildings owned by the coal companies.

In all mining towns and plants, for protecting either internal or external surfaces, the best quality of paint should be used in preference to that which is less expensive but of inferior quality. This is because the better paint is more economical in the end. Actual figures show that the materials cost for two coats of good paint applied by brush to a smooth surface is no more than 25 per cent of the total painting expense. The remaining 75 per cent represents the labor of preparing the surfaces and applying the paint.

In making this estimate, it is assumed that one gallon of paint will cover 600 sq.ft. of surface and that one man with a brush should paint 1,200 sq.ft. of surface in eight hours; that the average price of good priming and finishing paint is \$2.50 per gallon; that experienced painters are paid at the rate of \$1.25 per hour and that a painter's helper paid at the rate of 75c. per hour can prepare 2,500 sq.ft. of surface in eight hours.

The folly of buying paint solely on a price basis is

NOTE—The Bertha Consumers Co.'s village, shown in the head-piece, affords abundant proof that it pays to paint mining villages well and as often as necessary. Most of the houses in this picture are of the bungalow type and contain four rooms.

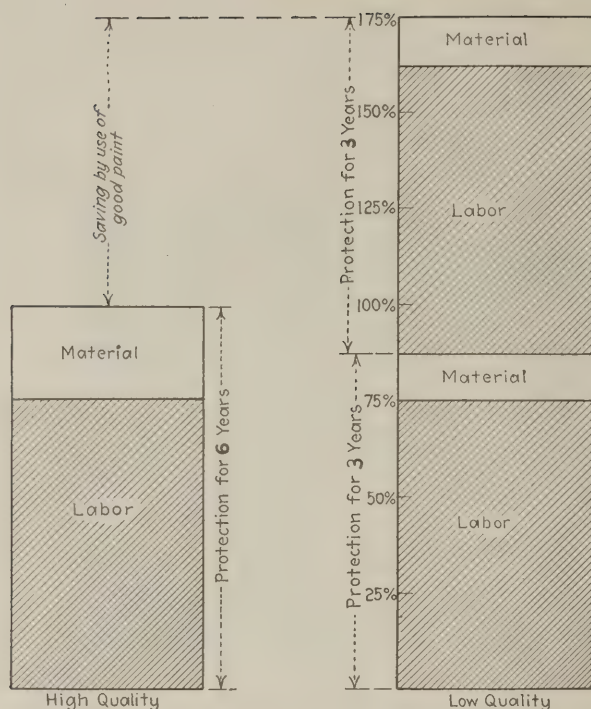


Fig. 1—Painting Cost Shown Diagrammatically

An inferior paint costs as much to apply as one that is good. Apparent savings made in material purchased are thus deceptive, being far more than offset by labor expense.

readily apparent from a comparison of the cost of the protection afforded by high- and low-quality paints. Such a comparison is shown graphically in Fig. 1. High quality paint at \$2.50 per gallon should have a life of at least six years, while that of low quality at, say \$1.25 per gallon, must be applied every three years in order to afford adequate protection. Use of the more expensive but better paint in preference to the cheaper article effects a saving in labor that represents 75 per cent of the total cost. This comparison, although strictly theoretical, is fair and reasonably accurate.

Because good paints are scientifically manufactured, by processes in which advantage is taken of the physical and chemical properties of the various ingredients, and because during certain steps in the process temperatures of manufacture are highly important, no one under ordinary circumstances should attempt to mix paint on the job. So thoroughly has the manufacture of good paint been reduced to a science, that even its coefficient of expansion is taken cognizance of and predetermined. Almost everyone has noticed at some time or other that the coat of paint applied to corrugated metal has cracked. This often results from the unequal expansions of the paint and the metal upon which it is placed.

The necessity for refinements of this nature in the manufacture of paints, particularly those intended for covering metal surfaces, is obvious when one considers the average range in temperature between midnight and noon. This sometimes amounts to as much as 60 deg. F. Paints covering surfaces that vibrate under the stresses set up by machinery, as for instance the coverings of tipples, must also be elastic and non-shattering; otherwise, they will crack and scale. As a matter of fact, however, all paints for ordinary purposes should form tough elastic coats. These, however, are only a few of the requisites that must be taken into consideration in making a paint and are here mentioned

merely to show that it is economical in the long run to use a paint of good quality that has been scientifically compounded and manufactured.

In mining towns house paints of light tint are desirable because they present a good appearance. Many prominent coal-mining companies throughout the United States invariably use paints of light color. Nevertheless, under certain specific conditions, as where houses closely adjoin tipples and consequently lie in the path of wind-blown coal dust, or are built in the proximity of coke ovens where they are subjected to the action of sulphurous gases, darker shades may be advisable.

Even the very best of paint must be used with discrimination. Thus a paint of specific composition cannot be utilized for all surfaces under a wide range of conditions. The paint used for covering the side walls of a house may be utilized on a fence also, but it should not be used on porch floors or steps. For these latter surfaces a paint must be able to resist abrasion and exposure to the weather. This is accomplished by compounding with it a durable varnish and other necessary materials. Good paint sometimes fails because it is applied to the wrong surface.

Coal companies that use inferior paints almost invariably choose the same interval between paint applications as do those firms who employ a paint of the highest quality. As a general rule, where an honest effort is made to preserve them, the buildings in mining towns are painted every four or five years. This is a period within the durability of good paint, when employed under favorable conditions.

Time is the only infallible test of the quality of a paint and its proper application. Any company that finds it necessary—although it may not choose to do so—to paint its buildings at intervals of only two or three years, is losing money in upkeep and in the application of the paint.

Good paint fails slowly by oxidation and powdering from the outer surface inward, a surface covered by



Fig. 2—Paint-Time in Lynch, Ky.

After spending millions of dollars in developing its mines and building the town and plant, the U. S. Coal & Coke Co., intends to preserve its buildings by painting them as often as may be necessary.

it requiring little preparation for repainting. After repainting, such a surface receives additional protection by reason of the old or under coats of paint not completely worn off. Poor paint fails by blistering, peeling, "alligatoring," scaling and the like, so that before a good paint can be properly and effectively applied to a surface that has already been covered by a poor paint, the underlying coat must be scraped and brushed to remove blisters, peeled spots, and the like, which are the manifestations

of poor quality or inferior application. The cost of preparing a surface in this way exceeds any saving that may be made by the use of a poor instead of a good paint.

It is false economy to forego the expense of painting until such time as exposed wood surfaces to be coated are dry and cracked for want of paint, or the metal surfaces show signs of corrosion. Thus neglected, surfaces present a shabby appearance, deteriorate rapidly and can be repainted only at an increased cost, because additional cleaning is required. Wood that is dried out and metal that is pitted or corroded absorb far more paint than similar materials properly conditioned. More labor also is expended in spreading the paint.

At this point, a few words on the preparation of the surfaces to be treated and the tempering of the paint may not prove amiss. Best results are obtained only when every detail is carefully observed. The surfaces of outside structures should not be painted immediately after a rain, in a damp atmosphere or during cold weather. All surfaces to which paint is applied should be thoroughly dry. A warm, dry atmo-



Fig. 3—Surface Preparation

The surface, if covered with loose particles of old paint, dust or mud, must be cleaned with a wire brush before being painted or the paint will not adhere.

sphere, such as that obtaining between spring and fall is ideal. Under other conditions, the paint cannot be made to adhere to and penetrate beneath the surfaces treated. The paint must always be thoroughly brushed on if a good wearing surface is to be obtained.

Wood in newly erected structures should be given a thin first or priming coat and then allowed to season for a period of three or four months before the second coat is applied. This seasoning eliminates the free water in the wood cells which, when thus emptied, absorb appreciable quantities of the paint.

MUD AND DIRT MUST BE CAREFULLY REMOVED

The ground on which mine houses are built is frequently neither level nor sodded. Furthermore, few miners' dwellings are provided with roof gutters and down spouts, so that the dripping of water from the eaves spatters more or less mud upon the outside walls of the dwellings. Houses built in the proximity of coal tipples also may be covered with a thin layer of coal dust.

All foreign matter of this kind should be removed by the use of wire brushes before paint is applied. Loose scaly paint should also be removed, if necessary by scraping, brushing or sandpapering. Sap streaks in new wood should be treated with turpentine, and glossy spots on paint-covered surfaces should be roughened prior to painting anew. It is also needless to mention that repairs to the woodwork of houses or other structures should precede painting.

Priming paint should be thinned before being applied and all paint should be kept thoroughly mixed by frequent stirrings. When two coats are to be given a surface that has previously been painted, the priming coat should be thinned by the addition of undiluted raw linseed oil and turpentine. The exact quantity of thinner used will depend upon the character of the surface treated, the kind of paint and other factors. The correct tempering of paint ordinarily cannot be accomplished by inexperienced men. Intelligence and skill derived from experience are necessary qualities of any person in direct charge of painting.

Painting of buildings is admittedly attended with difficulties, but steps usually can and should be taken to overcome them. Under no circumstances should the painting of an individual dwelling be left to the occupant, neither should the responsibility for painting mine structures be delegated to surface-plant crews. Some companies solve their residence-painting problem



Fig. 4—Paint Gunning

Money can be saved by spraying the first or priming coat. With a machine a man can cover from two to four times as much surface as he can with a brush. Two sprays can be operated from a single compressor unit.



Fig. 5—Brushing on the Second Coat

Two large coal companies are agreed that the finishing coat should be applied with the brush. Light-colored paints are preferable to more somber hues for miners' dwellings.

by supplying paint to their house tenants. This is usually applied on idle days and in a haphazard manner. The only advice that can be given in a case of this kind is, "Don't do it."

As a general rule, each coal company should do its own painting. The degree of success attained in this work will depend in large measure upon the skill of the men employed, consequently as many as possible of the painting gang should be experienced workmen. It is fully realized that it is not always possible to secure the services of any large number of experienced painters, and for this reason it frequently becomes necessary to hire men that are untrained to assist in the work. This is particularly true when the painting program is large and has to be completed in one season so that a comparatively large number of men must be employed. However, there is one way out of this difficulty, and that is the employment of one or more permanent paint crews.

By this arrangement, unskilled men work in a measure as apprentices under the supervision of those experienced in painting. They are thus soon trained to do their work well, and, having received this training, they should be retained as permanent assets to the mining organization. Of course, extensive painting programs can only be performed during the summer months, and it is therefore suggested that throughout the rest of the year these men be employed as general handy men and placed in the maintenance department under the supervision of a master of maintenance.

In weather not suited to painting, they may be employed in repairing roofs, windows, porches, fences and the like. The size and number of paint crews employed may be fixed by scheduling the various jobs of painting in one or in several plants. The skill attained by these men when employed at odd jobs is ample justification for organization in the manner described.

Those companies that cannot profitably retain a permanent maintenance department or doubt its efficacy, may well let their painting jobs on contract. This, however, should be done only to reliable contractors. It is better to let out a company's painting to some outside person than to employ green men on this class of work, for good painting requires skill. Contract painting is not, however, entirely satisfactory, because an unprincipled contractor has small interest at stake; his remuneration is based on the area covered, and the

quality of his workmanship will display itself only after months or years of exposure to the weather.

The unscrupulous contractor may accordingly instruct his men to thin the paint excessively in order to save material and labor in its application. He may employ a small or large number of inexperienced men or he may use an inferior quality of paint. For these reasons, coal companies should specify the make and kind of paint that shall be used on their buildings. They may further employ one or two inspectors constantly to supervise the work.

Coal companies, operating in isolated districts where it is difficult to get painting done on a contract basis, may well "import" several experienced painters to direct the painting of their buildings. The importance of having this work done "according to Hoyle" cannot be over-emphasized.

At the present time, a number of coal companies are applying paint with spray machines. With these devices, the paint is projected in a spray by compressed air from portable nozzles or guns. The equipment consists of two units—one compressing and distributing the air and the other containing and distributing the paint. The principle of operation of this device is somewhat similar to that of a cement gun. A pressure of about 10 lb. per sq.in. is maintained in the paint container to force a steady stream of this liquid through a flexible hose to the nozzle, where it is met and atomized by a current of air conducted from the compressor unit at a pressure of about 50 lb. per square inch. A spray machine usually supplies two guns which may be moved about within a radius equal to the length of the flexible hose employed.

Last summer the Hillman Coal & Coke Co., used spray machines in painting several of its towns. It reports that the cost of applying paint by the spraying process is less than by brushing, although the spray method consumes 10 to 15 per cent more paint. The difference in consumption between the two methods is greatest on windy days when a portion of the paint used in spraying is blown away. Although authorities differ as to the durability of paint applied by these two methods, some claiming that one is as good as the other, and others asserting that sprayed paint does not last as long as that applied by brush, this company is not discouraged with the results attained. Heretofore, it has applied both coats with the spray gun, but in future it intends to apply the finishing coat with a brush.

In painting its houses at Lynch, Ky., the U. S. Coal



Fig. 6—A Well-Maintained Substation

Proper painting of wood and metal surfaces in and about mining plants must be given adequate consideration by mining companies inasmuch as total upkeep costs are materially reduced thereby.

& Coke Co., uses spray machines in applying the first coat and brushes on the finishing coat. This town contains 991 houses, which should be painted at five-year intervals. All these houses were painted during October and November of 1922, and June and July of 1923. The entire town was thus painted during these four months by a crew of forty men and two foremen, work being carried on for 10 hr. per day. One spray machine was used on this job.

The air compressor used with this spray gun was driven by a gasoline engine and carried on a truck. This latter was moved from place to place by an automobile truck which also transported ladders, paint and the like. Three men are employed to operate the spray machine; two nozzle men and an attendant who looks after both the paint supply and the compressor itself. This crew can paint an area of 20,000 to 30,000 sq.ft. in 10 hr. The automobile truck mentioned is utilized not only for moving the spray machine, but also for supplying the brush painters with equipment and materials. Nine crews of four men each prepare the surfaces for the spray machine and brush on the finishing coat and trimmings.

Painting tipples either of wood or steel and maintaining an adequate protective paint covering upon them

Of course, all tipples, regardless of their material of construction should be carefully and thoroughly cleaned before they are painted or repainted. A manufacturer of paint reports that tipples, "if of steel construction, should be painted immediately upon erection to avert corrosion. Before being painted, however, the surfaces should be washed down with a solution of acetic acid and water in equal parts, or vinegar and water. This solution will cut the grease and insure the adhesion of the paint to the metal. Either a well-prepared paint or one of many paints made especially for metal surfaces may be used." For tipples, however, a sulphur-resisting paint should always be specified, because all coal dust contains more or less sulphur.

In the interiors of mine power plants, if paint is regularly applied to the walls, floors, railings and other objects in the generator rooms it adds greatly to their appearance, affords better illumination and acts as an incentive to employees to keep the plant clean. The bad effect of steam and gases upon metal can be counteracted by the periodic painting of surfaces susceptible to such action in the boiler and pump room. Paint also protects metal from acidulous gases escaping into the plant from the boiler furnaces. The importance of carefully painted interiors in substations should also

Fig. 7—Upkeep Indications

House painting is only part of the village upkeep; roads should be scraped, ditches cleaned and fences whitewashed. Good upkeep pays both in cash and in morale. A neat town attracts the type of men who work steadily, cooperate with the management and so make **operation** pleasant and profitable.



are not simple tasks by any means. It must be remembered that surfaces and structural members on tipples are neither smooth nor accessible and that they are covered with coal dust and smeared with oil and grease. Painting such surfaces by hand is tedious and slow. Spray machines cut this labor cost 50 per cent or more. It is estimated that it would require eleven men twenty-six days to brush one coat of paint on the big Lynch tippel, which has an area of 101,365 sq.ft. With a spray machine, this area could be covered by the same number of men in about one-half the time necessary for brush painting. It is further estimated that good paint properly applied to this tippel should last for five years. The Gary division of the same company is of the opinion that steel and concrete tipples should be given one coat of paint each year to eliminate the uncertainty of protection afforded by paint applied at greater intervals.

Many wooden tipples throughout the country are going to rack and ruin simply for the want of paint. Owners of these structures may well take a lesson from the Bertha Consumers Co., of Pittsburgh, Pa., which takes as good care of its tipples as it does of its houses, applying paint promptly whenever needed. Wooden tipples should be painted in the same manner and with the same material as are mine villages.

be recognized by all coal-mining companies, as it is already by transit companies and in most cases by public utilities.

Structural and other steel with the exception of rails that are stored in supply racks or yards should be painted to protect them from corrosion. Such steel is normally painted as soon as erected but much corrosion may be avoided by painting it as soon as it is unloaded from the railroad car.

Both intricate and simple piping systems should be given paint protection, otherwise they may deteriorate rapidly. Pipes, other than those conducting steam and consequently covered with asbestos, ordinarily should be given a coat of durable paint of a color conforming to established company convention. A "color scheme" for pipe facilitates repairs.

Underground structures and equipment should by no means be overlooked in any campaign for paint protection, although its possibilities are more limited there than on the surface. Underground substations and pump rooms should be as carefully painted as similar stations above ground. Iron doors, gear guards, lockers and tool boxes all last longer when painted.

Another big opportunity for saving is afforded by the painting of equipment installed in underground

machine shops. Dumps and other apparatus installed at shaft and slope bottoms may also be preserved by paint, as also may steel-timber sets provided they are painted immediately upon erection. These may advantageously be painted white to increase their visibility. When a piece of mining machinery of any kind is taken to surface shops for complete overhauling, it should be painted before being returned to service. It is asserted by some operators that even the outside surfaces of mine cars should be painted, this practice being followed at certain mines. Some operators claim that painting will double the life of car bodies.

At What Heat Was Anthracite Formed?

FINDING that in South Wales, anthracite is freer of ash than bituminous coal, Dr. Strahan has surmised that it was derived from a different type of vegetation and was a metamorphosed development of bituminous coal. Jordan and Burns attempted to account for the purity of Welsh anthracite by ascribing it to the removal as chlorides of the various ash constituents, stating that chlorine may have combined with the metallic oxides in the coal to form salts and thus leached out ashy constituents.

In South Wales anthracite has sometimes, even frequently, only 1 per cent of ash. In the United States we are not faced with the problem of explaining any such low ash content. The shoe is rather on the other foot. However, in South Wales, the low ash percentage has made several geologists disposed to reject the whole metamorphic theory.

In the Darwinian theory, as popularly interpreted, all living things are in a common chain of development, the superior beings derived their existence through a line of inferior beings still existent. The progenitor of man is the ape. The Darwinians are more circumspect. Man is derived probably from some other primate, the family not being definitely known. Just so with anthracite according to some geologists; it comes from vegetable matter, so does bituminous coal, but one is not necessarily derived from the other.

Now comes John Roberts strongly supporting the metamorphic theory in a scholarly paper read before the South Wales Institute of Engineers. He declares "Anthracite is a natural product of low-temperature carbonization, the parent substance having consisted of bright coal, probably both clarain and vitrain and which has subsequently attained in the earth's crust a temperature of between 500 and 550 deg. C." Note the temperature; it is a high one and he has a hard time proving his case against authorities who have said quite dogmatically that the temperature could not have exceeded 300 deg. C. and against still others who think that if we only wait some millions of years the lignite of the Dakotas will be turned into anthracite.

He makes only a poor fist at explaining the clean anthracite of South Wales. The best he can do is to quote Dr. Lessing who places the average ash percentages of fusain at 15.59 per cent; durain at 6.26 per cent; clarain at 1.22 per cent and vitrain at 1.11 per cent. As anthracite, unless it is leached, should have naturally more ash than bituminous coal because it has lost volatile matter, the clarain and vitrain percentages of ashes given would figure nearly 2 per cent instead of 0.8 per cent which South Wales anthracite

In fact, the opportunities for saving which paint affords in the mining of coal appear to be almost limitless. Few companies seem to have made any great effort to ascertain how much can be saved in that manner; none at least have proved its limits. When these opportunities are appreciated, fewer renewals of mining equipment and appurtenances will be required. It would appear that it is high time that the coal industry woke up to the fact that large savings can be made by the use of paint. The field is as yet barely half explored but promises abundant reward to those who fathom its possibilities.

is known to contain. Mr. Roberts recognizes this and quotes Leonard Silver as having found a gas coal having only 0.5 per cent of ash with an ash content in the vitrain of only 0.486 per cent. He instances also a coal that he himself obtained from Warsaw, with a moisture content of 7.8 per cent and volatile matter of 36.7 per cent, which had 1.2 per cent of ash but only 0.43 per cent in a bright band picked from the sample.

But to get back to the carbonization theory. Mr. Roberts has little difficulty in showing that both sub-graphitic luster and iridescence can be obtained when bright coal is heated under favorable circumstances to a temperature of 500 deg. C., that the coal fuses and loses its true cuboidal form.

He shows that when bituminous coal is heated to 500 deg. C., it loses volatile matter whereas anthracite coal does not. It seems somewhat feasible to claim with Mr. Roberts that the reason why anthracite does not evolve volatile matter at 500 deg. C. is because "it has been there before" and has already lost all the volatile matter that could be evolved at that temperature. The same conditions exist with semi-coke. It does not respond to a temperature of 500 deg. C. because it has already given out all the gas that temperature can call forth.

Similarly with the evolution of ethane, propane, etc. This is given off in quantity by bituminous coal below 600 deg. C. but neither semi-coke nor anthracite can be induced to part with any at any such temperature. It is also stated that when coal is heated between 400 and 500 deg. C. it passes through an exothermic stage, that is, without the presence of air to burn away the coal, the heat of decomposition was such as to continue the heating process. In fact Leonard Silver has suggested that if, by plication of the coal measures, one portion of a bed was raised to that temperature the action might extend throughout the field provided the surrounding strata were of such low conductivity as to prevent the heat from escaping and that the pressure of the overburden was enough to keep the evolved matter liquid and not gaseous. If gases were formed Leonard Silver surmised they would perform enough external work to lower the temperature below the exothermic point.

Mr. Roberts also calls attention to the fact that much of the substance in bituminous coal is soluble in pyridine. None of the substance in semi-coke is soluble in pyridine and none in anthracite. He is disposed therefore to believe that the coal has been raised to the temperature at which semi-coke can be made. He concludes for these reasons that the temperature of carbonization to which the coal was subjected was between 500 and 550 deg. C.



Surface Works of Old Ben No. 9 Mine

How Old Ben Corporation with Rock Dust Extinguished Seven Mine Explosions

Zone System vs. Coating System—Relative Advantages of Floor, Rib and Roof Dust—Frequencies of Application—Effectiveness of Dust Distributed by Air Current—Sampling by Vacuum Cleaner

BY J. E. JONES

Safety Engineer, Old Ben Coal Corporation,
Chicago, Ill.

NEARLY seven years have now elapsed since the Old Ben Coal Corporation, which considers safety as being as fundamental and important a requisite as production, commenced applying rock dust to its mines. In that time the dust used has suppressed seven explosions. From the experience gained a rough appraisal can be made of the relative effectiveness of the various types of rock-dust protection, of the means by which that protection may be afforded most readily and of the frequency with which dust applications must be made.

There are two general methods of rock dusting. The first may be called the zoning system, and the second, the coating system. The first implies placing rock dust in abundance at regular intervals throughout the mine, so located that it may be easily thrown into suspension in the event of an explosion. By this means the explosion flame is extinguished at the first rock-

dust zone or barrier with which it comes in contact. The second system entails maintaining the ash content of all mine dust at a percentage so great as to prevent

ignition, thus making a practically continuous rock-dust zone out of the entire mine. Each method possesses its own advantages and disadvantages, but fortunately the weak points of the one are the strong points of the other, so that a combination of the two systems affords ideal rock-dusting protection.

The Old Ben Corporation at first adopted the zoning system, chiefly because the panel system of mining afforded an excellent opportunity for zoning the underground operations, each panel forming a separate zone. In that system of

mining, main entries are driven in opposite directions from the shaft bottom; at intervals of 1,500 ft. cross entries are driven in opposite directions at right angles to the main entries. Again at intervals of 500 ft. along these cross entries, panel entries are turned in opposite directions at right angles to the cross entries. Each panel contains a maximum of 34 workers, including company men.

BARRAGES VERSUS COATING SYSTEM

AS a result of seven years experience in rock dusting, Mr. Jones is of the opinion that: The panel system of mining favors the zone system of rock dusting. The zone system of dust distribution is particularly suitable to abandoned workings which can have no other dust protection; it also affords dust for extinguishing mine fires. The coating system is less expensive than the zone system and is especially valuable when applied to roof and ribs. First two applications of dust should be less than three months apart. Three or four applications should be made during the first year and two per year thereafter. Dust should be blown into air courses at every third crosscut.

NOTE—Article read at Cincinnati convention and exposition, American Mining Congress, May 16, 1924. Article illustrated chiefly by photographs provided by W. D. Holman, mining engineer, Phelps-Dodge Corporation. They represent practice at the mines of that company.

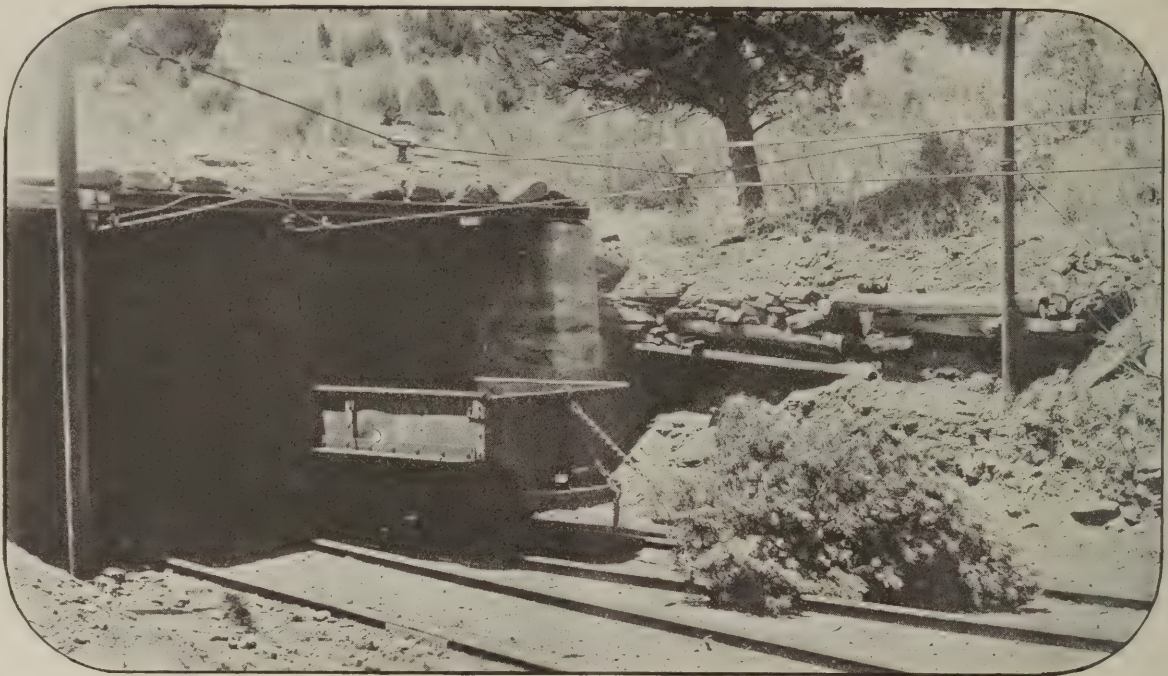


Fig. 1—"Excuse My Dust"

At the Phelps Dodge mine in New Mexico where this picture was taken the haulageway is treated with adobe dust several inches deep. Dragging the evergreen tree behind a trip stirs this dust up to float in the air current and be deposited on roof and ribs where it will be most effective

In this firm's early rock-dusting experience, a shale-dust barrier was installed at each entry intersection; later, intermediate barriers were installed in some of the mines midway between the regular barriers. The distance between panels being 500 ft., the centers of the regular dust zones or barriers had to be placed that distance apart. Each zone extends 100 ft. in each of the four directions, leaving a distance of 300 ft. between the larger barriers. When intermediate zones were installed they cut this distance in half, leaving a distance of approximately 150 ft. between zones.

Each zone consists of an Old Ben concentrated barrier installed over the haulage road, outby from each panel. The roof and ribs of the haulage road also are coated with rock dust for 100 ft. in all four directions, and dust troughs are likewise installed for 100 ft. in all four directions in the aircourses, these latter passageways not being provided with tracks. Troughs and platforms piled with rock dust also are installed at the side of the track in each zone territory wherever space permits.

The type of concentrated barrier employed is an overhead construction with a capacity of from $1\frac{1}{2}$ to 3 tons of rock dust. It is so built that should it be tripped accidentally or mischievously, no injury can result to any person who might be directly under it or approaching it on a rapidly moving trip. The wooden troughs containing the dust are supported and balanced in shallow notches, so that a slight force easily overturns them. Each trough holds approximately 60 lb. of rock dust.

The advantages of the zone system of rock-dust protection are: (1) The rock-dust barriers are favorably located, for they are placed at the intersections of passages which serve territories that are expected to remain in working condition over an indefinite period

of time. (2) They also, when placed at the entrances to old workings that are themselves inaccessible, afford effective protection to those abandoned areas. This is important as such abandoned places generally entail a greater hazard than is encountered elsewhere. (3) The abundance of rock dust installed under this system at regular intervals provides a barrier through which it would be difficult to force the flame of an explosion even though the gas content and the mine dust present were of a character that otherwise would permit of its propagation. (4) The system provides an abundance of rock dust in aircourses and other passages in which track is not laid. (5) Such a large quantity of rock dust is provided in each trough that even when moisture commences to harden it only a thin crust on the exterior is subjected to the hardening. (6) The system provides rock dust in quantity and condition suitable for the combating of mine fires.

The disadvantages inherent to rock-dust zoning are: (1) The cost of installing dust barriers is high compared to that incurred in the coating system. (2) Ignition of coal dust and propagation of explosions are not prevented within panels or between rock-dust barriers. (3) This method of mine protection is not equally well adapted to all systems of mining.

To a limited extent, the coating system of rock-dust protection was employed by the Old Ben Corporation at the beginning of its use of inert dust. This coating was applied on the haulage entries in the rock-dust zone in an effort to secure as efficient a supply of dust as was used in the aircourses. This dust was spread by hand.

Development of a successful rock-dusting machine was retarded by the many reports circulated concerning the difficulty of applying rock dust to a surface by

mechanical methods. Three devices have been tried, namely, a hand-power machine, one operated by compressed air on the principle of an aspirator and an electrically-driven, high-speed fan. The latter device has proved successful.

The machine now employed is of such capacity that 2,000 to 3,000 lin.ft. of haulage entry may be dusted per hour by two men, making a distribution of 2 lb. of rock dust per lineal foot. The fan is driven by a dust-proof motor, and the dust is automatically fed into the discharge line and directed onto the side of the entry. It thus requires two passages of the machine to complete the dusting of one entry. To double the speed of dusting would require only a machine of twice the capacity with a discharge pipe upon either side.

The success of the dust-coating system for passageways equipped with track has been established. Its usefulness depends on the low relative first cost of the equipment and the high ash content of the mine dust along the passageways where the rock dust has been applied.

A strong combined air-and-dust blast performs other duties that are important. Among these might be mentioned: (1) The coal dust in the path of the blast is forced into suspension in the air and thoroughly mixed with the rock dust. (2) Coal dust is forced out of crevices and small holes in the coal rib and from the timbers and is replaced by rock dust forced under

Table I—Samples Taken Prior to Coating Application

	Volatile Matter Per Cent	Fixed Carbon, Per Cent	Ash, Per Cent	Moisture, Per Cent	Per Cent Through 20- Mesh	Per Cent Through 48- Mesh	Per Cent Through 100- Mesh	Per Cent Through 200- Mesh
No. 1	26.8	46.2	20.3	6.7	100	92.7	84.1	75.9
No. 2	28.2	48.9	15.9	7.0	100	90.8	77.4	56.1
No. 3	28.0	46.5	17.6	7.9	100	66.1	40.0	39.7
Av. of 3 sam- ples....	27.7	47.2	17.9	7.2	100	83.2	67.2	57.2

high pressure into these small openings. (3) High places that are usually timbered always contain a large quantity of the finest of coal particles. Such places are easily accessible to the strong air-and-dust blast. (4) Where the coating method of applying stone dust is employed, the walls and roof are whitened, thus improving the illumination of the roadways.

The coating method of dust application requires that greater dependence be placed upon the analysis of the mine dust than is necessary with the zoning method. The Old Ben company has taken samples of dust before and after coating applications, obtaining in part the results set forth in Tables I, II and III. In Table I it will be noted that the ash content was higher than normal before dust was applied. This was because rock dust was carried by the ventilation current when the rock-dust zones were installed and deposited in the intermediate areas. Tables II and III show respectively the analyses of samples taken after the first coating application and an analysis of a sample of the shale dust itself.

These tabulations show that a finer mine dust is to be found after the application of the rock dust than before it has been applied. Sample 6 was taken four months after a coat of dust had been spread and its analysis shows that the ash content has decreased. Experience has demonstrated that the first two applications should be less than three months apart and that three or four applications should be given at regular

Table II—Samples Taken After First Coating Application

	Volatile Matter Per Cent	Fixed Carbon, Per Cent	Ash, Per Cent	Moisture, Per Cent	Per Cent Through 20- Mesh	Per Cent Through 48- Mesh	Per Cent Through 100- Mesh	Per Cent Through 200- Mesh
No. 4	13.1	12.6	69.4	4.9	100	97.2	93.8	88.3
No. 5	14.6	17.5	59.4	8.5	100	94.1	92.6	88.1
No. 6	16.4	34.3	43.5	5.8	100	93.8	86.1	75.1
Av. of 3 sam- ples....	14.7	21.5	57.4	6.4	100	95.0	90.8	83.8

intervals during the first year, after which probably two applications per year will be sufficient. One of these should be applied in midsummer when the moisture on the various mine surfaces will assist in causing the rock dust to adhere to roof, ribs and timbers.

In aircourses where no track is laid, the application of rock dust does not give the high degree of satisfaction afforded by the direct application of rock dust to ribs and roof. This is obvious inasmuch as the aircourse cannot be reached directly by the discharge from the rock-dusting machine and suitable tubing must be employed for this purpose. Thus dust can be introduced into these headings only at intervals, the length of which depends upon the distance between crosscuts.

The length of aircourse that can be efficiently treated by this method depends almost entirely upon the velocity of the air current and the length of time during which the dust is blown into the passage. Experiments show that with an air velocity of 680 ft. per minute, 61 per cent of the dust blown into suspension is deposited on the floor and 17 per cent on the roof and ribs in the first 100 ft. of distance from the point of dust introduction.

Again, the records obtained from blowing 4,000 lb. of dust in 50 min., into an air current traveling at a velocity of 680 ft. per minute, which speed of travel was maintained uniformly throughout 2,600 ft. of an entry 7x14 ft. in cross-section show the following results throughout this distance: At 100 ft. from the point of introduction, 14 lb. of dust were deposited per lineal foot of entry; at 600 ft. deposition had decreased to 9.3 oz. per lineal foot; at 1,200 ft. it was 3.8 oz. per lineal foot, whereas at 2,600 ft. from the point of dust introduction, 1.7 oz. was deposited per lineal foot of entry. From 600 ft. to 2,600 ft. from the source and apparently beyond this point, the deposition of rock dust on the roof and ribs was equal per square foot of area to that upon the floor.

It was apparent that even at appreciable distances from the source of dust introduction, a large quantity of dust is in suspension in the air, but the actual weight of the material deposited is small and the quantity adhering to the sides of the passage is of little value after even a comparatively short length of heading has been traversed.

Rock dust on the floor of an airway is of some value, but is not as effective as an equal quantity deposited on the roof and ribs. This is because of the following reasons: (1) It covers and is mixed with a mine dust of higher ash content than that deposited on the roof and

Table III—Sample of Old Ben Shale Dust

Volatile Matter, Per Cent	Fixed Carbon, Per Cent	Ash, Per Cent	Moisture, Per Cent	Per Cent Through 20- Mesh	Per Cent Through 48- Mesh	Per Cent Through 100- Mesh	Per Cent Through 200- Mesh
5.9	0.6	90.7	2.8	98.5	98.1	97.3	88.4

ribs. (2) When in contact with a fireclay floor, rock dust is apt to absorb moisture, so that it becomes difficult, if not impossible, to throw it into a cloud in the event of an explosion. (3) Rock dust deposited on the roof and ribs is advantageously located as it may be easily forced into suspension in the mine air. (4) Dust on the floor is subjected to more rapid deterioration and is far more liable to be covered up by falls of rock from the roof than is dust on the ribs.

In order to give an aircourse a coating of rock dust, approaching in efficiency that applied to haulageways, requires application of dust at frequent intervals. Such intervals should not exceed in length the distance between three successive crosscuts, or about 180 ft. This necessitates that small well-fitting doors be installed in every third stopping. These, however, must be large enough to permit the passage of a man. Part of the equipment carried by the rock dusters operating the machine is a board slightly larger than the doorway in these stoppings, near the bottom of which is a circular hole of the same diameter as the canvas dust tube. This tube may be slipped through this hole and the board placed over the open doorway.

In order to eliminate all guesswork, dust is blown into the aircourse at each station for a definite period of 10 min. By this means, 800 lb. of dust is supplied to each 200 lin.ft. of aircourse, the present machine handling dust at this speed. This gives an average of 4 lb. of dust per lineal foot of passage treated. After the first two or three applications, the time of dusting at each station may be reduced to five minutes.

The chief advantages of the coating system of dust application are as follows: (1) The dust application is highly efficient, especially on haulage roads. (2) The cost of applying dust in this manner is low compared to that entailed by the zoning system. (3) It is possible to protect the entire mine within reach of the haulage system by increasing the ash content of the mine dust above the limit where explosion propagation is possible. (4) Coal dust, especially that which has been deposited on timbers, lagging, etc., and which is extremely fine and low in ash is dislodged and non-explosive rock dust is deposited in its place. (5) The efficiency of this method of dust application is not dependent on or affected by any system of mining that may be used.

The disadvantages of this method of dust application include the following: (1) It is impossible to treat abandoned workings. (2) Coal dust in aircourses is not thoroughly mixed with the rock dust, and it is possible that coal dust on the roof and upper portions of the ribs are not effectively coated with the rock dust. (3) The effectiveness of the protection afforded by an entry well dusted with the coating system de-

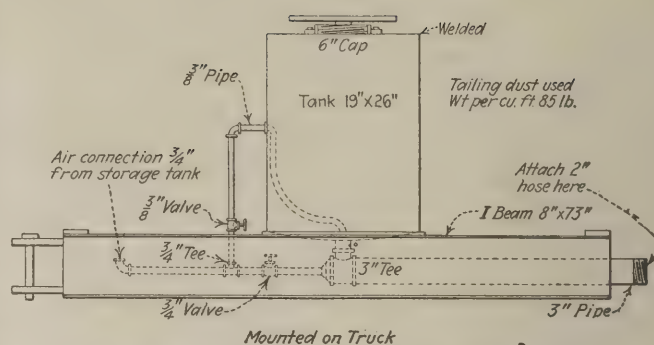


Fig. 3—A Compressed Air Dust Blower

A small compressor carried on another truck furnishes the air for the operation of this machine. A hose may be attached to the dust nozzle of this machine and the dust directed against ribs or roof anywhere within its reach.

creases more rapidly than does that of a well-installed dust zone. This arises from the passage of trips and the falling of particles from roof and ribs which displace the rock dust, as well as from the continuous deposition of coal dust. With the coating system, the ash content of the mine dust gradually decreases, so that with this method of protection, close supervision must be provided and frequent applications of dust must be made.

BEST TO COMBINE ZONING AND COATING SYSTEMS

Neither of the two systems just described can, of itself, assure complete protection against local coal-dust explosions. The greater territory protection and lower installation cost of the coating system, however, puts it in first place, and establishes it as the method to be preferred. Ideal protection can be obtained by using the zoning system as an auxiliary to the coating system. Thus a permanent barrier can be installed at the entrance to each main cross-entry section, at the entrance to each abandoned territory and at intervals of 500 ft. along aircourses. Installation of such dust barriers will be low in first cost, as troughs can be employed exclusively in all places mentioned except that a concentrated barrier should be installed at each main cross-entry entrance. In addition to affording the mine full protection against the propagation of coal-dust explosions, this method would also furnish an available rock-dust supply at regular intervals suitable for fighting fires.

As has been suggested previously the analysis of mine-dust samples in those operations employing the coating system of rock-dust distribution, is an important factor in the supervision of this work. Correct analyses depend largely upon correct sampling. The usual pan-and-brush method of dust collection is not satisfactory, because the most dangerous dust is carried away by the ventilating current.

The Old Ben company accordingly collects dust samples by air suction, using for this purpose an ordinary vacuum cleaner such as is employed in residences. From this machine, however, the handle, wheels and dust bag are removed and small bags employed to collect the samples. The motor, of course, must be suited to the electric current used in the mine. In operations not electrically equipped, a hand-operated suction device may be employed. In such mines also, some other power must be used to operate the rock-dusting machines.

The promotion of safety differs from other departments of industrial activity in that an exact knowledge of the degree of success achieved is always lacking.

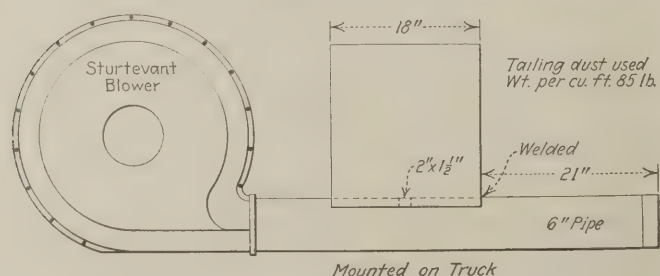


Fig. 2—Dust Blower to be Mounted on a Truck

In this device a fan driven by a motor blows a cloud of rock dust into the air current which carries it and deposits it everywhere on the mine surfaces. This machine is particularly adapted to use on haulageways and tracked headings.

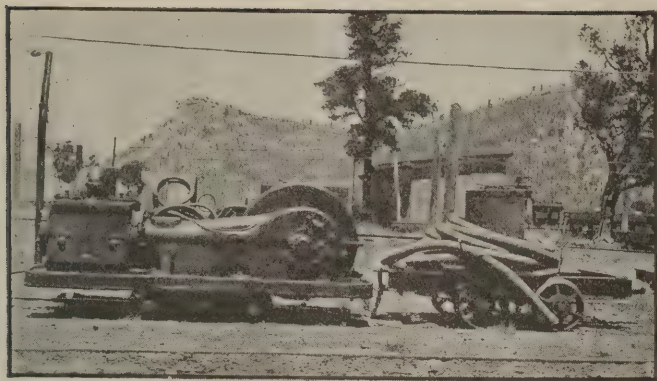


Fig. 4—Another View of Machine Shown in Fig. 3

The compressor supplying air and the hose for delivery of the dust are here plainly visible. This outfit will treat almost any surface within the mine that lies within a hose length of the track.

Other departments can, in a relatively short time, show in dollars and cents, or by some other measure, the degree of success or failure that a device or method has attained. Visualization of the progress made in safety methods and appliances depends largely upon statistics and these in turn are dependent upon such a multitude of contingencies that the information desired is often difficult to obtain. The measurement and tabulation of the results of an accident that has occurred is a simple matter, but the similar treatment of an accident that has been prevented by a safety device or method is certainly not simple and the damage such an accident would have caused had it not been prevented can in many cases not be measured in any way whatsoever.

This is in part true of the experience of the Old Ben company with rock dust. In most instances, it is impossible to determine whether an explosion would have proved disastrous had it not been for the rock-dust installation. It is always possible, however, to ascertain whether the rock dust arrested the propagation of an explosion. This much is certain, the flame of an explosion has never passed through a rock-dust barrier in the mines of this company.

OF MINE EXPLOSIONS SEVEN WERE STOPPED

Since the installation of rock dust was begun in the winter of 1917-18, nine explosions have occurred in these mines. For the purposes of the present study, these may be grouped as follows: (1) Those in which the explosion flame did not reach the nearest rock-dust barrier. (2) Those that originated within a rock-dust zone. (3) Those in which the explosion flame reached a rock-dust zone, but was not of such violence as to render it certain that the explosion would not have stopped had the dust zone not been installed. (4) Those in which the explosion flame reached a rock-dust zone and manifested such violence and heat that no question exists but that a disaster would have resulted, had it not been for the rock-dust installation.

In the first group, it is immediately obvious that the rock dust played no part in allaying the explosion. Two such explosions have occurred and in both instances the rock dust at the nearest zone was thrown into suspension.

Four explosions out of the nine can be classified under group 2; one of these was violent, knocking down I-beams, blowing out concrete stoppings and charring the flame side of the collapsed concentrated barrier as far as the flame traveled. It is probable

that this explosion would have been disastrous had it not been for the rock dust. In this instance the flame-affected territory measured 100 ft. in length. The other three explosions coming under this classification were not particularly violent, but two of them developed intense heat.

One of the nine explosions mentioned may logically be placed in group 3. The evidence visible after the explosion did not indicate much flame or violence, although the men in the vicinity were emphatic in their statements that the flame filled the entire entry until it reached the rock-dust zone, where it was extinguished instantly. The origin of this explosion was less than 100 ft. from the barrier.

In group 4, two explosions may be placed. There is no question but that disasters would have followed both of these ignitions had it not been for the rock-dust barriers. In each instance, the force of the explosion was evident for over 3,000 ft., but the flame was extinguished at the first rock-dust barrier encountered.

EXPENSE OF ROCK DUSTING NEED NOT BE GREAT

Pioneer work in rock dusting performed by the Old Ben corporation has been expensive, but it would not necessarily be so for other companies seeking rock-dust protection. The experimental stage in rock dusting has practically been passed and until some other and better means for preventing coal-dust explosions is developed, this method is established.

Application of dust by the coating method assisted by barriers at suitable intervals will render essential only one-fourth the number of troughs and one-tenth the number of concentrated barriers otherwise necessary but will require approximately the same quantity of rock dust as would be necessary if the zoning system alone were employed.

Little greater expense will be incurred in efficiently protecting a mine with rock dust applied in accordance with a well-established system than is now necessary in mines employing the imperfect and unsatisfactory method of dust watering.

Experience has shown that one of the greatest hazards to life encountered in the southern Illinois field is that arising from mine explosions. It is with a feeling of considerable satisfaction and gratification that a dependable means of safeguarding life and property against this danger has been developed. It merely requires that sufficient rock dust be properly installed before the explosion occurs. Disastrous results are thus rendered impossible.

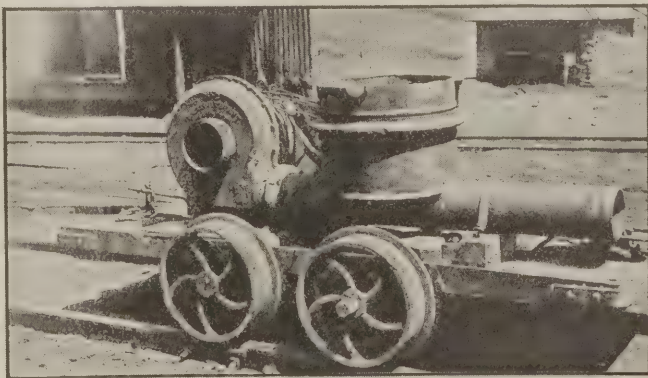


Fig. 5—The Blower Distributor of Fig. 2

This gives a good idea of the simplicity of the mechanism. This machine as well as the other here pictured is used by the Phelps Dodge Corporation in its mines in New Mexico.

How Automatic Substation Equipments Operate And What Control Features Are Supplied

Kind of Automatic Switching Apparatus Depends Upon Requirements—
Starting Impulse May Be Given by Relay, Time Clock or Push Button
—Permits Location of Station Where Best Results Can Be Obtained

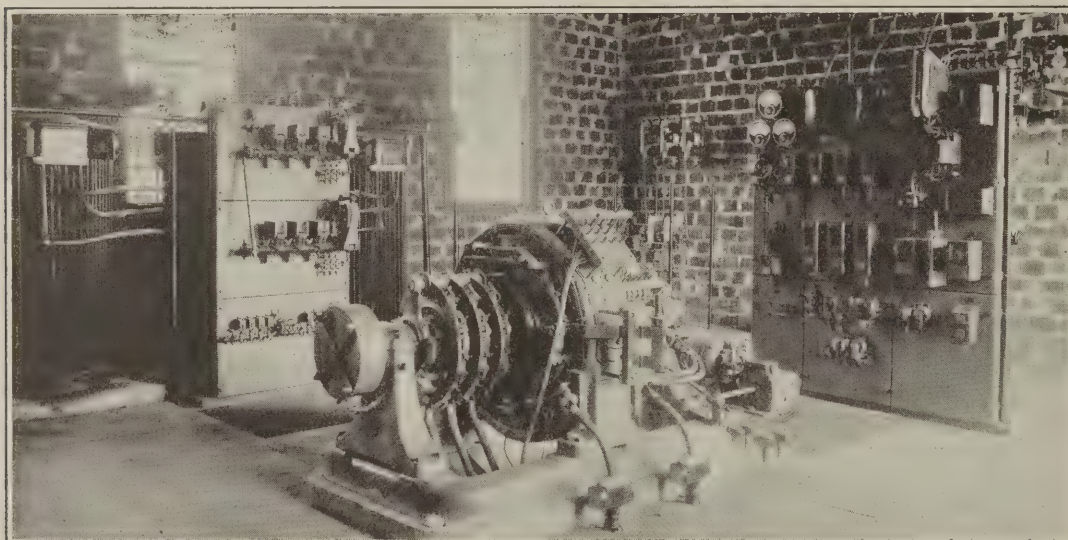
BY CHESTER LICHTENBERG
General Electric Co.

THE automatic power station is a new development in electric art. It was conceived by a central-station engineer and developed by a railway engineer. It is natural, therefore, for automatic stations to be more widely used in these branches of industry. Nevertheless, automatic substations seem equally available for the transformation and supply of electric power in other industries.

Electric power for factories, mills, mine shops and other industrial enterprises usually can be quite readily regulated by automatic devices. The kind of automatic switching equipment and its application, however,

the need to provide them with an operator has retarded their location at strategic points on the power-distributing network, or forced their location in existing attended stations remote from the point where they could do the most good. Whatever the reason may have been, the successful automatic operation of these units has extended their field of application widely.

The first automatic synchronous condenser was a 3,000-kva. unit installed by the Interstate Light & Heat Co. at Hazel Green, Wis. It was started in March, 1917, and is still in successful operation. It is located at a point on the transmission lines where regulation



Early Type Unit

This equipment is completely automatic, yet provision is made for manual operation. On the extreme end of the machine is the device for raising and lowering the brushes. It sets the brushes in position soon after the starting cycle is completed. This station is located at the Pleasant Hill Mine, of the Clearfield Bituminous Coal Corp.

depends to a large extent on the particular requirements of the industry.

Generally, some form of power-transforming equipment is utilized at all industrial plants. It may be rotating equipment such as motor-generator sets, synchronous converters or synchronous condensers, or it may be static equipment such as transformers, static condensers or mercury-tube converters. All of these have been equipped with automatic switching and control for central station, railway and mine service and can readily be adapted to other industries.

Primary generating plants using water power are particularly well-suited for automatic control, but steam-operated stations have not thus far been so controlled.

Synchronous condensers form one of the simplest classes of rotating machines to which equipment for automatic control has been applied. They also form a class of power conservers which industrial organizations seem hesitant to adopt. It may be that heretofore

had previously been quite poor. It more than paid for its cost in the first two years' operation. The latest automatic synchronous condenser is a 7,500-kva. unit being installed by the New England Power Co. at Worcester, Mass., mills of the American Steel and Wire Co. In the meantime there have been a number of installations of automatic synchronous condensers but invariably by the power companies, although in most cases the condensers have been utilized for the correction of power-factor conditions caused by the industrial enterprises using the electricity.

The automatic control of a synchronous condenser is relatively simple. The starting impulse is given by any one of several familiar devices. A voltage relay, a power-factor relay, a time clock or simple tumbler switch may be used to start the set. The synchronous condenser is usually provided with an amortisseur winding and is brought up to speed as an induction motor. A compensator or Y-delta starter may be used, either being readily adapted to automatic control. Usually during the period of acceleration, the synchronous condenser field remains disconnected from the

Note—Presented before American Institute of Electrical Engineers, Birmingham, Ala., April 10, 1924.

source of exciting current and is bridged by a field-discharge resistor. This aids in giving the required starting and pull-in torque. After its field is excited, the unit has been connected to the line and full pressure has been applied to its windings, it begins to function as a power-factor corrector. A power-factor or a voltage regulator which forms part of the automatic switching equipment adjusts the field current automatically to maintain either fixed power factor or fixed pressure within the limits of the unit.

Automatic synchronous condensers are provided with the usual automatic station protective devices. The bearings are equipped with bearing temperature relays which will cause the set to be shut down before damage results if the bearings tend to overheat. The machine armature is provided with current-operated thermal relays having a time-temperature characteristic similar to that of the condenser. These automatically shut down the machine if the armature current exceeds a safe value for a predetermined interval of time. They also permit the unit to re-start automatically after a shutdown of sufficient time duration to cool the windings. These thermal devices are of the integrating type and are self-adjusting for ambient temperatures.

A grounding protective relay is also provided which causes the set to shut down in case of any leakage to the ground in excess of 50 amperes. This device protects against insulation failures and prevents undue damage. Single-phase starting, harmful single-phase running, reverse phase, loss of field, too low line pressure, short time alternating-current overload, etc., are also prevented by the usual automatic station relays.

Synchronous motor-generator sets form the next general class of rotating electrical machines which have been successfully equipped with automatic switching. Units of 150-kw. capacity are now operating in many sections of the coal-mining districts and are typical of the smaller sizes. A 2,000-kw. set is in operation on the 666-volt direct-current electrification on the main line of the New York Central R.R. and is typical of the larger sizes applied to severe operating conditions.

These units may be started on load demand or at a pre-determined time by a clock or by a tumbler switch or its equivalent. The automatic switching equipment

proceeds to function immediately the starting impulse is given. First, it checks the line voltage to determine whether it is ample to start and run the set. Next, it checks the power supply to be sure all the phases are intact and are of the correct sequence. Then, it checks the bearings, machine windings and ambient temperatures, to be sure these will permit the machines to run if and when started.

Next, it connects the motor to the source of power, either through a compensator or directly to taps on the transformer, or through the transformers if Y-delta starting is used. Then the set starts to rotate and comes up to full speed. At synchronous speed, the automatic switching equipment again functions and connects the field circuit to the source of the exciting current. When the field current has been established, the set is transferred from the starting to the running circuits. During the accelerating period the motor field remains disconnected from the source of exciting current and is bridged by a resistor in the same manner as is the synchronous condenser during its starting cycle. This permits individual adjustment of each motor so as to obtain a complete start under practically all conditions which can be found in service.

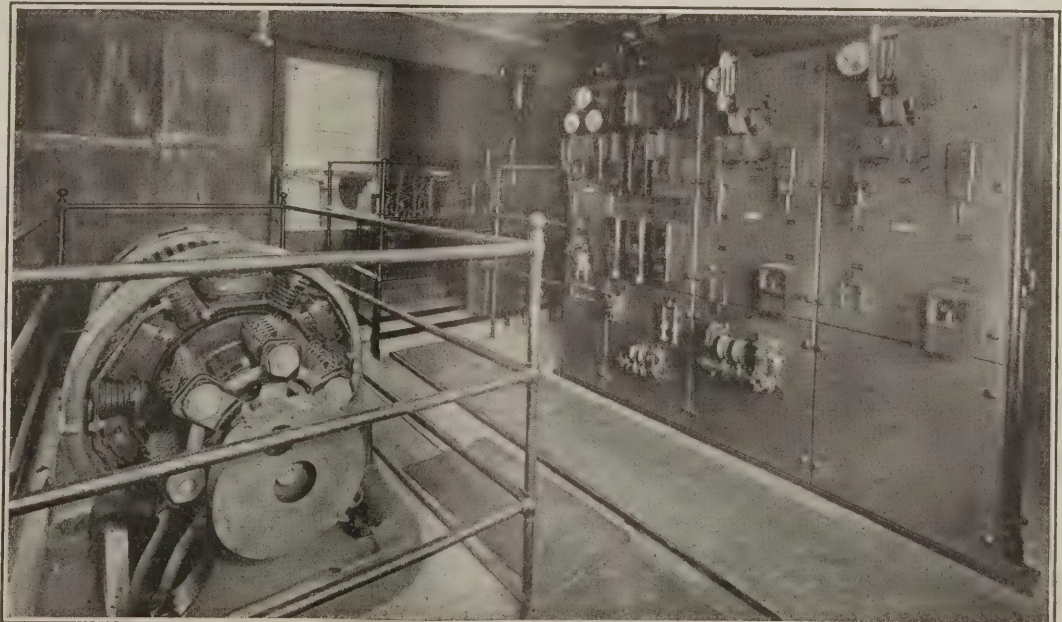
In the larger sets, a low value of field is applied while on the starting tap, and the full value after the machine is transferred to the running connections. In the smaller sets, the full value is applied in one step while the machine is running on the starting taps. The smaller sets having 250-volt or 275-volt direct-current generators are usually excited directly from the generators. Those rated for higher pressures or arranged with voltage regulators are usually supplied from an exciter either separately operated or direct-connected.

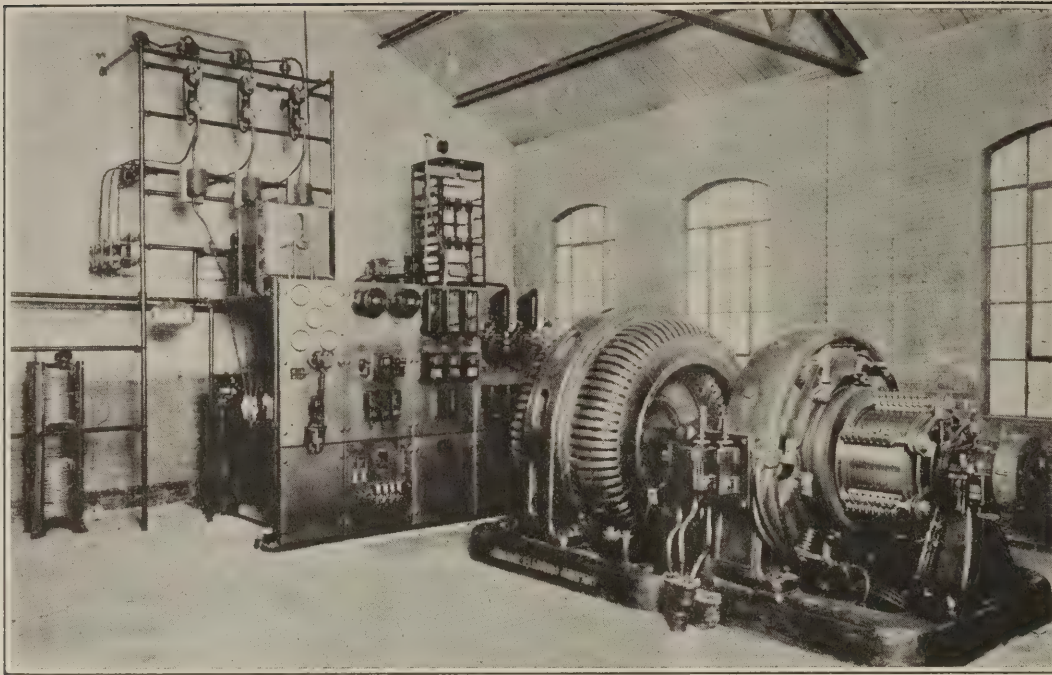
The synchronous motor has the usual automatic station protective apparatus to prevent runaway, operation without field, harmful single-phase operation, leakage to ground, short-time and long-time continued overload, bearing temperature control, etc. Some of these devices, such as the bearing temperature relays are hand reset where continued operation of the machines under any circumstances might lead to their destruction.

The number of such devices, however, is a minimum so as to insure continuity of service under all conditions, excepting where the machine might fail or other

Provides Safe Operation

The automatic control of this station recently installed at Rimerton, Pa., by the Rimerton Coal Co., makes safe operation possible. Automatic devices will be adopted in future if for no other reason than because it assures safety to men and equipment.





Automatically Operated Motor-Generator Set

This 300-kw. synchronous motor-generator set was one of the first mine units to be changed from manual to automatic operation. The stack of rheostats, shown above the switchboard, limits the load which can be applied to the machine.

serious consequences may result. Most of the other protective devices, such as the long-time delay overload relays, phase-checking relays, etc., are automatically reset and permit the equipment to resume normal operation as soon as the unusual conditions have been corrected.

The direct-current generator is provided with protection and adjustment, depending upon the service requirements. The simpler machines which may be shunt or compound-wound, are usually operated with a fixed shunt-field setting. This setting is chosen to give the desired terminal pressure, and in the case of multiple-unit sets, must be carefully adjusted to give the correct loading of the machines. Multiple-unit stations also require careful compounding of the units to permit the successful multiple operation of "hot" and "cold" machines.

The direct-current generators of large-sized motor-generator sets are frequently provided with automatic load regulation. One type is provided with a shunt-field bucking scheme. This has been successfully applied to shunt-wound generators for multiple-pressure booster service. The shunt-field current is normally furnished by the generator itself.

The current is passed through the armature of a small motor-generator set continuously rotating. This set, by suitable increase or decrease of its field current, bucks or boosts the shunt-field current of the generator, the correct amount, and gives the desired regulation. In one example, using this method of control, load swings of from 300 per cent normal to 200 per cent reversal are successfully handled.

Another modification is a compound-wound direct-current generator with the series field connected to oppose the shunt field. This type of generator is usually operated with the series field shunted by a circuit breaker which allows only a fraction of normal current to flow through the field when it is closed. Under heavy overload conditions, the circuit breaker is automatically opened and the series field carries the full line current. As soon as the overload condition ceases, the circuit breaker automatically recloses and shunts the series field.

By suitably proportioning the shunt and series fields, the direct-current generator can be made practically a constant-current machine, and service may be maintained at a reduced pressure during emergency load conditions. A number of such equipments are operating on the Edison three-wire networks of many of the large electric power corporations, and their use is being rapidly extended. Their judicious application to electrified industrial establishments would insure continuity of service under the most severe conditions short of complete and sustained interruption of the primary electric power supply.

Synchronous converters form without exception the largest single class of rotating electrical machines which have been successfully provided with automatic switching equipment. In fact, they were the first electrical machines to be so equipped, notwithstanding the fact that with a single exception they are considered the most difficult electrical machines to operate. This is principally because of the almost universal application of synchronous converters for interurban railway service where automatic stations were first widely adopted.

An automatic synchronous converter may be started by any one of the usual devices, such as a pressure relay, a time switch or their equivalent. Immediately the starting impulse has been given, the synchronous converter is connected to the starting taps on the power transformer. One-third or one-half full-voltage taps, depending on the design of the synchronous converter and transformers will usually furnish sufficient torque to start the converter armature and pull it into step. Then the converter is automatically transferred from the starting to the running taps.

During the starting operation, the shunt field is usually opened. After the machine has reached synchronous speed, its field is either flashed with the correct polarity before it is made self-exciting or is reversed until correct polarity is established.

The next step is to connect the synchronous converter to the direct-current network or feeder system and here the inherent characteristics of the converter require a different series of operations from those

provided with motor-generator sets. The direct-current terminal pressure of a synchronous converter is regulated largely by the pressure of the alternating-current supplied. By the field adjustment the direct-current terminal pressure can be regulated only over a relatively narrow range.

This field adjustment, therefore, needs to be supplemented by some arrangement for safely connecting the synchronous converter to the direct-current network, even though that network may be operating at a pressure quite different from the terminal pressure of the synchronous converter. This condition is most usually encountered in all sorts of electric haulage installations, for in all of these the changes in power demand are large compared with the feeding capacity of the supply of alternating current.

USE OF LOAD-LIMITING RESISTORS

For electric railways and commercial electric power service generally, and sometimes for industrial electric power supply, synchronous converters are equipped with load-limiting resistors. These are connected between the direct-current terminals of the synchronous converter and the direct-current network or feeder after the synchronous converter has been brought up to speed and put in operating condition, in so far as the alternating-current side is concerned. These resistors are usually shunted out in two or three steps thus gradually loading the synchronous converter with the direct-current load.

The shunting contactors or circuit breakers used for this service are usually provided with current relays having interlocks, so that the synchronous converter cannot be loaded beyond its thermal capacity. Other devices such as thermostats, located near the load-limiting resistors, permit the synchronous converter to supply current to the direct-current system within safe heating limits. The current is allowed to continue so long as the critical temperature is not reached. In many cases the reduction of the load prevents that point being attained but should the load continue heavy enough the thermostat comes into operation before the resistors and converter heat to a dangerous

degree. Should the thermostat, however, be obliged to act the converter is automatically shut down until it and the resistors cool. After the equipment has cooled sufficiently, it is again automatically started and placed in service. In some cases, where economy in design and manufacture permit Y-delta starting, the load-limiting resistors are shunted out in only one step. With this combination and with suitable transformer design, the Y-delta arrangement may be used to take the place of one step of the load-limiting resistors.

The load-limiting combination available for, and used with, synchronous converters permits their wide application to all electrified industries. It permits the use of the economical synchronous converter in many places where motor-generator sets were formerly considered most desirable. For certain few applications, they are excelled only by specially designed motor-generators with automatic load-regulating features.

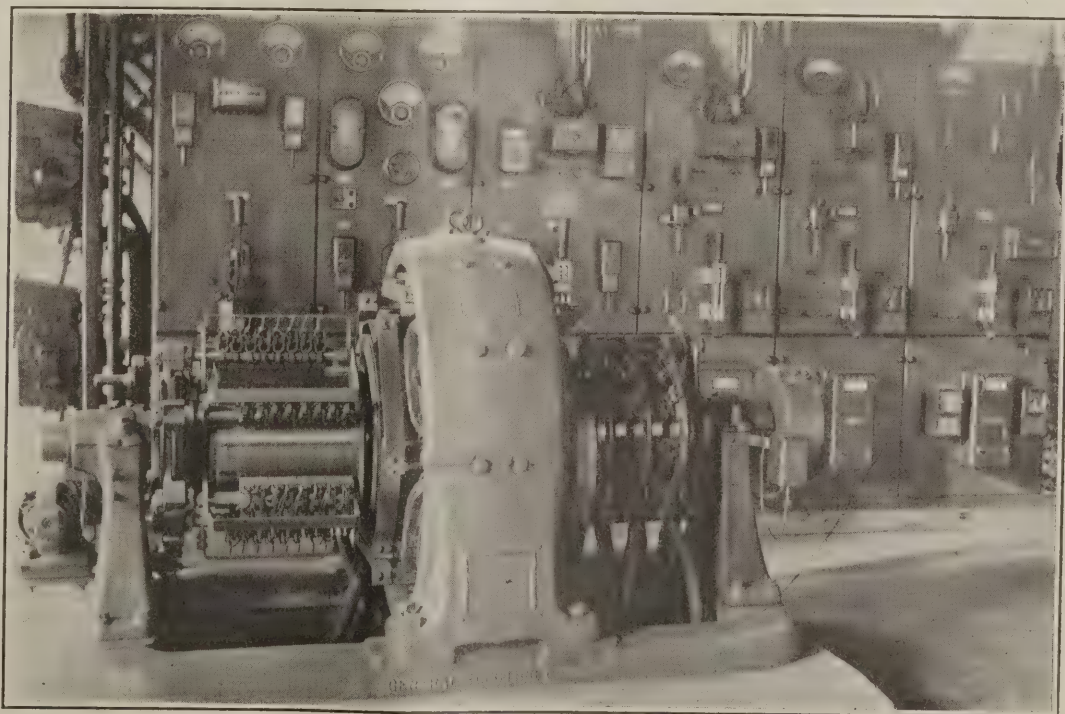
Synchronous converters for automatic operation are provided with the usual automatic-station protective features such as bearing and resistor temperature relays, short and long-time continued alternating-current overload relays, single-phase starting and harmful continued single-phase running preventive relays, low alternating-current pressure starting or operating preventive relays, overspeed switches in combination with a shunt trip circuit breaker, leakage to ground relays, etc.

Other electric power-transforming machines, such as balancers, mercury-tube converters, and static transformers have been made completely automatic and equipments thus protected are now in successful operation. Their design is usually patterned after the best manual-operation scheme, except that the time for the switching is generally reduced from minutes to a few seconds.

Feeder breakers on alternating-current and direct-current networks are now not only automatically tripped on overload, but also automatically reclosed when conditions are correct and safe. Many such protective systems are available, each being particularly designed for its individual application.

Rotary-Converter Outfit

Ordinarily automatic equipment appears to be extremely complicated. However, this station was installed and put in operation by the Black Diamond Coal Co., Drakesboro, Ky., in much shorter time than that usually required to install a manually operated station.





News Of the Industry



Republican Platform Adopted at Cleveland Has Broad Bearing on Coal Industry

Conciliatory Attitude Toward Labor Seen in Planks Reaffirming Collective Bargaining and Opposing Compulsory Arbitration—Coal Plank
Lifted from One of President's Addresses

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Cleveland, June 13.—The coal-mining industry is concerned with more than the coal plank which just has been indorsed by the Republican National Convention. The declarations in the labor plank and the labor section of the railroad plank are of greatest importance to the coal industry. Briefly these planks reaffirm collective bargaining and intimate that the function of the Railroad Labor Board should be modified, and the point is brought out unequivocally that the party "does not believe in compulsory action at any time in the settlement of labor disputes." This puts the party on record against compulsory arbitration and in doing so accepts one of the more important declarations of the Harding Coal Commission, which could not see its way clear to recommend compulsory settlement of disputes.

Platform's Labor Planks

The attitude of the platform toward labor is conciliatory. This attitude is emphasized by the favorable reference to the child labor amendment, which long has been sought by the American Federation of Labor. At first glance it appears that the party managers have attempted to placate the United Mine Workers, among others of the powerful unions, but it is doubtful whether the utterances amenable to such an interpretation will impress the miners as much as that section of the coal plank which says, "When, through industrial conflict, the supply is threatened, the President should have authority to appoint a commission to act as mediators and as a medium for voluntary arbitration." The mine workers of late have felt so strong that they have disdained mediation except in an instance or two when they felt themselves in danger of losing.

The reaction among some of the political observers in Cleveland is that the labor vote will be influenced less by the professions of the platform than by the past utterances of the candidates. Since assuming the office of President Mr. Coolidge has done nothing which has incurred the enmity of labor leaders unless it be the veto of the postal salary increase. His policy in the Boston police strike at that time

made him anathema to labor leaders.

As for General Dawes, labor is expected to look upon him as being upon the side of the employers. It is quite apparent that the Republican candidates will not be indorsed by the American Federation of Labor. It is doubtful, however, that any candidate that the Republicans might have chosen could have obtained the indorsement of that body and it has been demonstrated again and again that while the American Federation of Labor acts unitedly in such matters as wage demands, it is unable to deliver labor's votes. In a political campaign impressions are made by individual candidates upon individual workers.

The coal plank as it stands is practically lifted from one of the President's messages to Congress. It embodies the same ideas and expresses them in practically the same words. It commits the party to full publicity of the kind foreshadowed by Senator Oddie's references to the coal bill which he partly prepared but which he did not introduce.

To Probe Labor Disputes

The plank commits the party to investigations of all labor disputes by special representatives of the President and commits the party to federal control of distribution during any period of shortage of supply. The precise means of obtaining those ends are not set forth but on the whole the plank is an acceptance of the major point in the Coal Commission's report.

The platform, with its commitments in regard to the World Court, and the selection of General Dawes as Mr. Coolidge's running mate mean participation in Europe affairs. In the matter of farm relations it is apparent that the party has materially altered its policy. The party has not only underwritten the World Court but it has underwritten the Dawes reparation plan. By giving its moral support to these two endeavors, the Republican Party has entered into world affairs just as definitely as would have been the case had it indorsed the League of Nations. This seemed to be the opinion of the majority of the delegates to the convention, even though they did not like to admit it.

Coolidge's Coal Plank

The Republican presidential platform adopted by the convention at Cleveland, June 11, contains the following "plank" on coal:

"The price and a constant supply of this essential commodity are of vital interest to the public. The government has no constitutional power to regulate prices, but can bring its influence to bear by the powerful instrument afforded by full publicity.

"When through industrial conflict its supply is threatened, the President should have authority to appoint a commission to act as mediators and as a medium for voluntary arbitration. In the event of a strike, the control of distribution must be invoked to prevent profiteering."

In the selection of General Dawes the party virtually agrees to uphold his hands in the reparations agreement which he effected. This means the moral support of the party for the securities of the bank which the Dawes report proposes, which must be sold largely in the United States. The party has taken action which tends to approve the contention of Ramsay MacDonald, the British Premier, that isolation declarations on the part of the United States are "pompous folly." The Democratic Party favored rushing into the League. Four years ago the Republican Party held aloof from any definite commitments as to foreign relations. Apparently now it has adopted a middle course between these extremes.

All of this has a bearing on coal. If it stimulates rehabilitation in Europe our prosperity will be stimulated, particularly in the agricultural regions, thereby removing one of the sores on the body politic. To reduce the amount of discontent and to bring about a more stable business situation means the consumption of more coal. By increasing the ability of Europe to buy, our export trade will be increased, and that means that more coal must be consumed.

The platform again touches coal in its indorsement of immigration restriction. This means that the great stream of recruits from whom mine workers once were made will not be restored. The mines will have to bid for labor in competition with other industries. This will help to maintain the present level of wages and pave the way for increases when new levels of prosperity have been reached.

Study and Fun Mark Three-Day Outing Of Illinois Mining Institute

**Causes and Remedies of Explosions, Cleaner Coal, Radio Communication
Between Mine and Surface and Safety Training Come in for
Discussion on Mississippi River Cruise**

Special Dispatch to Coal Age

Ninety Illinois mining and machinery men spent three days cruising the Mississippi between St. Louis and Paducah, Ky., on the new stern-wheeler "Cape Girardeau" last week enjoying a real vacation full of good fellowship and discussion of mine problems. It was the eleventh annual summer outing of the Illinois Mining Institute. The boat left St. Louis the night of June 12, and returned the morning of the 15th.

A right good outing it was, too, mingling horseplay with studiousness, fair weather with a midnight Mississippi hurricane, calm moonlight drifting with a race against the "Tennessee Belle," and languorous hours on deck with a vigorous visit at the new plant of the Atlas Powder Co., 12 rough miles back from the landing at Grand Tower, Ill. Many of the men saw river sights new and entertaining to them, they all enjoyed the hospitality of Paducah, Ky., and Cape Girardeau, Mo., where they were driven about in automobiles, and they landed at St. Louis Sunday morning, June 15, with memories to cherish until next summer.

Variety of Papers Read

The program was administered in short doses in the main saloon of the boat except for one afternoon session on the forward deck. President D. D. Wilcox and Vice-President Ted Lewis presided. Causes and some remedies of explosions were treated by L. D. Tracy, superintendent of the Bureau of Mines station at Urbana, Ill. Martin Bolt, director of the Illinois Department of Mines and Minerals, proposed some methods of reducing accidents. A paper by Arthur M. Hull, appealing to operators to produce cleaner coal, was read, and S. W. Farnham, mining engineer for the Goodman Manufacturing Co., was most entertaining in his illustrated talk about primitive coal mining in India. Something new was sprung by A. B. McCall, of the Springfield (Ill.) High School faculty and consulting engineer for the Bureau of Mines. He announced that the radio club of the high school, on which he keeps a guiding hand, had established radio communication between mine and surface by vertical conduction of voice currents through the ground. This has never been done before, he said.

Harold C. Culver, of the Illinois Geological Survey, told the Institute of a general Illinois coal report soon to be issued and asked for suggestions as to material mining men thought should be in it. The discussion of the institute centered on safety mainly.

An appeal for cleaner coal was made by Arthur M. Hull, editor of the *Midwest Coal Retailer*, in a paper read by Frank M. Tirre, of St. Louis. Mr. Hull pointed out that only 20 lb. of bone in a ton is 1 per cent and that often the percentage of unnecessary ash shipped

with coal runs up to 30 and 35, all of which takes the full coal freight rate and helps to make the consumer disgusted not alone with the dealer who sells it but the operator as well. This sort of thing is responsible for part of the loss of market to oil producers. The miner ought to be convinced that had he always loaded out clean coal fewer mines would be shut down nowadays and fewer men would be jobless, the paper said.

Two heated arguments were started by Martin Bolt's discussion of accidents in Illinois—the old ones about whether the British miner is safer than the American and whether the Illinois com-



Dr. George Otis Smith

Director of the U. S. Geological Survey, who will represent the United States as a delegate to the world power conference at London, June 30-July 12.

pensation law is a help or a detriment. Both went 10 rounds to no decision as usual.

Scanning 40 years, he said in the first eleven years the ratio of deaths was 2.7 per thousand men employed and 4.1 per million tons produced. Accidents causing the loss of 30 days or more working time were 8.8 per thousand men and 17.6 per million tons. During the next decade, when machinery and electricity came in, deaths per thousand dropped from 2.7 to 2.3 and non-fatal accidents per million tons declined from 4.1 to 3.8. From 1904 to 1913, when gigantic mines were built and tonnage doubled, the fatality rates per thousand men rose to 2.9 but accidents decreased from 13 to 10.2 per thousand men and from 22.3 to 15 per million tons. Then came the compensation law period. Between 1913 and 1923 deaths decreased from 2.9 to 2.2 per thousand men and from 4.2 to 2.6 per million tons while non-fatal accidents jumped from 10.2 to 28.6 per thousand men. Exactly 62.5 per cent of all the non-fatal accidents

of the whole 40 years took place in that period.

He said 60 per cent of all Illinois accidents are due to falls of roof and coal and to mine cars and motors and that therefore attention ought to be centered on them. The industry should not accept the tremendous accident total as "just part of the business," but should regard mining as a most dangerous occupation, as in England, and hedge it about with more intense safety effort. He advocated making safety part of every miner's training, the adoption of a strict safety code and the rigid enforcement of this code, not by the employer alone but by a joint board of miners and operators.

While the ensuing arguments were rollicking gayly along some things of interest also were said. D. D. Wilcox declared greater safety and greater production go hand in hand and that he always has observed in his own company that attention to safety means more economical and intelligent operating methods. In one mine, where a manager made a special safety effort, not a single accident occurred in 30 days and production went up 20 per cent. A great deal was said by various members about how the compensation law enables crooked miners to collect from their employers for all sorts of questionable accidents; yet president Wilcox was cheered when he appealed to companies to "be fair minded toward the men and the majority will be fair minded toward the companies." He thinks there must be more underground supervision, for today it is all but impossible for a boss to see each of his 75 or 100 men more than a minute or two a day.

Would Train Miners in Safety

L. D. Tracy argued for safety training for every miner. Men who have taken it are seldom hurt. A. B. McCall suggested that safety training be required before any man gets a certificate. Frank Tirre said great safety effort can be made through such organizations as the Superintendents and Managers Association of the Fifth and Ninth Illinois districts, to which 77 men now belong and meet regularly to discuss every sort of operating problem with very personal interest. The fact that these men visit each other's properties and discuss them critically at the meetings stimulates a lot of effort at the mines out of a sense of pride. C. J. Sandoe, a general superintendent, found that accidents were reduced so much merely by requiring detailed reports of every one from mine managers that insurance rates were lowered.

No company should ever let its men get the idea that it doesn't care much if they get hurt, according to J. H. Haskins. Real interest in safety by one company he knows of permitted that company to run two years and produce two million tons of coal without a major accident.

Tom Hunter argued that accidents certainly would be reduced if shotfirers all set their own shots. One thing the whole Institute agreed upon was that where there is good feeling and mutual interest between men and companies, accidents are reduced and that there is no better way to reduce them than to develop such good feeling.

Coal Contracts Awarded for New York Institutions

The Shawnee Fuel Co., of New York City, was awarded contracts for furnishing and delivering to various New York State institutions 82,000 net tons of run of mine coal, as a result of bids opened May 27 by the State Department of Purchase at Albany. The prices ranged from \$1.45 to \$1.69 per ton f.o.b. mine. This company also obtained the contract for furnishing and delivering 2,000 net tons of slack coal to the Binghamton Hospital at \$1.99 per ton f.o.b. mine. Deliveries on all contracts are for the period between July 1, 1924, and March 31, 1925. Other contracts awarded follow:

Titan Fuel Corporation, New York City, 25,600 tons run of mine to the Central Islip Hospital and 3,600 tons to the Kings Park Hospital, Long Island, at \$1.48 per ton f.o.b. mine; George D. Harris & Co., New York City, 360 tons run of mine to Farmingdale (L. I.) Hospital and 800 tons of smokeless coal to the Willard Hospital at \$1.48 and \$1.69 per ton, respectively; E. L. Hedstrom, Buffalo, 400 net tons 14-in. lump to Fredonia Normal School at \$2.15 per ton, f.o.b. mine; Hartmann Coal Co., New York City, 28,120 net tons run of mine to various institutions, \$1.65 per ton f.o.b. mine; W. G. Morton, Albany, 3,360 tons run of mine to Matteawan State Hospital, \$1.47 per ton f.o.b. mine; George H. Foster Coal Co., Pittsburgh, Pa., 4,160 net tons nut and slack at \$1.30, and 400 net tons three-quarter lump, \$1.70 per ton f.o.b. mine; and Commercial Coal Co., New York City, to institutions in New York City, 7,200 tons run of mine, \$4.24 per ton, f.a.s. dock; 13,600 tons run of mine, \$4.29 per ton, f.a.s. dock, and 600 tons slack, \$3.96 f.a.s. dock.

For furnishing and delivering 500 gross ton broken coal, 1,650 tons egg, 4,290 tons stove, 1,545 tons chestnut, 5,900 tons pea coal, 10,000 tons No. 1 buckwheat, 20,000 tons No. 2 buckwheat

Upholds I.C.C. Ruling in Joint Mine Case

The order of the Interstate Commerce Commission regulating the distribution of cars among soft-coal mines located on two or more railroads was approved by the U. S. Supreme Court in a decision handed down June 9. The effect of this ruling is to limit the number of cars that a mine located on and served by more than one railroad may order to 100 per cent of its rated capacity. Prior to this decision a joint mine was permitted to order 150 per cent of its rated capacity.

The New River and other companies operating bituminous-coal mines in West Virginia succeeded in the lower federal courts in having annulled the order of the commission which applied to mines located on two or more railroads, a rule with regard to car distribution different from that applying to mines reached by only one road.



Ira C. Cochran

Reappointed commissioner of the American Wholesale Coal Association at its recent convention at White Sulphur Springs, W. Va.

and 10,000 tons No. 3 buckwheat to various institutions the D. L. & W. Coal Co., New York City, was awarded the contract at the May circular price, subject to an increase of 10c. per month to Oct. 1 and a decrease in April next, deliveries to be made between July 1, 1924, and June 30, 1925.

Martin F. Shea, of New York City, was awarded the contract for delivering 700 tons of egg coal, 11,590 tons stove coal, 1,590 tons chestnut, 39,900 tons No. 1 buckwheat and 200 tons of grate coal to other institutions at \$2.64 f.o.b. mine for the buckwheat, \$8.85 for stove and \$8.75 for chestnut and grate.

Lewis Suspends Autonomy of West Virginia Union

The International Executive Board of the United Mine Workers on June 14 suspended the autonomy of District No. 17, which includes practically all of West Virginia, and Percy Tetlow, of Ohio, was named head of the district by John L. Lewis, International president of the union.

Headquarters for Mr. Tetlow will be established in Charleston, W. Va., and he announced that Van A. Bittner, of Pittsburgh, International representative, would be placed in charge of the northern part of the district, with headquarters at Fairmont. The order became effective June 16.

That policies of the International union had not been applied and enforced with sufficient vigor in District No. 17 was given as the reason for the suspension. It also was explained that all of the district and subdistrict officers of the union in West Virginia appeared before the Executive Board and filed a petition asking that the International union assume charge.

Union policies hereafter will be pursued vigorously in West Virginia and "differences of opinion among the former district officials resulting in conditions menacing to the union will be eliminated," according to an announcement at union headquarters.

Operators and Engineers to Study Mine Safety

More than 200 coal-mine operators and mine safety engineers will meet in a Midwest coal-mine safety conference called by the Mining Section of the National Safety Council at St. Louis, June 25 and 26.

The tentative program is as follows: Wednesday, June 25, 10 a.m., "Prevention of Haulage Accidents," Ralph D. Brown, superintendent O'Gara Coal Co., Harrisburg, Ill.; "Mine-Rescue Work in Illinois," by a rescue-station superintendent; 2 p.m., "Ventilation and Dust Control," J. E. Jones, Old Ben Coal Corporation, Chicago; "Safe Handling of Explosives," by a powder company man. Thursday, June 26, 10 a.m., "What the Joseph A. Holmes Safety Association Is Doing for Accident Prevention"; "Getting Results from Organized Safety Work," C. L. Colburn, U. S. Bureau of Mines, Pittsburgh; 2 p.m., "Mine Gases and Their Effect on the Body," Dr. H. G. Bristow, professor of chemistry, St. Louis University; "Infections from Wounds," Frank Farrington, district president of the miners' union of Illinois, will lead the discussion of Mr. Colburn's paper.

Gilbreth, Efficiency Expert, Dies in Telephone Booth

Major Frank B. Gilbreth died suddenly from heart disease Saturday, June 14, in a telephone booth of the Lackawanna R.R. Major Gilbreth was one of the first to take an interest in motion studies in their relation to efficiency of operation. He was born in Fairfield, Me., in 1868 and was a contracting engineer in Boston from 1895 to 1904 and in New York until 1911, when he became a consulting engineer. In 1917 he was made consulting major of engineers in the U. S. Army and was on active duty at the general staff college at Washington. He organized the Taylor Society for the promotion of the science of management.

Union Demands Dismissal Of Town Officials

A bombshell was tossed into the town of Sydney Mines, one of the leading bituminous coal mining centers of eastern Canada, when Jubilee Local of the United Mine Workers demanded of the Town Council that every official of the town be dismissed. The order was signed by the president and secretary of Jubilee local, which has headquarters in Sydney Mines. It is charged that the officials of the town, from the Mayor down, favored the operators, and discriminated against the Communist leaders of the union for the eastern Canada district. Dire threats were made in the event that the order was not heeded. Some time ago the Council of New Waterford, another mining center, dismissed the entire fire department because members played cards and checkers with executives of the Dominion Coal Co.

Rock Dusting Lowers Insurance Rate

Gas and Dust Explosions Have Killed Nearly 6,000 Men—Insurance Cost Would Have Been \$14,000,000 at Present Rates—Explosion Risk May Be Lowered 85 per Cent

By G. B. BUTTERFIELD
General Manager Associated Companies,
Hartford, Conn.

Owing to the increasing frequency of explosions in coal mines during the winter of 1923 the compensation insurance carriers have made an exhaustive study of the causes of mine explosions.

They found that in the United States from 1839 to 1923 inclusive 7,907 men were killed in bituminous mine disasters. Of this number 5,722 men, or 72 per cent, lost their lives in gas and coal-dust explosions. If workmen's compensation laws had applied to all of these explosions, the compensation cost alone, at the average of \$2,500 per death, would have been \$14,305,000. This is an enormous loss measured in dollars, to say nothing of the families which were deprived of their supporting heads by these preventable explosions.

The U. S. Bureau of Mines' experiments verify the fact that if rock dust and bituminous-coal dust are mixed in such proportions as to have a mixture of about 45 per cent coal dust and 55 per cent rock dust, the coal dust will not explode. Coal mines can be rock-dusted by hand, but this is rather ineffective and expensive. The best way to rock dust a mine is with the use of mechanical equipment and in many mines home-made equipment is doing the work quite satisfactorily. A small motor mounted on a track drives a centrifugal fan, which forces the rock dust through a nozzle, and on the end of the nozzle there is a sphere filled with small holes through which the rock dust is forced with much pressure. This sphere is held in a fixed position, thus insuring the complete spraying of the roof, ribs and bottom.

Mine Dust Should Be Tested

In specifically ascertaining the time when the mine should be rock dusted again, certain areas of the dust at various places in the mine should be tested. A mine official should select an area about 8 in. in width across the roadway and take samples over this section—one from the roadway, one from the ribs and one from overhead on the roof or timbers. These samples should then be run through a ten-mesh sieve and that portion of the sample which will not go through the sieve should be rejected; the remainder is the sample which should be tested for the percentage of combustible content. A simple machine known as a volumeter has been invented and placed on the market for this purpose.

The leading coal-mine compensation insurance carriers recognize the rock dusting of bituminous-coal mines as a real safety factor in the prevention of mine explosions, and have incorporated this subject as Item 1-C in the Bituminous Standards. The specific wording of this paragraph is as follows:

"All entries, aircourses, manways, room necks and entries or approaches

(other than old room necks to old and abandoned sections, shall be rock dusted with limestone, shale or other inert dust approved by the U. S. Bureau of Mines. The application shall be of sufficient amount and of sufficient frequency to maintain on the roof, ribs, bottom, timbers and all places of lodgment sufficient inert dust so that the combustible content of the resulting mixture of rock dust with coal dust shall not exceed 45 per cent at all times. That is, the resulting mixture of rock dust with coal dust shall not exceed 45 per cent of coal dust, allowing the remaining 55 per cent to be rock dust."

Reduced Rates for Good Records

The insurance carriers have decided to allow a reduction in rate varying from 10c. to 20c. per \$100 of payroll, depending upon the past history of catastrophes in each specific state.

The compensation insurance carriers are so sincere in their belief in the good results to be obtained by rock dusting that they feel that approximately 85 per cent of the deaths in mine explosions would be averted if the mines are rockdusted.

Let our motto be "That every bituminous coal mine in the United States be rock dusted before Oct. 1 of this year."

Lewis to Probe Anthracite Outlaw Strikes

Special Dispatch to Coal Age

Scranton, Pa., June 16.—John L. Lewis, International president of the United Mine Workers, is to conduct an investigation into the series of outlaw strikes affecting collieries and coal companies in the Pittston region of the anthracite field. To this end he will send five international organizers to the field. Yesterday, following the receipt of telegrams from President Lewis, the general grievance committee of the Pennsylvania and Hillside Coal & Iron Co. strikers, numbering 11,400, who have been idle the past week, voted to return to work on Tuesday morning. Much opposition to the motion was encountered from the radical elements on the committee. It is possible that the International office investigation will get under way this week and before it is ended many of the radical powers in the local organization may be dethroned.

Horace M. Swetland, Noted Publisher, Dies

H. M. Swetland, president of the United Publishers Corporation, which publishes *Iron Age*, *Dry Goods Economist*, *Automotive Industries* and other important business publications, died at his home in Upper Montclair, N. J., June 15. He was one of the pioneers of modern industrial publishing and had been a leader in raising journalistic standards through his activities in the Associated Business Papers. At one time he was owner of *Power* and of *Engineering & Mining Journal* (as it was then called), both now owned by the McGraw-Hill Company.

Mr. Swetland was born in Chautauqua County, New York, in 1853. In 1880 he came to New York as reporter and as subscription and advertising salesman of the *Boston Journal of Commerce*. In 1884 he became Boston representative of *Power*, later coming to New York and assuming the management of that publication. In this capacity he was associated with James H. McGraw, now president of the McGraw-Hill Company, and Emerson P. Harris. The association was discontinued in 1888 when Mr. Swetland purchased *Power*, the ownership of which he retained until he sold it to the late John A. Hill in 1900.

In 1911 he organized the United Publishers Corporation, which included publications in the steel, automotive, building and textile fields. He was elected president of that corporation and retained that office to the time of his death. He also was president of the National Publishers Association, the Class Journal Company, the Federal Printing Company, the U. P. C. Realty Company and the Swetland Realty Company, and a director of the Commercial Trust Company.

Mr. Swetland's work and contribution to industrial publishing are well set forth in the following tribute paid to him by his lifelong friend and former associate, Mr. McGraw:

"Mr. Swetland's success as a man and a publisher was due to a rare combination of personal qualities and business acumen. He was a tireless worker, had great penetration, concentration and perseverance. He was an organizer of the first rank and was always a co-operator. His ideals in publishing were high, service to the readers of his publications being his first consideration. The publishing business has lost an outstanding figure in the passing of Horace M. Swetland, but his work will endure in the great institutions to which he gave unstinted devotion, and in the lives of those whom he trained in the technique of publishing and encouraged to make the best of their opportunities."

The Circuit Court, sitting at Fayetteville, W. Va., on Monday last, nolle prossed all indictments against C. Frank Keeney, Fred Mooney and William Blizzard, in connection with the armed march in Logan County in 1921. It was indicated that the efforts of the state would now be directed to the prosecution of active participants in the march.

Accidents at Coal Mines
During April Resulted
In Death of 234 Miners

Accidents at coal mines during April, 1924, caused the death of 234 men, according to the U. S. Bureau of Mines. The fatality rate for the month was 6.44 per million tons of coal produced, as compared with 7.06 for the previous month, 3.71 for April last year and 4.94 average for April during the 10 years 1914-23. The high fatality rate for April, 1924, was due to the Benwood explosion, on the 28th, which resulted in the loss of 119 lives. The rate for bituminous mines alone was 6.91 per million tons (including the Benwood disaster), as against 3.48 for April last year and 4.67 average for April for 10 years. For anthracite mines alone the rate was 4.41 per million tons, as compared with 4.96 for April, 1923, and a 10-year average rate of 6.28. Of the 234 men killed in April, 1924, 30 were killed at the anthracite mines in Pennsylvania and 204 at bituminous mines throughout the country. Underground accidents at both classes of mines numbered 220, shaft accidents 4, and surface accidents 10.

During the first four months of 1924 the records show a total of 993 lives lost, indicating a death rate of 5.06 per million tons. For the same period last year the rate was 4.08. The 4-month average rate for bituminous mines alone was 5.03 in 1924 and 3.84 in 1923; for anthracite mines alone it was 5.19 in 1924 as compared with 5.36 in 1923.

"Major disasters"—that is, disasters in which 5 or more lives were lost—

World's Highest Mine

The height of mines is not ordinarily as much of a factor as the depth. However the developers of the new Black Diamond mine of the Black Diamond Fuel Co., in the Clear Creek region of Utah, claim their mine holds the palm for height. It is 9,500 ft. above sea level, which makes it the most exalted coal mine in this country and probably in the world barring only a mine or two in the Crested Butte field of Colorado. But this is conveniently counted out because the coal mined there is not bituminous.

numbered five during the period Jan. 1 to April 30, 1924; the resulting loss of life was 384. During the corresponding months last year there were four similar disasters with a loss of 140 lives.

Comparing the causes of the fatal accidents in 1924 to the end of April with those for the same period in 1923, the records show reduced fatality rates attributable to falls of roof and coal, haulage equipment, explosives and electricity. Increased rates are shown for explosions of gas and coal dust. The following figures indicate the fatality rates per million tons for the main causes of fatal accidents at coal mines:

	Year 1923	January 1923	to April 1924
Falls of roof and coal.....	1.807	1.808	1.756
Haulage.....	.644	.649	.534
Explosions of gas or coal dust.....	.580	.770	2.082
Explosives.....	.177	.185	.142
Electricity.....	.117	.106	.082

Coal Contracts Awarded for
Navy Yards and Stations

The Navy Department awarded contracts June 10 for the supply of 221,150 tons of bituminous coal for use at navy yards and naval stations during the next fiscal year as follows:

Brinker Coal Co., Johnstown, Pa., 2,000 tons, for delivery at Iona Island, at \$5.30 per ton; 28,000 tons, for delivery at Indian Head, \$5.49.

Castner, Curran & Bullitt, Inc., New York, 5,500 tons, for delivery at Chelsea, Mass., at \$6.30 per ton.

Dexter & Carpenter, Inc., New York, 1,050 tons, delivered at Bellevue, \$4.63.

Hall Bros. & Co., Inc., Baltimore, 450 tons, for delivery at Fort Mifflin, Pa., \$4.90; 1,200 tons at Annapolis, \$6.05; 2,500 tons at Annapolis, \$4.96.

W. M. Hollerback, Philadelphia, 12,500 tons, Lakehurst, \$5.27.

W. C. Huber & Co., Philadelphia, 1,800 tons at Lake Denmark, at \$6.15.

Johnstown Coal & Coke Co., New York, 1,500 tons at Yorktown, Va., \$4.82.

Lake & Export Coal Sales Corporation, Chicago, 5,500 tons at Great Lakes, \$2.24; 34,500 tons bituminous screenings at Great Lakes, \$1.60.

Morrisdale Coal Co., Philadelphia, 30,000 tons at Philadelphia, \$4.54 under chutes and \$4.69 at wharf.

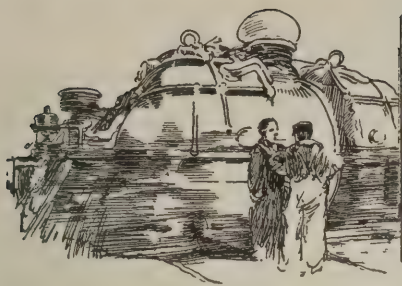
Pocahontas Fuel Co., Inc., New York, 5,500 tons at Portsmouth, \$5.03; 4,000 tons at Charleston, \$5.42.

L. A. Snead Co., Washington, 400 tons at Alexandria, \$4.95; 21,000 tons at Hampton Roads, \$5.03; 25,000 tons at Norfolk, \$5.03; 50,000 tons at Washington, \$4.90.

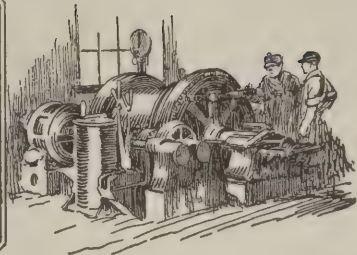
Coal-Mine Fatalities During April, 1924, by Causes and States

(Compiled by Bureau of Mines and Published by Coal Age)

State	Underground											Shaft				Surface				Total by States								
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1924	1923	
Alabama	6				1			2					9												2	2	11	8
Alaska																											0	0
Arkansas																											0	1
Colorado		2											3													3	6	
Illinois	1												1													4	18	
Indiana			1																							1	1	7
Iowa	2												2													2	1	
Kansas																											0	0
Kentucky	5	1	1	1									8													8	9	
Maryland													1													1	0	
Michigan	1												1													1	0	
Missouri																											0	2
Montana	1		1										2													2	0	
New Mexico																											0	3
North Dakota																											0	0
Ohio	3		1										4													4	9	
Oklahoma																											0	0
Pennsylvania (bituminous)	7	2	2			1				1			13	1	1			2								15	31	
South Dakota																											0	0
Tennessee			2										2													2	0	
Texas																											0	1
Utah	1												1													1	2	
Virginia	1	1	1					1					4													4	7	
Washington	2	1											3													3	1	
West Virginia	13	3	3		119								138						2				1		3	141	40	
Wyoming			1										1													1	2	
Total (bituminous)	46	10	14	1	120	1		3		1			196	1	1			2	2				4		6	204	148	
Pennsylvania (anthracite)	8	3	4	2				1					5	24		1		2	2		1			1	4	30	40	
Total, April, 1924	54	13	18	3	120	2		4		1			5220	2	1	1		4	4		1		4	1	10	234		
Total, April, 1923	84	13	38	2		17		6		2			5167	2		3	1	6	6				2	7	15		188	



Practical Pointers For Electrical And Mechanical Men



Making Electric Equipment Safe to Use

Rife with suggestions for the prevention of accidents from electrical apparatus are the practices of the Union Pacific Coal Co. contained in an article by D. C. McKeehan, chief engineer, in a recent issue of the magazine published by that company.

He states that automatic starters are being installed for all motor-driven fans as part of the electrical safety program. Experience with these starters has shown that minor interruptions in the power circuit have no effect on the mine ventilation as the fan automatically starts when the current is restored. In the day or during the night reliance may be placed on these starters. They will do their work with almost human intelligence.

For example, power interruptions for, say, an interval of five minutes which may occur perhaps at midnight when few are around will not necessarily cause the fan to stand idle and the mine to go unventilated awaiting the next morning when someone will arrive who will set it in motion. With such an automatic starter the fan will "get busy" as soon as the power is restored.

Automatic reclosing circuit breakers have been in use for several years. Originally they were intended for the protection of generators against excessive currents and short-circuits. The Union Pacific Coal Co. is using them to sectionalize parts of the mine so as to limit the power that may flow into a short-circuit or a faulty piece of apparatus, and also to withhold power from defective locomotives or mining machines and thus not delay the whole mine pending the location of the faults, which are given the best of in-



A Fan That Will Not Be Idle When Power Is Available

Automatic starters on fan drives obviate the necessity for sending a man to the fan house to restart the motor after a power failure. If the voltage is taken off the line during the night and the fan remains idle until morning, large and dangerous accumulations of gas may result and cause explosions.

trouble. Have you thought of this as one of the functions of the automatic circuit breaker available for your mine?

In the near future all underground transformers in the Union Pacific Coal Co.'s mines will be installed in fireproof vaults so constructed that in case flame issues from a burning transformer the ignited transformer oil and insulation will cause a steel door to close and cut off the current to the transformers. The threshold to these vaults will be raised so that in the event of a transformer exploding the burning oil will not flow from the room.

In many instances the Union Pacific Coal Co. is no longer reducing the voltage from 2,200 volts to 220 volts but is carrying the higher voltage direct to the larger motors. The engineers have long realized that the 2,200-volt cir-

culation and protection, are much safer than the transformers which also require a 2,200-volt supply. Of the two evils, the transformers are regarded as the greater.

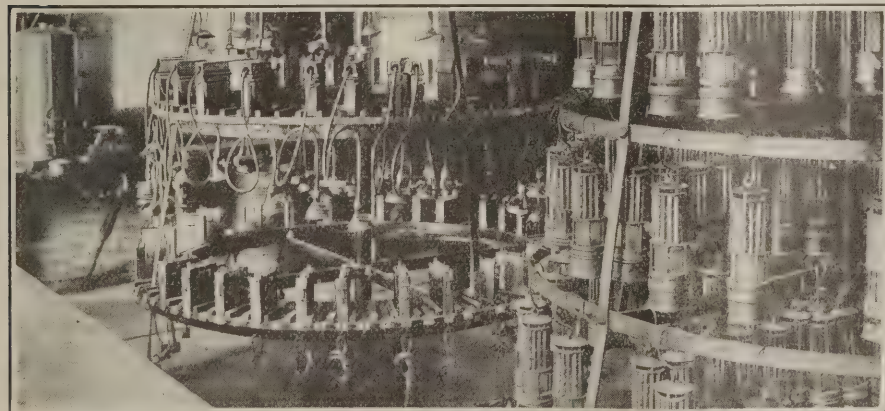
However, the use of 2,200-volt apparatus underground is not practiced without certain dangers that cannot go unheeded. First, these circuits carry high power and it is imperative that the protecting oil circuit breakers trip, that is, disconnect the lines, at times of trouble. Second, there are dangers if the metal parts containing 2,200-volt conductors are not properly grounded. This includes the motor frames, oil switches, relays, compensators, starting and controlling apparatus and all parts that may come in contact with 2,200 volts due to breakdown of the insulation.

It has been the intention of the Union Pacific Coal Co. for many years to ground all parts that high voltage may make dangerous, but as the machinery is removed to different parts of a mine or to different mines such matters are often overlooked, and it is necessary that all workmen become vigilant for their own safety as well as for that of others.

An object is protected by grounding when it is connected to the general mass of earth in such a manner as to insure at all times an immediate discharge of electrical energy without danger.

Men working on high-voltage lines short-circuit all conductors so that the switch or breaker will "kick out" in case it is accidentally closed. They, however, often neglect to ground the circuit as well as short-circuit it and this may bring about an extremely dangerous condition.

Although a 2,200-volt system may be free of ground yet there always exists a potential from either line to the



Electric Mine Lamps Reduce Fire Hazards

Nothing has contributed more than the electric safety lamp to make the work of the miner safer and easier. Sparks and smoke from the old-fashioned oil lamps were a continual source of danger. Oil-soaked clothes and timber were also responsible for serious burns and mine fires.

earth. The condition becomes dangerous if only one line is charged or one side of the circuit closed, as the voltage to ground would be dangerous to one working on either line and at the same time touching the earth.

Grounding is also resorted to in order to protect one from being subjected to a voltage to the earth that is higher than the normal voltage of the circuit.

Suppose a transformer breaks down and allows the 2,200 volts to come in contact with the 110-volt secondary. We would then have a voltage of 2,200 to earth, but, by grounding one side of the 110-volt circuit, in most cases, a voltage higher than 110 volts to earth cannot exist and the high voltage cannot manifest itself in a dangerous way.

Phasing Out a Converter

Before starting any converter for the first time if it is necessary to predetermine the direction of rotation a test of the wiring should be made to insure that the connection of the incoming line phases to the machine rotate in proper sequence. With each start by an induction-type starting motor or from the direct-current side some method for indicating synchronism between machine and line is also necessary.

The elementary principle of the method of determining when two alternating-current machines are of the same frequency and are in phase is illus-

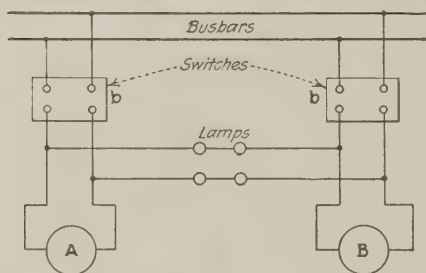


Fig. 1—Connections Used When Synchronizing Circuits

The diagram shows the wiring of the lamps when synchronizing two single-phase circuits. When the voltage of the two circuits are exactly equal and in phase the current in the lamps is zero. Under this condition there is a balance of the two opposing pressures at the terminals of the lamps.

trated by Fig. 1 in which A and B represent two single-phase machines, the leads of which are connected to the busbars by the switches C and through two series of incandescent lamps. It is evident that as the relative positions of the phases of the voltages change from that of exact coincidence to that of exact opposition, the flow of current through the lamps varies from a minimum to a maximum. If the voltages of the two machines are exactly equal and in phase the current through the lamps will be zero and, as the difference in phase increases, the lamps will light up and will increase in brilliancy until the maximum is reached when the phases are in exact opposition. From this condition they will decrease in brilliancy until completely dark, indicating that the machines are again in phase. The rate of pulsation of the brilliancy of the lamps depends upon the difference in frequency; i.e., in the speeds of the machines. In cases of

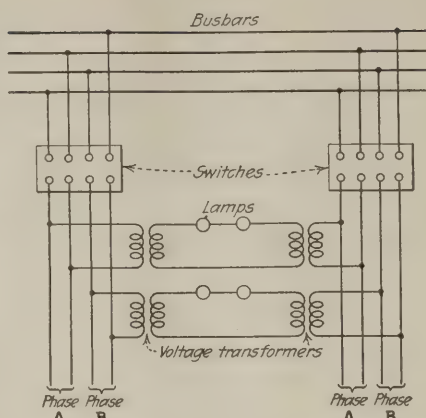


Fig. 2—Two-Phase Testing

By reversing the connections of one of the primaries or one of the secondaries of the transformers dark lamps will indicate synchronism if bright lamps had previously indicated synchronism. Smoother results are generally obtained when paralleling circuits if synchronism is indicated by the lamps when dark.

polyphase machines, if the phases are in the correct relation to each other, all the lamps, will be bright or dark at the same time. If this is not the case, the leads should be interchanged until this condition is obtained.

In order to determine whether the lamps will be bright or dark for a given connection of transformers when the machines are in phase, remove the main fuses from one machine, or disconnect the machine back of the shunt connection, and throw in the main alternating-current switches with the other machine at full voltage. Since both primaries are now connected through the switches to one machine, the lamps will be in the same condition as when the main or paralleling switches are open and both machines are in phase. If the lamps burn brightly and it is desired that they be dark for an indication of synchronism, the connections of one of the primaries or one of the secondaries of the transformers should be reversed. Dark lamps as an indication of synchronism are recommended.

The lamps should be adapted for the highest voltage which they will receive, i.e., double-normal voltage. Fig. 2 shows the connections for a two-phase machine. For three-phase machines the connections are modified to correspond. For six-phase machines the phasing can be most easily done on the high-tension side for which condition one of the above connections will apply.

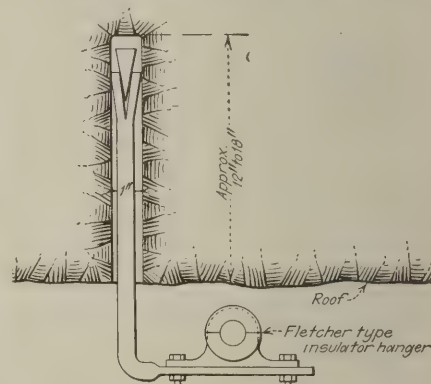
Feeder Wire Hanger for Mine Service

In some mines the proper method of suspending feeder wires and return cable presents quite a problem. The rib ordinarily is the logical place to put them and consequently there is on the market today any number of good hangers for supporting all sizes of wires and cables. However, even the best hanger has its drawbacks under certain conditions especially the types requiring lag screws. A hanger using two small lag screws is not always a permanent job because of the difficulty in getting a good bearing under the screws. Again, the hanger using one

large lag screw is not always good because of the difficulty of drilling one large short hole.

The accompanying figure presents a hanger which is a trifle more costly but has proved its worth by years of service. It cannot be purchased on the market but can be readily made by any blacksmith. It is made out of 1- or 1½-in. round iron, bent as shown in the figure, and flattened at one end to support the insulator. The other end is made like a wedge-bolt used so often around mines for foundation bolts, etc.

To install the hanger a hole only has to be drilled and with the use of a



Cable Support That Is Made Secure

The wedge-bolt fastened into the roof where a long hole can be drilled is greatly to be preferred to hangers that require only a shallow hole that easily breaks. Where such improved hangers are used greater spacing between supports is permissible.

sledge hammer the hanger is in place in a few minutes. The hanger is rigid and by being placed in the roof is in nearly all cases more permanent than the types that are fastened in the side walls of the gangway.

O. E. KENWORTHY.

Direction to Run Belt Splices

Spliced belts should be run in such a direction that the thin edge of the splice on the inside of the belt will be the first part of the splice to run over the pulley. See the illustration, Fig. 1.

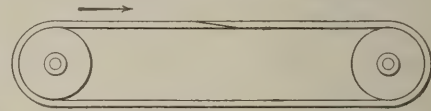


Fig. 1—How Spliced Belt Should Run

Note that the thin edge on the inside surface of the splice runs over the pulley first.

This is the rule in most favored use; however, there is considerable difference of opinion on this matter. Frequently disagreement with the above rule is founded on the action of the air or of the pulley surface turning back the lap and thus causing the splice to break down. The splice in a rubber belt should be run in the same direction as the splice in a single leather belt.

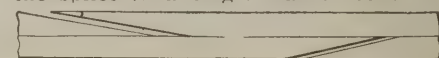
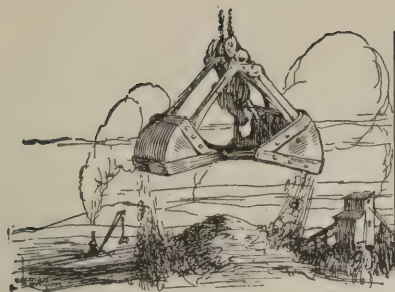
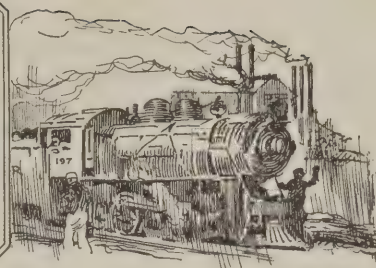


Fig. 2—Double Leather Belt

Here the recommendations are that the thin edge of the laps on both the outside and inside surface should point away from the direction the belt travels.



Production And the Market



Bituminous-Coal Market Continues to "Mark Time" As Moribund Industrial State Persists

The feeling is quite general that unless there are false bottoms in the storage bins of the holders of big reserves, stocks are approaching the danger point in some centers, which means, of course, that a number of consumers who have been strangers to the coal market are nearly due to resume the placing of orders for fuel. In some sections, such as the New England district, where the depression in the textile industry is particularly marked, the reserve piles are still large, and consequently little activity can be expected for some time. Reports of bad business are quite general, however, the reduction in coal movement being strikingly reflected in the reports of earnings by the railroads. The formality of nominating President Coolidge and adopting a platform by the Republican convention at Cleveland last week removed another excuse for hesitancy in business, and next week will see the Democratic convention out of the way. Meanwhile the coal trade continues to mark time.

More Government Contracts Awarded

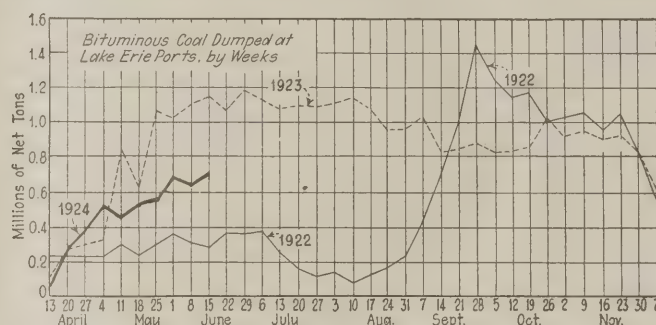
The Navy Department awarded another batch of contracts last week for supplying bituminous coal to navy yards and naval stations during the next fiscal year, beginning July 1. The awards totaled 221,150 tons, being the second lot of contracts let on the basis of proposals opened May 21. The State Department of Purchase of New York also has placed contracts for supplying the coal needs of various state institutions.

Coal Age Index of spot prices of bituminous coal reacted 4 points during the week, standing at 166 on June 16, the corresponding price being \$2.01. This compares with \$2.06 on June 9.

Activity at Hampton Roads continued its downward trend, dumpings of coal for all accounts during the week ended June 12 totaling 265,222 net tons, as com-

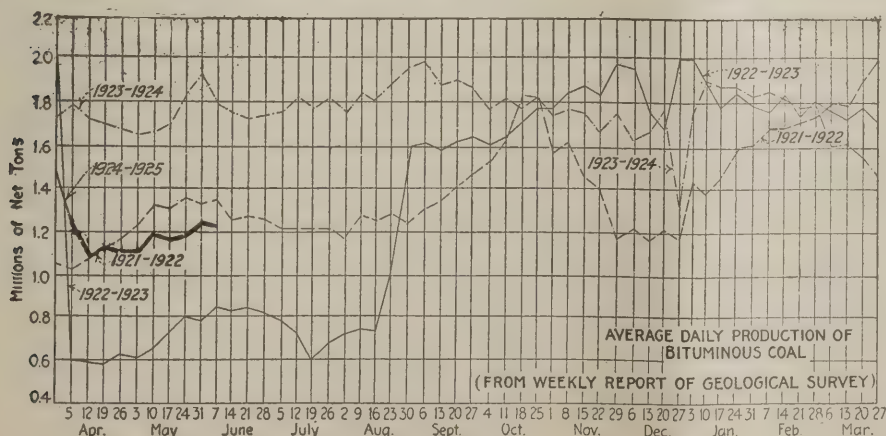
pared with 318,918 tons during the preceding week. Coal dumped at Lake Erie ports during the week ended June 14, according to the Ore & Coal Exchange, was as follows: Cargo, 645,978 net tons; fuel, 39,184 tons. The respective totals during the preceding week were 619,115 tons of cargo coal and 37,198 tons of fuel coal.

There was a slight rebound in the production of bituminous coal following the holiday, the output during the week ended June 7, according to the Geological



Survey, amounting to 7,378,000 net tons, which was 670,000 tons more than was produced during the week ended May 31.

Demand for anthracite continues on its well-oiled path downward since the reaction of a few weeks ago. The slackening of business is in evidence in both steam and domestic sizes. Aided and abetted by local outlaw strikes at a number of the mines of some of the large companies, there has been a corresponding shrinkage in production, which likewise has had a tendency to hold independent prices on an even keel. Ten thousand miners on strike in the Pittston district were joined last Saturday by 700 more from the Underwood colliery of the Pennsylvania Coal Co.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
May 24	11,049,000	7,163,000
May 31 (a)	10,091,000	6,708,000
June 7 (b)	10,676,000	7,378,000
Daily average	1,780,000	1,230,000
Cal. yr. to date (c)	239,358,000	204,496,000
Daily av. to date	1,773,000	1,516,000

ANTHRACITE

May 24	1,956,000	1,850,000
May 31	1,606,000	1,294,000
June 7	2,046,000	1,846,000
Cal. yr. to date	45,192,000	40,061,000

COKE

May 31 (a)	395,000	135,000
June 7 (b)	405,000	151,000
Cal. yr. to date (c)	8,799,000	5,698,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Little Change in Midwest

The Midwest market droned along during the week without enough change in any particular to have a marked effect. Some sales managers for Illinois producers thought they detected a slight improvement in storage domestic coal such as was hoped for June 1 but which did not materialize then. The domestic market is so flat that a difference of 100 cars a week from the State of Illinois is enough to be noticed. Steam coal was in no demand in spite of the small supply and the prices of last week were hard to maintain against the softening tendency. However, no price changes worthy of note were made, except 15c. off on Indiana screenings and offers of contract southern Illinois screenings at \$1.75 instead of \$1.85, which is the spot market bottom.

The smokeless market edged upward very slightly on prepared sizes, which dealers are beginning to store in small volume. Mine run continues rather soft at \$2. The June 10c. increase in anthracite is pushing a few dealers to buy at once.

Illinois fields appear to be at as low a point as they ever have touched except during a general strike. Few mines among the scattering ones that are running are getting

more than two days a week. A little railroad coal is about all that is moving. The Standard field is suffering along on practically nothing and yet screenings, which have been bringing \$1.60, have been cut down to a flat \$1.50 with not many takers.

There is nothing doing in St. Louis except a little public-school and apartment-house trade. Dealers are not storing anything either in the city or in the country towns nearby, claiming they do not know yet whether their customers are going to lean toward a cheap fuel or high-priced stuff during the coming season. Country steam demand, which had been fair, is no longer felt.

Kentucky Feels Better

Although no Kentucky coal man is cheering about anything, most of the trade feels a little better about the June outlook. A slight pick-up has been felt in industrial demand. Many buyers are beginning to see the bottoms of their respective storage piles and realize that prices can hardly get lower than they are right now. Many Hazard and Elkhorn mines are getting reasonably busy on steel, byproduct, utility and industrial orders as well as on railroad business, which is just beginning to develop. Retailers, however, are not stocking.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	June 18 1923	June 2 1924	June 9 1924	June 16 1924†	Midwest		Market Quoted	June 18 1923	June 2 1924	June 9 1924	June 16 1924†
Smokeless lump.....	Columbus.....		\$6.25	\$3.50	\$3.50	\$3.50@ \$3.85	Franklin, Ill. lump.....	Chicago.....	\$4.05	\$2.85	\$2.85	<i>\$2.50@ \$3.00</i>	
Smokeless mine run.....	Columbus.....		3.90	2.30	2.30	2.20@ 2.45	Franklin, Ill. mine run.....	Chicago.....	3.10	2.35	2.35	2.25@ 2.50	
Smokeless screenings.....	Columbus.....		3.60	1.85	1.85	1.00@ 1.50	Franklin, Ill. screenings.....	Chicago.....	1.80	2.00	2.00	1.85@ 2.00	
Smokeless lump.....	Chicago.....		6.10	3.35	3.35	3.50@ 3.75	Central, Ill. lump.....	Chicago.....	2.60	2.35	2.35	2.25@ 2.50	
Smokeless mine run.....	Chicago.....		3.85	2.00	2.00	2.00	Central, Ill. mine run.....	Chicago.....	2.10	2.10	2.10	2.00@ 2.25	
Smokeless lump.....	Cincinnati.....		6.35	3.60	3.60	3.75	Central, Ill. screenings.....	Chicago.....	1.60	1.60	1.60	1.50@ 1.75	
Smokeless mine run.....	Cincinnati.....		4.25	2.10	2.10	1.75@ 2.00	Ind. 4th Vein lump.....	Chicago.....	3.35	2.85	2.85	2.50@ 3.00	
Smokeless screenings.....	Cincinnati.....		4.10	1.60	1.50	1.40@ 1.65	Ind. 4th Vein mine run.....	Chicago.....	2.60	2.35	2.35	2.25@ 2.50	
*Smokeless mine run.....	Boston.....		5.85	4.40	4.40	4.25@ 4.40	Ind. 4th Vein screenings.....	Chicago.....	1.80	1.95	1.95	1.75@ 1.90	
Clearfield mine run.....	Boston.....		2.35	2.00	2.00	1.65@ 2.35	Ind. 5th Vein lump.....	Chicago.....	2.85	2.35	2.35	2.25@ 2.50	
Cambria mine run.....	Boston.....		3.00	2.50	2.35	2.15@ 2.75	Ind. 5th Vein mine run.....	Chicago.....	2.10	2.10	2.10	2.00@ 2.25	
Somerset mine run.....	Boston.....		2.75	2.20	2.15	1.85@ 2.50	Ind. 5th Vein screenings.....	Chicago.....	1.55	1.60	1.60	1.50@ 1.75	
Pool 1 (Navy Standard).....	New York.....		3.75	2.75	2.65	2.50@ 2.90	Mt. Olive lump.....	St. Louis.....		2.85	2.85	2.75@ 3.00	
Pool 1 (Navy Standard).....	Philadelphia.....		3.65	3.00	3.00	2.75@ 3.25	Mt. Olive mine run.....	St. Louis.....		2.50	2.50	2.50	
Pool 1 (Navy Standard).....	Baltimore.....						Mt. Olive screenings.....	St. Louis.....		2.00	2.00	2.00	
Pool 9 (Super. Low Vol.).....	New York.....		2.75	2.20	2.20	2.00@ 2.40	Standard lump.....	St. Louis.....	2.35	2.15	2.15	2.00@ 2.35	
Pool 9 (Super. Low Vol.).....	Philadelphia.....		2.75	2.20	2.20	2.00@ 2.45	Standard mine run.....	St. Louis.....	1.80	1.80	1.80	1.75@ 1.85	
Pool 9 (Super. Low Vol.).....	Baltimore.....		2.80	1.85	1.85	1.80@ 1.90	Standard screenings.....	St. Louis.....	1.50	1.60	1.60	1.50	
Pool 10 (H.Gr. Low Vol.).....	New York.....		2.35	1.85	1.85	1.75@ 2.00	West Ky. lump.....	Louisville.....	2.25	2.00	2.00	1.90@ 2.25	
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....		2.20	1.85	1.85	1.70@ 2.00	West Ky. mine run.....	Louisville.....	1.75	1.55	1.55	1.40@ 1.65	
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....		2.45	1.70	1.65	1.60@ 1.70	West Ky. screenings.....	Louisville.....	1.35	1.55	1.55	1.40@ 1.60	
Pool 11 (Low Vol.).....	New York.....		2.00	1.65	1.60	1.50@ 1.75	West Ky. lump.....	Chicago.....	2.35	1.85	1.85	1.90@ 2.10	
Pool 11 (Low Vol.).....	Philadelphia.....		1.90	1.50	1.50	1.30@ 1.70	West Ky. mine run.....	Chicago.....	1.45	1.60	1.60	1.40@ 1.60	
Pool 11 (Low Vol.).....	Baltimore.....		2.25	1.55	1.55	1.50@ 1.60							
High-Volatile, Eastern							South and Southwest						
Pool 54-64 (Gas and St.)...	New York.....		1.80	1.50	1.50	1.40@ 1.65	Big Seam lump.....	Birmingham..	3.05	2.80	3.00	2.90@ 3.10	
Pool 54-64 (Gas and St.)...	Philadelphia.....		1.80	1.55	1.55	1.45@ 1.70	Big Seam mine run.....	Birmingham..	2.05	1.85	1.85	1.75@ 2.00	
Pool 54-64 (Gas and St.)...	Baltimore.....		1.75	1.50	1.50	1.40@ 1.65	Big Seam (washed).....	Birmingham..	2.35	2.00	2.00	1.75@ 2.25	
Pittsburgh se'd gas.....	Pittsburgh.....		2.80	2.40	2.40	2.30@ 2.50	S. E. Ky. lump.....	Chicago.....	3.25	2.10	2.10	2.00@ 2.25	
Pittsburgh gas mine run.....	Pittsburgh.....			2.10	2.10	2.00@ 2.25	S. E. Ky. mine run.....	Chicago.....	2.35	1.60	1.60	1.25@ 1.75	
Pittsburgh mine run (St.).....	Pittsburgh.....		2.05	1.85	1.85	1.75@ 2.00	S. E. Ky. lump.....	Louisville.....	3.50	2.10	2.10	2.00@ 2.25	
Pittsburgh slack (Gas).....	Pittsburgh.....		1.50	1.35	1.35	1.30@ 1.40	S. E. Ky. mine run.....	Louisville.....	2.10	1.50	1.50	1.35@ 1.75	
Kanawha lump.....	Columbus.....		2.80			+	S. E. Ky. screenings.....	Louisville.....	1.35	.95	.95	.90@ 1.25	
Kanawha mine run.....	Columbus.....		2.05			+	S. E. Ky. lump.....	Cincinnati.....	3.60	2.50	2.35	2.00@ 2.50	
Kanawha screenings.....	Columbus.....		1.45			+	S. E. Ky. mine run.....	Cincinnati.....	1.75	1.50	1.45	1.25@ 1.75	
W. Va. lump.....	Cincinnati.....		3.60	2.25	2.10	2.00@ 2.50	S. E. Ky. screenings.....	Cincinnati.....	1.35	1.00	.90	.75@ 1.00	
W. Va. gas mine run.....	Cincinnati.....		1.75	1.45	1.35	1.25@ 1.50	Kansas lump.....	Kansas City..	4.00	4.50	4.50	4.50	
W. Va. steam mine run.....	Cincinnati.....		1.75	1.45	1.35	1.25@ 1.50	Kansas mine run.....	Kansas City..	3.25	3.50	3.50	3.50	
W. Va. screenings.....	Cincinnati.....		1.25	.90	.85	.75@ 1.00	Kansas screenings.....	Kansas City..	2.60	2.50	2.50	2.50	
Hocking lump.....	Columbus.....		2.75	2.40	2.40	2.25@ 2.65							
Hocking mine run.....	Columbus.....		1.90	1.70	1.70	1.60@ 1.85							
Hocking screenings.....	Columbus.....		1.20	1.40	1.40	1.30@ 1.45							
Pitts. No. 8 lump.....	Cleveland.....		2.75	2.40	2.45	2.00@ 2.85							
Pitts. No. 8 mine run.....	Cleveland.....		1.90	1.85	1.85	1.85@ 1.90							
Pitts. No. 8 screenings.....	Cleveland.....		1.20	1.15	1.20	1.10@ 1.25							
							* Gross tons, f.o.b. vessel, Hampton Roads.						
							† Advances over previous week shown in heavy type , declines in <i>italics</i> .						
							‡ On strike.						

* Gross tons, f.o.b. vessel, Hampton Roads.

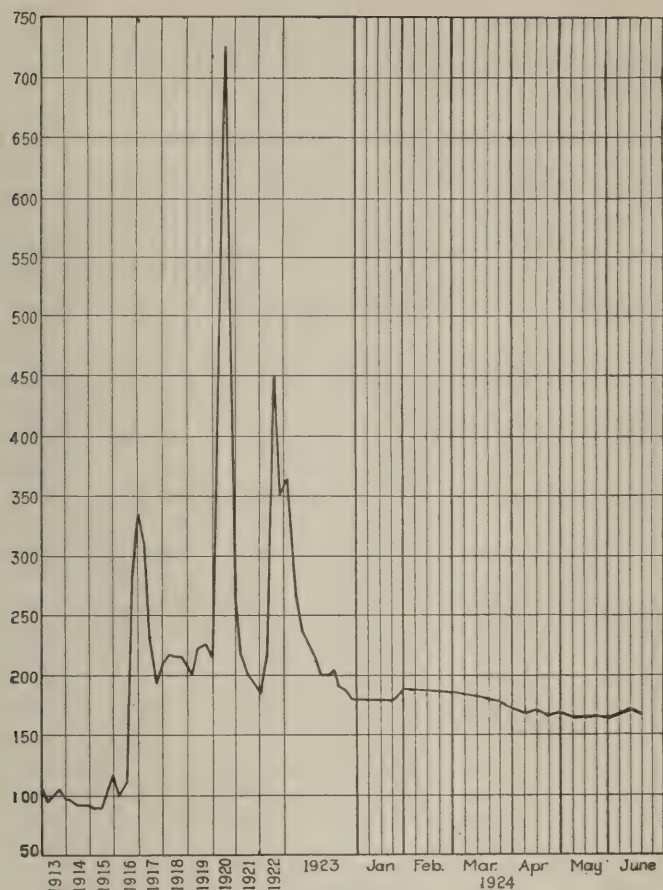
† Advances over previous week shown in heavy type, declines in italics.

‡ On strike.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	June 18, 1923		June 9, 1924		June 16, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York.....		\$2.34		\$7.75@ \$8.35		\$8.00@ \$8.85		\$8.00@ \$8.85
Broken.....	Philadelphia.....		2.39		7.00@ 8.10		8.70@ 8.85		8.70@ 8.85
Egg.....	New York.....		2.34	\$8.50@ \$11.50	8.00@ 8.35	\$8.75@ \$9.25	8.45@ 8.85	\$8.75@ \$9.25	8.45@ 8.85
Egg.....	Philadelphia.....		2.39	9.25@ 10.50	8.10@ 8.35	8.80@ 9.60	8.80@ 8.85	8.80@ 9.60	8.80@ 8.85
Egg.....	Chicago.....		5.06	7.60@ 10.25	7.25@ 7.45	7.86@ 7.90	7.83@ 7.90	7.86@ 8.00	7.83@ 7.90
Stove.....	New York.....		2.34	8.50@ 11.50	8.00@ 8.35	9.00@ 9.50	8.45@ 9.10	9.00@ 9.25	8.45@ 9.10
Stove.....	Philadelphia.....		2.39	9.25@ 10.00	8.15@ 8.35	9.15@ 9.80	8.85@ 9.00	9.15@ 9.80	8.85@ 9.00
Stove.....	Chicago.....		5.06	7.60@ 10.25	7.25@ 7.45	8.17@ 8.30	8.13@ 8.23	8.17@ 8.30	8.13@ 8.23
Chestnut.....	New York.....		2.34	8.50@ 11.00	8.00@ 8.35	8.75@ 9.25	8.45@ 8.95	8.75@ 9.25	8.45@ 8.95
Chestnut.....	Philadelphia.....		2.39	9.25@ 10.50	8.15@ 8.35	8.85@ 9.70	8.80@ 8.85	8.85@ 9.70	8.80@ 8.85
Chestnut.....	Chicago.....		5.06	7.60@ 10.25	7.25@ 7.45	8.00@ 8.13	8.08@ 8.13	8.00@ 8.13	8.08@ 8.13
Range.....	New York.....		2.34		8.30		8.70		8.70
Pea.....	New York.....		2.22	7.25@ 8.00	6.00@ 6.30	5.00@ 5.50	5.50@ 6.00	5.00@ 5.50	5.50@ 6.00
Pea.....	Philadelphia.....		2.14	7.00@ 7.25	6.15@ 6.20	5.75@ 6.25	5.75@ 6.00	5.75@ 6.25	5.75@ 6.00
Pea.....	Chicago.....		4.79	6.25@ 7.25	5.50@ 5.65	5.13@ 5.45	5.36@ 5.91	5.13@ 5.45	5.36@ 5.91
Buckwheat No. 1.....	New York.....		2.22	2.75@ 3.50	3.50@ 4.15	2.15@ 2.75	3.00@ 3.15	2.15@ 3.00	3.00@ 3.15
Buckwheat No. 1.....	Philadelphia.....		2.14	2.75@ 3.50	3.50	2.50@ 3.00	3.00	2.50@ 3.00	3.00
Rice.....	New York.....		2.22	2.00@ 2.50	2.50	1.75@ 2.25	2.25	1.75@ 2.25	2.25
Rice.....	Philadelphia.....		2.14	1.75@ 2.50	2.50	2.00@ 2.25	2.25	2.00@ 2.25	2.25
Barley.....	New York.....		2.22	1.25@ 1.50	1.50	1.25@ 1.50	1.50	1.25@ 1.50	1.50
Barley.....	Philadelphia.....		2.14	1.15@ 1.50	1.50	1.50	1.50	1.50	1.50
Birdseye.....	New York.....		2.22		1.60	1.50	1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924		1923	
	June 16	June 9	June 2	June 18
Index	166	170	169	210
Weighted average price.....	\$2.01	\$2.06	\$2.04	\$2.54

This diagram shows the relative, not the actual prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

The few mines of western Kentucky not affected by the strike find the going pretty hard in view of the union scale most of them are paying, but the volume produced in that end of the state is so much curtailed that the situation is easier for them. Thus far there is no indication of a break in the strike.

In eastern Kentucky the peak price appears to be around \$2.75 for best 4-in. block coal, and in western Kentucky the peak price is around \$2.50 for 6-in. block. Mine run generally is selling at around \$1.35 and up in eastern Kentucky, and from \$1.40 up in western Kentucky, the latter field getting as much for screenings as mine run. In eastern Kentucky screenings start at around 90c. and go to about \$1.25. Egg and nut sizes are in better demand in both fields of the state.

There is a gradual improvement in West Virginia, more noticeable perhaps in the southern than in the northern part of the state. Production in the high-volatile fields is larger, chiefly as a result of additional spot orders, though prices are not advancing. A considerable tonnage is moving to the lakes—not as much as usual perhaps but enough to swell production a little. Output in the Upper Potomac and adjoining regions also has taken a slight spurt.

Northwest Is More Hopeful

A steadying of prices and a slightly better movement to the docks are the only characteristics of the market at the Head-of-the-Lakes. Selling in bituminous is at a standstill, and the only revival in anthracite is a few cars that are going toward the Twin Cities since the slight reduction in rate made by the Interstate Commerce Commission.

Twenty-six boats were unloaded at the Duluth-Superior

docks last week, of which three were hard coal. Receipts for May were as follows: Anthracite, 80,240 tons; bituminous, 591,511 tons, bringing the total for the season to 164,632 for anthracite and 851,529 for bituminous. Anthracite receipts are 41,084 tons and bituminous receipts 796,099 tons less than last year.

A consensus of opinion now is that the changes which the I.C.C. has made in bituminous rates will have no effect at Duluth, as they are too slight to help the market. Anthracite, however, will be strengthened.

At Milwaukee there seems to be a hopeful feeling in coal circles, in spite of the fact that trade is very quiet at present. Conditions in the manufacturing districts must mend, however, before there can be any substantial improvement. The movement of coal by lake is slowing up, and cargo receipts totaling 157,306 tons of anthracite and 357,599 tons of soft coal are subnormal. Last year's totals up to this time were 207,619 and 706,199 tons respectively.

At the Twin Cities active buying is universally dull for the season. The unseasonable weather has had a depressing effect, and the general spirit of hesitation makes steam buyers hold off more than usual. The dock trade anticipates a better business next autumn as a result of the rate decision, and probably will stock somewhat heavier.

Production Gains Steadily in Southwest

There is no heavy activity in the Southwestern district, but a steady increase in production since mines began to reopen following the wage agreement. Production has just about kept pace with demand, so there is little or no price cutting. A little coal is being stored.

Kansas coal quotations have not changed. Arkansas semi-anthracite is \$5.50@\$6 for lump, with the possibility of an increase next month; \$3.50 for mine run, and screenings are steady at \$2. Henryetta (Okla.) lump is \$5.50; nut, \$3.75; mine run, \$3.50, and screenings, \$2.50.

Very little change was noted in the Colorado coal market during the week. Industries are buying very little and dealers absolutely refuse to place any storage orders yet. Mines worked an average of 23 hours last week and nearly 35 per cent of the working time lost was on account "no market." A slight price advance is anticipated for July 1.

In Utah trade is about dead. Industrial demand is light and dealers are refusing to store a ton, saying that their experience last summer of storing during the hot months only to see the price drop in the autumn is something they can't stand again. There is no contracting worthy of note. However prices are low and have not sunk further.

Cincinnati Market Featureless

Once again the market at Cincinnati is marking time. It is devoid of either discouraging features or the reverse. There has been a bit of a letdown in the Kentucky fields, which has kept the market from clogging to the extent that it could be in any wise called in distress. Lake buyers are still fiddling for position, holding off with a persistence that shows that this movement is in concert. However, egg and 2-in. high-volatile coals command \$1.75@\$2, which shows the determination of the operators to hold to their stand also. Smokeless jogs along at its recent gait. Orders for lump and egg have been a little slow during the week and bituminous also has slowed up. Slack is weaker because of the strength of prepared, which has caused a larger output of it.

While domestic trade at Columbus is showing a slight improvement, steam business is at a standstill. Little activity is reported in any section and both producers and distributors are playing a waiting game. One of the best features is the amount of school coal that is moving. Utilities are buying to a certain extent and railroad requirements are about normal. Contracting is quiet, as most of the larger users are content to buy on the open market to take advantage of the low prices. A few contracts have been renewed, however, but new ones are not reported.

Lake trade is rather brisk but Ohio mines, especially those in the Hocking Valley, are not sharing in the business.

The situation in the Cleveland trade is practically unchanged. The demand for steam coal is as dead as ever, and nothing has occurred as yet to lift the depression. Manufacturing plants, working part time, are still able to get along on storage fuel, picking up small lots at prices even below the already low spot level.

There is no material change in the general alignment of the Pittsburgh market. Many mines are closed entirely. Demand is coming from only a few quarters. Railroad buying continues to be light, as the roads still seem to have sizable stocks. The steel industry has been a poor buyer, but the decline in steel-mill operations is now nearly over however. There is still no general demand for Pittsburgh district coal for lake shipment. The wage reduction in the Connellsville region has not resulted in any greater steam-coal competition.

Business at Buffalo is slow, in keeping with the condition in most industrial lines.

New England Industry in the Dumps

There are those in the trade who feel that prices are at the low point of the season, but no such optimism has yet spread to possible buyers. The market hereabouts has practically reached the saturation point so far as the more active industries are concerned; the cotton mills with few exceptions are suffering such a depression that no buying is anticipated from that quarter for weeks if not months to come.

Demand inland from rehandling wharves at this end reflects the same kind of market that prevails f.o.b. Hampton Roads. All the factors are carrying heavy stocks, and since they so directly represent the several Pocahontas and New River agencies there is constant pressure to move coal enough to make room for further receipts. The nominal quotation for spot coal f.o.b. Boston is now \$5.75 per gross ton, but the local situation is by no means firmly in hand and moderate shading of this price can be looked for. At retail in Boston there is a similar situation, except that here the actual price is virtually a full dollar a ton less than the \$7.50 per net ton delivered that appears on the printed lists. Prices down to \$6.35 for deliveries through to next April have been almost general in recent weeks, especially on state and municipal business.

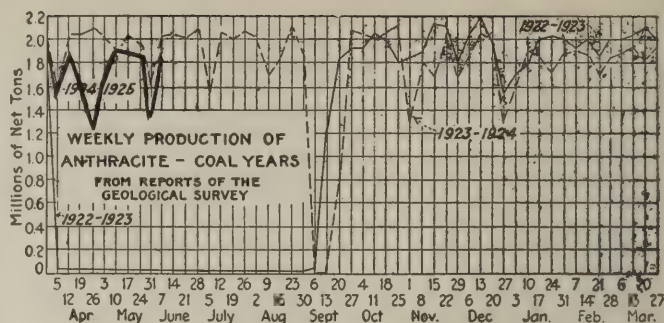
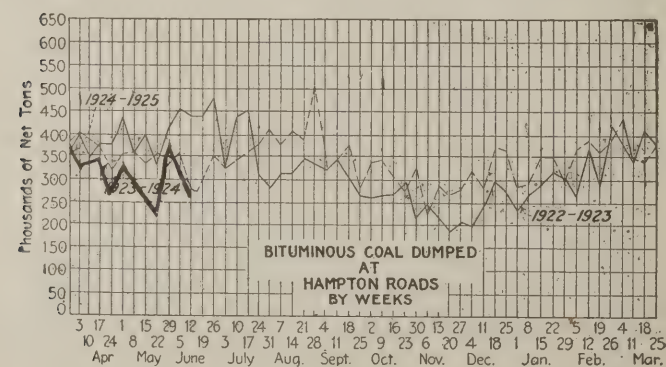
No. 1 Navy standard grades the shippers continue to hold at \$4.40 f.o.b. vessel, although occasional sales are reported at \$4.25. There are almost no comprehensive orders in the market, and a large proportion of what coal is dumped at the three piers is being applied either on coastwise contract or on blocks that were sold off-shore early in the season. No. 2 coals have sold down to \$3.95, but accumulations of this grade are not large and inquiries are relatively few:

All-rail from central Pennsylvania there is no material change. Most producers are either entirely shut down or their mines are working but one or two days a week. Via the Philadelphia and New York piers the tonnage moving is extremely light.

Demand Weak on Atlantic Seaboard

Slow demand as well as slow shipments feature the markets along the Atlantic seaboard. New York buyers continue on a hand-to-mouth diet and no inducement seems strong enough to arouse them from their indifference. Large consumers are satisfied to dig into their reserve stocks, so that about the only spot business transacted nowadays is with the small consumer, who, unfortunately for himself, cannot afford a reserve pile. Business at the New York tidewater depends largely on the position of the buyer and of the shipper. During the last week the daily average number of cars at the various docks ranged around 1,600, but the coal was kept moving and there was no actual hurry about moving it. For that reason prices were firm.

Signs of a revival are still lacking at Philadelphia. Though a turning point is looked for in July there are



some misgivings, as there are rumors that certain branches of the iron trade are likely to take an extended holiday unless orders are forthcoming soon. Industry is not at all encouraging in lines other than iron, although there are a few favorable signs, such as the reopening on a five-day schedule of plants which have been shut down for several weeks. Prices on the spot market remain firm.

Except for a few individual lines, which from time to time report healthy sales, extreme dullness is the keynote at Baltimore. Industries continue to buy for immediate use only in the majority of cases. Prices remain at the same level as for several weeks past. Stagnation has hit the export trade to a surprising extent, involving cancellation of a number of charters which had been expected to bring up the June movement to a considerable figure. Some of the local exporters now have representatives in Europe in connection with the export trade.

Birmingham reports little change in the market. Some interests note a better inquiry and some actual new business taken on, while others are unable to discern any upward trend. It is the consensus of opinion that the lull is due entirely to the industrial slump and that any stimulus in this direction will be promptly reflected in a more active market and increased requirements, as there are no stocks in the hands of consumers.

Anthracite Demand Continues to Slacken

Lack of demand is keeping pace with the cut in production due to labor troubles and holidays at the mines. The situation is slowly but gradually growing easier. Dealers have full yards and consumers are showing no desire to empty them. While it has been an active spring for retail dealers, due in most part to unseasonable weather conditions, buyers do not show any desire to avail themselves of the present prices, although wholesale as well as retail prices are subject to at least a 10c. per ton advance on the first of each month until September. Retail dealers are not anxious for independent coal since they can get sufficient company product to take care of their needs. While the maximum current quotation for independent domestic coals is about \$9.25, straight stove coal brings as high as \$9.75, the lower figure covering mixed orders of egg, stove and chestnut. Pea coal moves quietly and there is comparatively little strength in the buckwheat sizes.

The Philadelphia market continues to soften; were it not for the pressure exerted for stove, and to a lesser degree on egg, there would be nothing of moment in the market whatever. Pea is showing signs of heaviness, as the larger companies are compelled to store it. The steam market is particularly poor, a large surplus going to storage yards.

Baltimore dealers have decided to stick to their original schedule not to raise prices before July 1. Considerable discussion has been raised over an average jump in wholesale prices of between 30 and 35c. per ton. It had originally been planned, on the theory that wholesale prices would increase about 10c. per month from May to September, to absorb this 50c. boost by two advances at retail, one on July 1 of 25c. and one on Sept. 1 of 25c., but dealers may be forced to take an entirely different course.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended May 31, 1924.....	819,904	120,215
Previous week.....	918,213	139,083
Week ended June 2, 1923.....	932,041	171,248
	Surplus Cars	
	All Cars	Coal Cars
May 31, 1924.....	338,526	168,913
Previous week.....	331,012	170,333
May 31, 1923.....	32,443	3,953
Car Shortage		
	16,277	11,392

Foreign Market And Export News

Recovery of British Coal Market Slow; Output Declines Again

Though business in the South Wales market has expanded somewhat, complete recovery of the industry has been impeded by the uncertain labor outlook. There is a fair amount of inquiry but business is very slow. The holdings also have been instrumental in curtailing the volume of orders. Foreign buyers are apprehensive, which no doubt accounts for some of the business going away which normally comes to Britain. Italian and South American purchases are poor, and French and other European inquiries are fitful.

The Newcastle market is weak and dull, though the tone on forward business is better. Some German and Dutch consumers are taking small quantities, but their orders are inconsiderable. The supply is much in excess of the demand and many of the collieries are producing only as much coal as they are likely to sell immediately.

The agreement for the regulation of wages in the British coal-mining industry has been ratified by the miners by a majority of 162,000 in a total vote of 784,000. The agreement is now in force for a period of 12 months; after that it is subject to annulment on one month's notice on either side.

A special cable to *Coal Age* states that British collieries during the week ended May 31 produced 5,308,000 tons, according to the official reports. This compares with 5,436,000 tons during the week ended May 24.

Market Sags at Hampton Roads; Bunkers Alone Hold Up

Business at Hampton Roads is dull, with the market slightly weaker, and with bunker business alone holding its own. Considerable movement to South America on old contracts, which is having no immediate effect on the trade, is one of the features of the situation.

Coastwise business is fair and foreign movement is dropping to a marked degree. Dumpings for the week fell

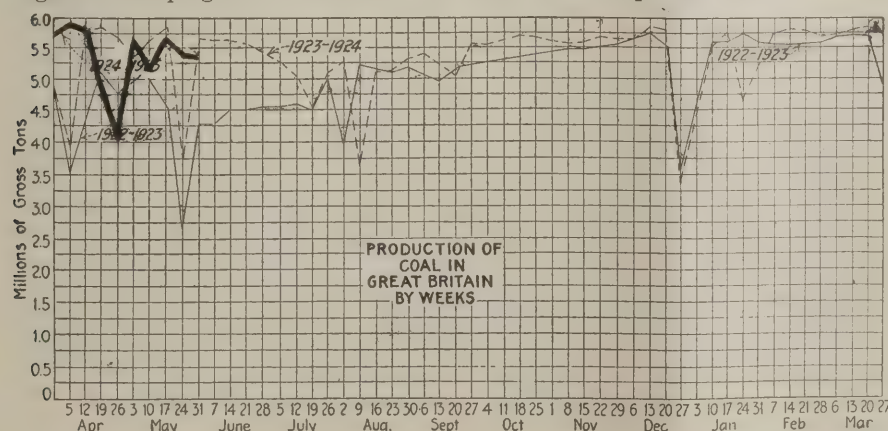
away still further, and a low record for monthly movement is forecast by shippers. The supply of coal at tide shows some improvement, but it is due to lack of demand more than to any greater movement from the mines. The tone of the market is dull and no immediate improvement is in prospect.

French Market Firmer, Aided by Exchange and Ruhr Turmoil

Due to the pressure of exchange and the labor situation in the Ruhr the position of the French coal market has improved. The demand for industrial coals is better, on account of the curtailment of arrivals from Germany. The situation in house coals, however, is dull, in spite of the attraction of summer rates. The supply of rolling stocks has been satisfactory with the freight rate lower at 21 fr., Bethune-Paris.

Receipts of indemnity fuels by France and Luxemburg between May 1 and 17 were 156,750 tons of coal, 248,000 tons of coke and 15,770 tons of lignite briquets, or a total of 420,600 tons. During the first four months of 1924 the Ruhr sent to France (coke reduced to its equivalent of crude coal on the basis of 3 tons of coke for 4 tons coal) 787,031 tons in January, 888,965 tons in February, 1,028,446 tons in March and 1,371,000 tons in April. The program of the Reparation Commission called for 735,000 tons per month during the first quarter, but the quota for April was only 684,000 tons. The tonnages imposed by the Reparation Commission are getting lower in proportion as the output increases in the French devastated mines.

Fuel imports for April consisted of 2,228,024 tons of coal, 703,446 tons of coke and 54,205 tons of patent fuel. The figures for March were 2,185,954 tons of coal, 491,625 tons of coke and 96,391 tons of patent fuel.



French exports of fuel during April comprised 178,781 tons of coal, 49,711 tons of coke and 8,517 tons of patent fuel, as compared with the following for March: 178,327 tons of coal, 49,412 tons of coke and 18,104 tons of patent fuel.

Export Clearances, Week Ended June 14, 1924

FROM BALTIMORE		
For Martinique:		Tons
Am. Schr. Chas H. MacDowell.....	1,038	
For Germany:		
Ger. Str. Porta	709	
For Italy:		
Ital. Str. Aquitania	6,488	
FROM HAMPTON ROADS		
For Brazil:		
Br. Str. Saint Andrew for Rio de Janeiro	6,979	
Br. Str. New Brooklyn for Rio de Janeiro	7,854	
Br. Str. Irish Monarch for Rio de Janeiro	5,673	
For Canada:		
Du. Str. Peursum for Kingston...	2,034	
Amer. Schr. Tolima for St. Stephen.	1,015	
Br. Str. Eskbridge for Bridgetown..	4,395	
For Dominican Republic:		
Br. Str. Llanberis for Puerto La Plata	5,059	
For Italy:		
Ital. Str. City of Para for Venice..	2,169	
Ital. Str. Maria Enrica for Porto Ferrajo	10,739	
Ital. Str. San Pietro for Portovecchio de Piambino	7,219	
For Porto Rico:		
Amer. Str. Irene for San Juan.....	4,523	
FROM PHILADELPHIA		
For Newfoundland:		
Amer. Schr. M. Taylor for St. Johns.....		
For Cuba:		
Br. Str. Sunpath for Havana.....		

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	June 7	June 14
Cars on hand	930	1,261
Tons on hand	56,291	77,329
Tons dumped for week	114,356	73,016
Tonnage waiting	10,000	15,000
Virginian Piers, Sewalls Pt.:		
Cars on hand	779	912
Tons on hand	56,100	70,250
Tons dumped for week	87,381	72,535
Tonnage waiting	10,743	13,419
C. & O. Piers, Newport News:		
Cars on hand	1,546	1,405
Tons on hand	76,725	72,740
Tons dumped for week	83,011	91,255
Tonnage waiting	3,975	10,485

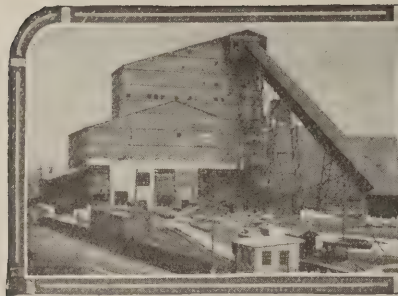
Pier and Bunker Prices, Gross Tons

PIERS			
	June 7	June 14†	
Pool 9, New York.....	\$4.85@ \$5.00	\$4.85@ \$5.00	
Pool 10, New York.....	4.60@ 4.75	4.60@ 4.75	
Pool 11, New York.....	4.40@ 4.50	4.40@ 4.50	
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05	
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80	
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55	
Pool 1, Hamp. Roads....	4.30@ 4.40	4.35	
Pool 2, Hamp. Roads....	4.25@ 4.30	4.25	
Pools 5-6-7 Hamp. Rds...	4.20	4.20	
BUNKERS			
Pool 9, New York.....	5.15@ 5.30	5.15@ 5.30	
Pool 10, New York.....	4.90@ 5.05	4.90@ 5.05	
Pool 11, New York.....	4.70@ 4.80	4.70@ 4.80	
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40	
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00	
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80	
Pool 1, Hamp. Roads....	4.40	4.40	
Pool 2, Hamp. Roads....	4.30	4.25	
Pools 5-6-7 Hamp. Rds...	4.20	4.20	

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to <i>Coal Age</i>			
	June 7	June 14†	
Cardiff:			
Admiralty, large....	27s. 6d. @ 28s. 6d.	27s. 3d. @ 28s.	
Steam smalls.	18s. 6d. @ 19s.	18s. 6d.	
Newcastle:			
Best steams.	25s. 6d. @ 26s. 6d.	22s. 6d. @ 23s. 6d.	
Best gas.	23s. @ 23s. 6d.	23s. @ 23s. 6d.	
Best bunkers.	22s.	20s. @ 21s.	

† Advances over previous week shown in heavy type, declines in italics.



News Items From Field and Trade



COLORADO

An electric power plant is soon to be erected at the Pike View mine of the Pike's Peak Consolidated Fuel Co., Colorado Springs, to supply power for the mine and for the Golden Cycle ore-reduction mill in that city, owned by related capital. The mill is now served by the Colorado Springs city electric light plant, which last year sold the mill about 8,000,000 kw.-hr. of current for about \$70,000, which is said to be less than the cost of producing the power. The city company sold the remaining 11,000,000 kw.-hr. of its output to its customers for \$479,000.

IDAHO

Negotiations are still in progress concerning the Teton Coal Co.'s plan to mine coal in the Teton basin. After a long series of hearings and various investigations for the State Public Utilities Commission, a decision is now awaited which may order the Oregon Short Line to operate the 11 miles of abandoned track from Teton Junction to the mine sites. The road asserts that the prospective coal traffic out of the mines will not justify the cost of repairing the spur, but H. F. Samuels, politician and president of the coal company, has worked up a great deal of public sentiment in favor of his move to force the road to give his prospective mines service. The road proposed that he put up the money for the repairs. His counter proposal is that he will guarantee to ship 29,920 tons of coal annually and furnish a bond of \$36,910—the estimated cost of opening the line—if the railroad will guarantee certain low freight rates on his coal to certain towns within 125 miles. The case hangs fire.

ILLINOIS

The Illinois Coal Corporation, Chicago, has completed a 200-ft. concrete smokestack at its twin mine at Nason, in Jefferson County and has erected a tippie at one of the shafts. The tippie at the other is expected to be completed early in the autumn.

George A. Harwood, who has been promoted by the New York Central Lines, has resigned the vice-presidency of the Chicago & Harrisburg Coal Co. He has been succeeded by Walter R. Gibbons, real estate and tax agent of the Big Four road, of which the Chicago & Harrisburg Coal Co. is a subsidiary.

What is said to be the largest strip

coal mine in Illinois was recently opened by the United Electric Co. near Lewistown. The mine is on a 2,000 acre tract and equipment has been installed capable of producing 80 carloads of coal per day. The coal is reached 20 to 40 ft. below the surface; powerful shovels take off the top covering of earth while smaller shovels follow up and extract the coal. It is estimated it will require 30 years to remove all of the coal on the land.

INDIANA

Judgment for \$21,236.89 returned Nov. 2, 1923, in the circuit court at Lebanon, in favor of the Black Comet Coal Mining Co. against the Indianapolis Street Railway Co. will stand, it is believed by Indianapolis attorneys, because the proposed appeal to the state Supreme Court was lost for failure to file the necessary papers within the 180 days required by the court rules. It is thought the defendant will be compelled to pay the judgment with interest and costs, amounting to \$22,021.19. The case involved the purchase and delivery of 6,043.2 tons of coal and the judgment is one of the largest returned in the circuit courts of central Indiana for many years.

KENTUCKY

J. T. Dougherty, formerly president of the Jellico Coal & Coke Co., recently became secretary-treasurer of the Harlan Jellico Coal Co., of Louisville.

It was reported from Whitesburg on June 8 that the Ulvah Coal Co., at Bluefield, Lechter County, after being idle for several months, was preparing to resume operations. The company is controlled by West Virginia interests.

The Island Creek Coal Co. has declared an extra dividend of \$1 on the common and the regular quarterly dividends of \$2 on the common and \$1.50 on the preferred stocks, payable July to stock of record June 20.

The men who went on strike at Straight Creek, where several men were recently killed by shooting up the camp, and were ejected from the property of the Liberty Coal & Coke Co. by Judge Cochran, of the U. S. District Court, under injunction proceedings, have all moved to Molus, in Harlan County, the property of the Wallins Creek Collieries Co., of which Mike Roach, of Charleston, W. Va., is president. About 50 families were affected by the injunction proceedings against members of the United Mine Workers. The Molus-Roach plant has been closed

down for some time and will not be able at present to offer work to these men.

The mines of the Jamieson Coal Co., near Idamay, on Sturgeon Creek, above Beattyville, were flooded, company bridges washed out, and two miles of the branch line of the Louisville & Nashville R.R., inundated as a result of a cloudburst in the upper sections of Sturgeon Creek. The damage is estimated at \$300,000 or more, the plant of the Petroleum Carbon Black Co., a West Virginia corporation, having been washed out. Families of miners had to be carried to safety before the crest was reached. For a while wires were down and the town cut off from communication. So far as known no one was injured, and all miners got out of the mines before the plant was flooded.

MARYLAND

Olin D. Robinson has filed a petition in the Circuit Court of Allegany County, praying that the Midland Georges Creek Big Vein Coal Co. be dissolved and a receiver appointed to assume charge of the affairs of the corporation. Robinson asserts that he is a stockholder in the corporation, that it is indebted to him, that the corporation is insolvent and has no money to meet its obligations. The company was organized in 1920, leasing a small tract near Midland, owned by the Consolidation Coal Co. Among other stockholders in the company are Joseph E. Ravenscroft, of McCoole, and Clarence Fletcher, of Frostburg.

MINNESOTA

The Peabody Coal Co., Chicago, has opened an office in Minneapolis, at 614 Plymouth Building, with E. E. Heiner as district sales manager. He formerly was with the Superior Coal & Dock Co.

The summer schedule of a 10c. a month advance on hard coal added that amount on June 1, as has generally been the case each month through the summer. It is a regular custom, but for some reason it caused a little daily press spasm this time.

MISSOURI

Drillers are at work on the King farm, east of Liberty, sinking a test hole for coal and are down about 100 ft. now. It is expected that coal will be found at a depth of about 240 feet.

The St. Louis Southwestern Ry. will open bids at noon June 25 at Room 908, Pontiac Building, St. Louis, on from 300,000 to 500,000 net tons of bitu-

minous mine-run coal suitable for locomotive use, to be used as needed. Quotations are to be submitted f.o.b. cars at sellers' mines.

The Coal By-Products Engineering Co. has purchased a 10-acre tract at the intersection of the Tesson Ferry road with the Missouri Pacific R.R. and is erecting a 100-ton smokeless fuel and coal byproduct plant. The plant will produce coal for domestic purposes through a process invented by George Johns, utilizing bituminous and mine fines, lignites and other low-grade fuel. The byproducts recovered, such as gas, oils, tars, creosote, ammonia and sulphate of ammonia, will be sold to the domestic market.

The Mosby Block Coal Co., recently incorporated for \$100,000, has obtained a lease on the Mosby Coal Co., for a period of fifty years for the purpose of mining and selling coal. The coal company under the terms of the contract is to receive 20 per cent of the profits and the Mosby Block Coal Co., the lessee, is to receive 80 per cent of the profits. The last-named company is to make certain permanent improvements for which it will be reimbursed at the termination of the lease with a deduction of 2 per cent per year.

NEW YORK

Marcus L. Bell, vice-president of the Chicago, Rock Island & Pacific R.R., and Frank Burns, president of Burns Brothers, were elected directors of the Coal & Iron National Bank at a meeting of the board held June 11. Mr. Burns succeeds his father, M. F. Burns, deceased.

OHIO

The Southern Ohio Coal Exchange reporting for the week ending May 31 shows a total production of but 58,786 tons out of a full-time capacity of 540,152 tons from 440 mines reporting.

This leaves a shortage of 481,366 tons. Labor shortage was responsible for a loss of 4,740 tons; strikes, 6,280 tons; mine disability, 855 tons and "no market" 459,491. This was a five-day week because of the intervention of Decoration Day. During the same week the eastern Ohio field ordered 8,442 cars and loaded 6,153 cars.

H. S. Brown, who has been manager of the Columbus office of the Philadelphia & Cleveland Coal Co., has been placed in charge of the Indianapolis office, and R. J. Bush, formerly connected with the Cincinnati office, has been named manager to fill the vacancy.

The Morrow-Callahan Coal Co. offices in the Dixie Terminal Building, Cincinnati, have closed. J. D. A. Morrow, who was in charge, will hereafter devote all his attention to his duties as vice-president and general manager of the Joy Machine Co., Pittsburgh, Pa.

The strike of the Cannan Coal Co., Cannanville, is still on and there is a loss of approximately 6,500 tons per week owing to the layoff. Efforts on the part of operators to end the strike have proved futile. The difficulty is over the question of payment for dead work.

The Citizens Trust & Saving Bank, of Columbus, has brought a suit in federal court seeking to establish its claims as a prior lien on properties of the Maynard Coal Co., now in the hands of W. S. Harmon and Frank L. Stein, receivers. The petitioning bank is a trustee under a mortgage deed for a \$1,500,000 bond issue, of which \$680,000 is outstanding. This is secured by a mortgage on the coal properties and 5,500 shares of stock of the Superior Coal & Dock Co., a subsidiary.

Governor Donahey has written a letter to John E. Harper, Director of Public Welfare, which department has charge of the operation of 23 state institutions, urging him to lay in the winter's supply of fuel now in order to help the mining situation in the Hock-

ing Valley. The annual consumption of coal at the various state institutions is about 150,000 tons, mostly mine run and screenings. It is believed that by purchasing now funds available after July 1 can be used to pay for the coal.

The Rice Coal Co., of Dayton, announces the appointment of Earl Wertz as northern sales agent, with headquarters at 839 Ohio Bldg., Toledo. Mr. Wertz will have charge of the distribution of the output of the company's mines in addition to which has been added the output of the Keel Coal Co. at Pauley, Ky., and the Columbia Coal Co.

PENNSYLVANIA

Thin-vein mining is more in evidence in the Hazleton region. The big measures have been worked for from fifty to seventy-five years, and it has been found advisable to take the coal out of the smaller strata.

The Lehigh & Wilkes-Barre Coal Co. has declared a dividend at the rate of 7 per cent a year on the preferred stock or 1½ per cent for the period from April 1 to June 1, and a dividend of \$3 a share on the common stock, payable June 2 to stock of record May 20.

The mines of the Cascade Coal & Coke Co., at Sykesville, controlled by Rogers, Brown & Co., have been closed because the union miners refused to work at reduced wages. It is expected that the company's mines at Tyler, in the same vicinity, will close soon for the same reason.

The oft-repeated statement that the coal supply of the country will give out within a hundred years has been sharply challenged by the engineers of the Lehigh Coal & Navigation Co., who are preparing plans for extensive stripping operations in the Panther Creek Valley near Lansford.

Work has been started on the removal of coal from the new stripping of the Wolf Coal Co. on the Beisel tract, between Drifton and Lattimer. Coal measures were exposed a week ago. The coal is being prepared at the Drifton breaker. The tonnage is shipped over the Lehigh Valley railroad.

Mayor E. J. Healey, of Carbondale, last week ordered Anthony Pinaro, a contractor, to cease operations in three veins surrounding a mine fire in that city. The contractor was removing the coal from the surface and was filling in with dirt in an effort to check the mine fire. Residents of the vicinity complained to the Mayor that the operation was a menace to their health and property. The situation is being investigated by the City Council and mining engineers.

The Lehigh Valley Coal Co., recently segregated from the Lehigh Valley R.R., reports net income of \$6,449,516 for 1923. After allowing for all interest charges, including interest on the new 5 per cent bonds, and allowing for federal tax reserves, the company reports a balance of \$4,495,064, or \$3.70 a share on the 1,212,000 shares of capital stock sold to stockholders of the Lehigh Valley R.R. No dividend has been declared by the coal company



Courtesy U. S. Distributing Corp.

Tipple of Sheridan-Wyoming Coal Co., Carney, Wyo.

This property formerly belonged to the Carney Coal Co. and is one of the leading mines in the north of the state.

since its segregation from the railroad property, but it is reported that a dividend of at least \$2 a share annually is expected on the stock before the end of this year.

The Pennsylvania Coal Co. made the following changes at three of the company's largest collieries June 1, according to an announcement by J. P. Jennings, general superintendent of the Pittston district; Superintendent James C. Johnson, transferred from the Butler colliery, Pittston, to the Central colliery, Avoca; Superintendent T. H. O'Brien, of Avoca, from the Central colliery to No. 9 colliery, Pittston, and Superintendent Thomas Huntley, of Pittston, from No. 9 colliery to the Butler colliery, at Pittston.

A controversy at Mine No. 5 of the Portage Coal Mining Co., at Portage, Cambria County, which resulted in a strike on Feb. 2, involving 450 men, has been settled, the men agreeing to return to work on the terms proposed by the company at the time the strike was called. The strike was against the wishes of the United Mine Workers officials. The vein mined in this operation contains about 1 ft. of inferior coal, known as "rooster" coal. This the company ordered not shot down and the miners went on a strike, alleging that the order reduced their earning capacity.

Fatal mine accidents showed a 16 per cent falling off in the first five months of this year, according to Secretary of Mines Joseph J. Walsh. Whereas 410 miners lost their lives in mine accidents in Pennsylvania during the first five months of 1923, the number of fatalities in the similar period in 1924 totals 343, a decrease of 67 deaths. "In the anthracite region," Secretary Walsh stated, "there were 237 fatal accidents in the first five months of 1923, as compared with 198 in the same period of 1924. "In the bituminous region there were 173 fatal accidents as compared with 145 in the same five months of 1924."

WASHINGTON

The Black Carbon Coal Co. is approaching the operating point with its property near Buckley, which is aimed to be a 300-ton mine. The company has bought the properties once operated as the Spiketown, Morristown and Pittsburgh mines. The officers of the company are Fraser H. Lantz, general manager; James Kelley, assistant general manager; David Grey, superintendent and engineer; James C. McCracken, secretary-treasurer and in charge of the Seattle office.

WEST VIRGINIA

There is more activity in the New River field now that the Loop Creek mines are running on a full-time basis, including the McKell Coal & Coke Co. mines and the Sun and Price Hill mines.

The Huntington Coal Sales Co., of Huntington, has filed articles of dissolution in the office of the Secretary of State and will discontinue its corporate existence. The New Pocahontas Coal

Co., of Huntington, also has filed a certificate of dissolution.

In connection with the suit of the Shrewsbury Coal Company for \$75,000 damage for alleged failure to take coal under contract, brought against the Hooper-Mankin Fuel Co., of Huntington, the Circuit Court of Kanawha County after presentation of evidence in the case, directed a verdict in favor of the defendant.

A deed recorded in the office of the County Clerk of Monongalia County shows the sale by the W. A. Stone Fuel Co. of about 342 acres of land with underlying coal in Union district of Monongalia County. The estimated consideration was \$50,000. The Morris, Stewart and Colebank tracts are involved. The coal is in the Pittsburgh seam.

The Benwood explosion on April 28, in which 119 miners were killed, made the list of casualties in West Virginia mines during April unusually large, 141 men having perished in the mines of the state during that month. One hundred and nineteen deaths occurred in Marshall County, five in Raleigh County, 3 in Fayette County, 4 in Logan County, 2 in Greenbrier County, and one each in Clay, Kanawha, Marion, McDowell, Mercer, Ohio, Preston and Tucker County. Aside from the large toll in the Benwood disaster there were 22 fatalities, 16 of which resulted from a fall of slate, other deaths being due to miscellaneous causes.

WISCONSIN

Affairs of the defunct Valley Coal & Dock Co., of Milwaukee, are being investigated by a federal grand jury. It is charged that a Milwaukee man interested in the company obtained large credit for the concern on false representations.

CANADA

The Clear Mountain Coal Co., which is said to be investing \$300,000 in developing Lillooet sub-bituminous coal near Ashcroft, B. C., is now putting that coal on the Vancouver market, hauling it by rail from upper Hat Creek to Squamish and by water to Vancouver.

The Pacific Coast Coal Mines, which formerly operated the Morden mine, near South Wellington, B. C., which has been in liquidation, is being re-organized and is expected to resume operations next autumn. The company also owns a coal concession at Hequash, near Alert Bay, where some development work has been done.

In the first-aid competitions both for the British Columbia championship (Senior) and the Wallace Nesbitt Cup (Junior), held under the auspices of the St. Johns Ambulance Association, the Nanaimo "A" team (Western Fuel Corporation of Canada) scored the highest number of points among the seniors, with 268 out of a possible 325, the juniors of the same corporation obtaining first place in their class with 185½ points. The latter were given a close run by the Fernie 4th Troop of

Boy Scouts with 175 out of a possible 250.

Striking miners in the Drumheller district of Alberta received their first relief from the international organization at Indianapolis on June 6. It was distributed in the form of orders for groceries and clothing, single men receiving \$2 per week and married men \$4 a week with 50c. additional for each child. The stand taken by President John L. Lewis and the International officers is that relief will be given only when cases are considered needy.

The Pacific Coast Coal Mines, Ltd., at one time one of the big producing coal operators of Vancouver Island, is to resume work within a few months. The company acquired a large acreage near South Wellington which was developed during 1909, 1910, 1911 and 1912 until it was mining about 215,000 tons a year. In 1911 New York interests gained control but litigation finally led to the sale of the property by the Sheriff of Nanaimo in 1922. The property then was bought in by some of those most largely interested financially. Since that time the mine has been idle. It may be said, as to the present holdings, that the Morden Mine, which is located on the 1,500 acre block, South Wellington, possesses the most modern colliery plant on the Pacific Coast. This mine is connected to the shipping point at Boat Harbor, east coast of Vancouver Island, about five and a half miles from the mine, with a standard-gauge railroad and is provided with all necessary rolling stock. At tidewater there are shipping wharves, bunkers, washeries and loading conveyors.

Association Activities

A general meeting of the **Smokeless Coal Operators' Association** has been called by the president, Robert H. Gross, to be held Thursday morning, July 12, at the Hotel Washington, Washington, D. C.

The "Shop Talk" meeting of the **Fayette-Greene Coal Producers' Association**, on Wednesday evening, June 11, at the Summit Hotel, near Uniontown, Pa., brought out about 100 coal and coke company officers, superintendents, master mechanics and mine foremen. After an enjoyable repast, G. Carl Areford, President of the association, introduced William Z. Price, assistant general superintendent of the Buckeye Coal Co., of Nemacolin, Greene Co., who presided. The principal topic of the evening was rock dusting, and the first speaker of the evening, Captain Edward Steidle, of Pittsburgh, Pa., in charge of the short mining course at the Carnegie Institute of Technology, read a very comprehensive paper on the subject. He was followed by A. C. Fieldner, superintendent of the U. S. Bureau of Mines station at Pittsburgh, who also spoke on the same subject. State Mine Inspectors Edward E. Girod, of Masontown, and Richard Maize, of Uniontown, also took part in the short discussion. Edward H. Cox, general manager of the Snowdon Coke Co., of Brownsville, gave a talk on machine loading, and was followed by Frank W. Newhall, of Uniontown, chief engineer of the Republic Iron & Steel Co.'s coal and coke plants, who made a few remarks on the same subject. Clyde Elkins, of Connellsville, inspector for the State Compensation Insurance Fund, read a paper on mine safety. M. D. Cooper, of Pittsburgh, assistant general superintendent of the Hillman Coal & Coke Co. and president of the Coal Mining Institute of America, spoke briefly on the topics of the evening and called attention to the next annual session of the Institute to be held next December, at which rock dusting is to be one of the chief topics of discussion.

Traffic News

Commerce Commission Approves Clinchfield Lease

The Interstate Commerce Commission on June 12 approved the applications of the Atlantic Coast Line and the Louisville & Nashville R.R. for joint control of the Clinchfield Ry. system. The commission approved the lease under certain conditions, which were submitted to those interested in the Clinchfield properties on Feb. 9 last, but protested against by the applicants. Opposition to the granting of the application also was voiced by the Seaboard Air Line and other carriers.

The commission also granted the applicants authority to assume, as lessees, obligation of paying as rental for the property rights and franchises of the Carolina, Clinchfield & Ohio Ry. and its subsidiaries amounts equivalent to dividends at certain rates upon \$25,000,000 of common capital stock and interest upon certain bonds and equipment obligations of the Clinchfield in the amount of \$28,292,000 now outstanding and, the commission said, as guaranteed by the lessor of the property upon \$1,500,000 of Holston Corporation 5 per cent realty and collateral trust convertible notes.

Indiana Rate Cut Deferred

The recent order of the Indiana Public Service Commission reducing intrastate coal freight rates will not become effective until July 1, an agreement having been reached between attorneys of the commission and attorneys for 21 railroads that brought suit in the Superior Court before Judge Linn D. Hay, to have the order of the commission set aside. The order was originally intended to go into effect April 1, but the date was postponed from time to time until after the hearing. Judge Hay said that the case will not be decided before the latter part of June.

Obituary

Joseph Shelly Sillyman died last week in Philadelphia, of a complication of diseases. He was born at Pottsville, Pa., on May 5, 1847. After graduation from the academy in that city he followed the profession of civil and mining engineer in Pottsville and Hazleton, Pa., being one of the best known engineers in central Pennsylvania, widely recognized as an expert in mineral lands and mining. The practice of his profession took him into nearly all parts of the bituminous-coal fields in Pennsylvania, West Virginia and eastern Kentucky.

Donald McDonald, Sr., vice-president and general manager of the Louisville Gas & Electric Co., a Byllesby subsidiary, died suddenly June 3 following a stroke of apoplexy at the completion of a talk June 3, before the Electric Club, Louisville. He had just made a strong

address in favor of passage of a \$75,000,000 bond issue for roads and schools in the fall elections, under an enabling act passed by the recent Legislature. The Louisville Gas & Electric Co. owns its own coal mines at Echols, in Western Kentucky and has a fleet of battleship hopper cars, used for transporting its fuel to Louisville during periods of car shortage.

Will O. Davis, 62 years of age, secretary-treasurer of the Kentucky River Coal Co., Lexington, Ky., and prominent lawyer, died at his home at Versailles, Ky., a few days ago of apoplexy, having become ill while in Louisville two weeks prior to his death. He had recently been named state manager for Oscar W. Underwood, Democratic candidate for President, who was his old classmate at college.

David C. Thomas, of Columbus, Ohio, a retired coal operator, was instantly killed recently by falling from the 15th floor of the building at 8 E. Broad St. in that city. He was for many years head of the D. C. Thomas Coal Co., with main offices in Columbus. He sold out in 1919 to the Hisylvania Coal Co. and retired from active business, although nominally vice-president of the Piney Fork Coal Co. and the Panhandle Collieries Co., for which the Hisylvania is selling agent. He is survived by his wife, a son and five daughters.

Publications Received

Analyses of Ohio Coals. Bureau of Mines, Washington, D. C. Technical paper 344. Pp. 39; 6x9 in.; tables.

An Investigation of the Maximum Temperatures and Pressures Attainable in the Combustion of Gaseous and Liquid Fuels, by G. A. Goodenough and G. T. Felbeck. Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin 139. Pp. 160; 6x9 in.; illustrated.

First General Report of the Lignite Utilization Board of Canada, Montreal, Canada. Pp. 263; 6x9 in.; illustrated. This complete and well illustrated report covers operations from Oct. 1, 1918, to Jan. 1, 1924.

Report on the Mines of Province of Nova Scotia for 1923. Department of Public Works and Mines, Halifax, N. S. Pp. 215; 6x9 in.; tables.

Mechanical Engineers' Handbook. New second edition, by Lionel S. Marks. Pp. 2,000; 4½x7 in.; illustrated. Price \$6. All material in this book has been brought up to date and much new matter included. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

Coming Meetings

American Society for Testing Materials; annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers, annual convention, June 23-27, Edgewater Beach, Chicago, Ill. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

First International Management Congress, Prague, Czechoslovakia, July 21-24.

World Power Conference, Wembley, London, England, June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

Rocky Mountain Coal Mining Institute. Summer meeting, Aug. 7-9, Rock Springs, Wyo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New Equipment

Temperature Indicator for Transformers

W. D. Crumpton & Co., 8 Bridge Street, New York, sole distributors for the Packard Electric Company, Ltd., St. Catharines, Ontario, Can., recently



placed on the market the Baker transformer temperature signal. This device is operated by a thermostat which moves a rod to which is mounted a drum, thus indicating the temperature of the transformer at all times. Part of the device consists of a maximum high temperature indicator which records at all times the highest temperature obtained by the transformer oil. The maximum high temperature drum is colored red and white. Red denoting overload, white denoting safe load. A white and black disc indicates underload. Temperature indications are shown against large figures which can be readily observed from the street

Instrument Tells Amount of Load

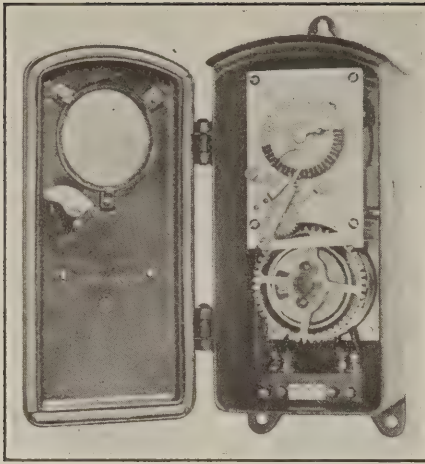
The safe loading of a transformer is a function of the temperature. This device records the temperature of the oil and thus gives a visual indication of the load.

level through a glass window in the head of the instrument. The materials used in the construction of this device are non-corrosive metals, all parts are sealed so as not to leak water or any vapor. The standard size stems are 7 in., 9 in. and 12 in., but any other length can be made to order.

Switch Timed by Synchronous Motor

For the control of circuits of moderate rating, a new automatic time switch, has been developed by the General Electric Co. The principal feature of the new device is the adoption of a Warren synchronous motor in place of the conventional spring-driven clock commonly employed to operate the timing mechanism. The new switch is for use on alternating-current circuits.

The function of this device is the same as that of the many other forms of time switches now on the market. It differs markedly from these other types, however, in that its time-keeping and propelling member is in the form of a small synchronous motor instead of the usual clock with escapement mechanism and spring. Control is effected by automatically closing and



Automatic Time Switch

The timing mechanism of this device is driven by a synchronous motor, thus the usual clock attachment is not necessary and no winding is required. Operations which must start and stop at definite periods can now be accomplished with regularity.

later opening the circuit at any predetermined time for which the switch may be set. It is especially adapted for use with electrically driven pumps, compressors, motor-generator sets, battery charging apparatus, lighting systems, etc.

The new switch, is about 12 in. high, 5 in. wide and about 4 in. deep. It is enclosed in a weatherproof case, thus being adapted for outdoor mounting as well as for mine service. It is rated 20 amperes, double-pole, single-throw, for use on circuits not exceeding 250 volts.

Mine Car Is Equipped with One-Piece Drop Bottom

One of the points where cars are frequently delayed longer than necessary is at the tipple dump. Naturally

if cars must be uncoupled, discharged one at a time and then coupled together again the entire process consumes much time and also requires the services of several men. If cars can be dumped consecutively without being detached from each other, simply by being drawn along by some mechanical means, not only would the time of dumping be reduced but the operation would be simplified and the cost lowered.

To attain this end P. W. Holstein has invented and placed on the market the drop-bottom car shown in the accompanying illustration. As may be seen the drawbar extends through and is attached to the car box only. The wooden bottom, to which the running gears are, of course, fastened, is securely hinged to the car box at the forward end. Angle-iron guides along the sides of the bottom assure that the two parts will return to proper position after they have swung apart in dumping. Along the top of the car box also is a wide angle-iron stiffener or gunwale.

The dump upon which this car discharges is likewise of simple type. It consists merely of a suitable depression in the track over a pit or bin for receiving the coal and a pair of chains upon either side. These chains engage the gunwales of the cars and support the car box as it moves across the dump. The bottom of the car on the other hand is supported by the car box at the hinged end and by the rear wheels at the other. As the rear wheels therefore take the depression in the track the bottom of the car swings open discharging the contents but returns to normal position as the rails again rise to their proper level relative to the chains.

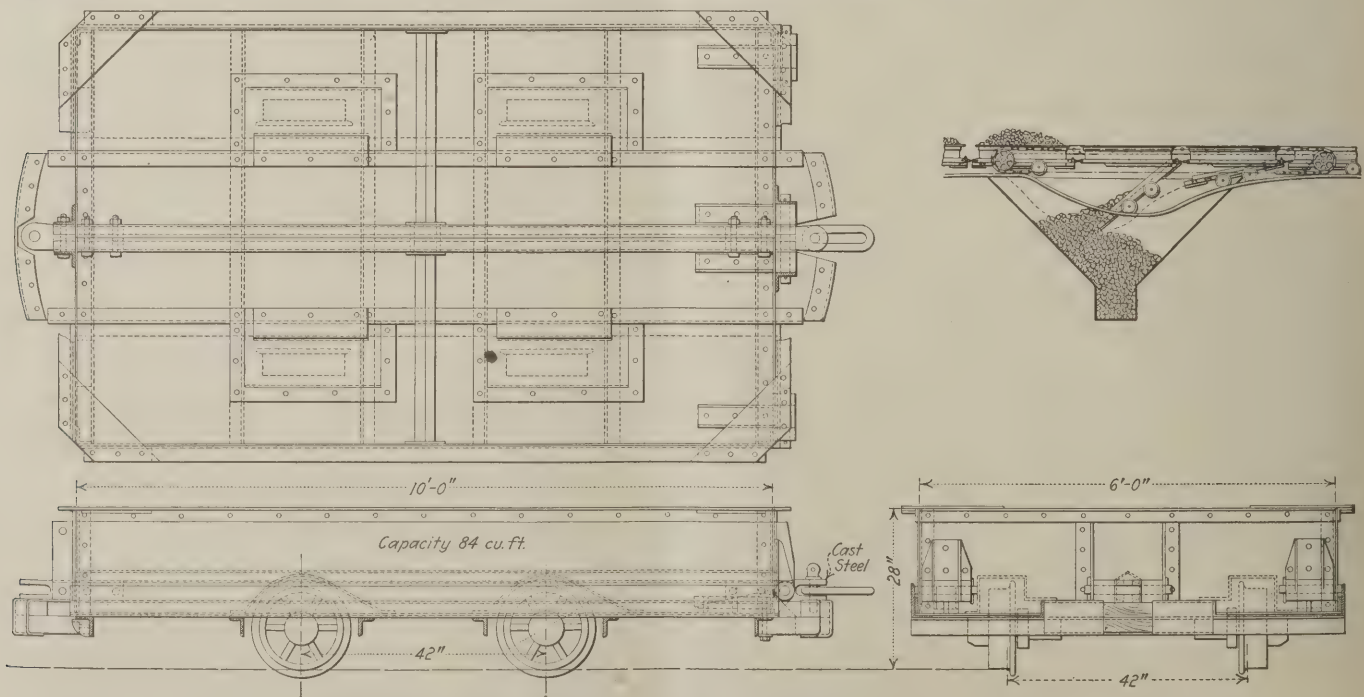
Any number of cars may be discharged by this dump without stopping or uncoupling from each other. A dump of this variety has been in operation at a Kentucky mine for over two years

and has given entire satisfaction. The cars employed at this operation, however, are of a slightly different model, lacking the through drawbar and being fitted with lugs instead of the gunwale. The differences, however, are not so pronounced as to cause any particular variation in their operation.

Flow Meter With New Integrating Unit

The Cochrane Corporation of Philadelphia has recently added an integrating device to its new type flow meter used for measuring water and steam in pipe lines. It is claimed that this additional device imposes no load or resistance to the operation of the meter and as a consequence the sensitivity and accuracy of the meter is not impaired.

The integrator is driven by a clock, the deflecting member of the meter merely controlling the position of a stop or motion-limiting pin. Its operation is similar in principle to the method used by steam engineers for obtaining the mean effective pressure from an engine indicator card, which consists in ruling evenly spaced parallel lines across the chart, adding up the lengths of the lines intercepted between the indicator lines and then dividing by the total number of lines which have been added. The indicator goes through motions equivalent to drawing a line from zero to the pen trace on the flow-meter chart once each minute, the length of this line being proportional to the momentary rate of flow and the sum of the lines proportional to the total flow for a definite period. The integrator can easily be calibrated and is said to give results within 1 per cent of absolute accuracy in a run during which the flow varies between 20 per cent and 100 per cent of full-load rating.



Details of New Drop-Bottom Car and Elevation of Its Dump

The bottom of this car is hinged to the body at one end. On the dump the car body is supported by two chains, one upon either side, while the rear wheels follow the rails. The bottom thus swings open and then closes again in the manner shown.

COAL AGE

McGraw-Hill Company, Inc.
JAMES H. MCGRAW, *President*
E. J. MEHREN, *Vice-President*

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

Volume 25

NEW YORK, JUNE 26, 1924

Number 26

Our Case Like the Farmer's

CROP shortages and Government assistance have demoralized the farmers, as coal shortages, strikes and railroad inabilities with consequent high prices have demoralized the coal industry. It is difficult to tell how many years it will take to put either of the industries properly on their feet, so much have they suffered from over-expansion and the consequent excessive competition. If the coal men could combine in times of high prices to keep the price of coal down and to see that the ultimate consumer gets the benefit of that fact there would be less speculation, less consumer ownership of coal properties, an important cause of over development, and the industry would be on a surer footing.

Example of the Powder Companies

OPERATORS have convinced themselves quite generally that their business is done when they have produced the coal. It is the consumer's business, they say, to learn how to burn it. Of course, there are exceptions. After all there are different kinds of coal, and if one has only one kind to sell it pays to help the buyer to get good results. It helps to hold trade. If one has many kinds it is profitable to see that the consumer gets the kind that suits him and that gives him best value; it is well to see that he burns it economically. That promotes satisfaction and holds a customer.

But when a rival like oil is met, the coal men can get together to promote the common end. The menace is best overborne by making the consumer thrive so well burning coal that he will want no other fuel. The Kansas coal men are striving to achieve some such co-operation and some of the coal men elsewhere are endeavoring to create what they are pleased after the popular manner to term an institute. Whatever it is named it will have the same end in view.

Powder companies are setting the coal men a good example. They, individually, are trying to enable the operator to get lump coal with minimum risk to life, limb and property. Their function is to sell powder, but they believe it is also their duty to help the consumer to use it effectively. They even try to make him use less of it. They advocate open spaces in shot-holes and rock dust instead of heavy, tight shots. Not by any means wholly unused to selling service the operators of coal mines can nevertheless learn a lesson from the powder manufacturer. In fact it is the genius of the hour to sell service and not merely a product.

Mr. Lewis, Keep Your Seat

NOBODY seems to be training to run against John Lewis next December for the presidency of the United Mine Workers. We hope nobody will. Mr.

Lewis is a good man for the job and he ought to stick to it, for if ever in history the union miners of this country needed a strong, sound leader, it is now. It is going to take a mighty good man to hold the organization together when it becomes necessary for that organization to take the backward step in wages as it has done in West Kentucky. Lewis will come as near to holding it together as anybody and operators in the strong union fields ought to be glad of that. It is distinctly to their interest that the United Mine Workers remain a representative unit with which to deal. There would be chaos indeed in the coal industry were there no such unit. Let us hope the union will not break, for the system of checks and balances which exists between unionism and non-unionism in coal is a healthy though oftentimes painful thing for the industry.

In a way it is unfortunate that President Lewis, facing the future that he faced before Jacksonville, waved his lion's mane so belligerently when he said he would never take a backward step in the matter of wages. Fortunately, however, a good politician can say a great many pompous and important things before election which are easily forgotten afterward. Mr. Lewis may have this comforting truth yet to learn. In past years he has not been a suave, wily politician. He has been a bludgeon swinger and a good one. His has been a victor's march. He has strewn his course with ultimatums delivered in the well known "loud stentorian tone." It remains to be proven that he is diplomat enough to accept for his men a wage that the coal industry can afford to pay. But he is a good man and we have hopes.

Shall Gas Be Made At the Mines?

THOUGH such a redoubtable authority as G. S. Brewer, the assistant fuel engineer of the U. S. Bureau of Mines, answers "No," to the question "Should Buffalo's gas be made at the coal mines?" the industry cannot but feel that the suggestion has not been and will not be definitely and finally shelved, especially where market and mine are closer to each other than is the case at Buffalo. It seems such a reasonable proposition that one is prone to doubt the negative testimony of experts.

It must be remembered that Buffalo is a long way from the coal fields, one hundred and twenty-five miles, and that distance adds to the difficulty. One company in Illinois is convinced that it does not pay to distribute more than fifty miles and decided to continue to operate two gas plants rather than concentrate on a single plant because that distance would be exceeded in that event. In that case the maximum pressure was about thirty pounds absolute. The Buffalo plan proposes to increase that to three hundred and seventy pounds.

However, it will be necessary to confront the facts, and these are that almost all the coal fields except the

anthracite region are obliged to compete with natural gas. Consequently the transmission of artificial gas through long distances seems almost inevitable if the gas is to reach a market not already monopolized by natural gas. If gas producing 1,000 British thermal units has rarely been transmitted long distances, there seems to be some valid reasons why artificial gas producing 537 British thermal units should find such transmission expensive especially in further view of the fact that natural gas being normally under high pressure requires less compression to make its delivery through pipes feasible. Leakage and the short life of wells perhaps account for hesitancy in building long gas lines but welding now makes leakage negligible even under high pressures and a line is being built from Shreveport to Beaumont, a distance of 210 miles.

According to G. S. Brewer, the authority mentioned, an investment of nearly two million dollars would be necessary if gas is to be transmitted to Buffalo through pipes from the nearest point in the coal field which is in the neighborhood of Reynoldsville, Pa. This investment *should* afford a profit of six per cent or not less than one hundred and twenty thousand dollars per annum, whereas, according to Mr. Brewer it cannot be figured to save more than sixty-six thousand. Such a prospect of meager profit would not find many takers.

However, looking at the figures contained in the article on p. 951 of this issue it will be seen that no consideration has been given to the storage of gas which would involve a considerable expenditure, perhaps \$300,000 if the manufacture were centered in Buffalo. The pipe line proposed would hold 518,375 cu.ft. at 370 lb. pressure or between twelve and thirteen million cubic feet figured at atmospheric pressure. This is an item not to be overlooked. It would iron out daily peaks quite satisfactorily. It must be remembered, however, that with twice that quantity being used per day in the winter it would not enable the plant at the mines to store in any one month enough gas to reduce perceptibly the needed production in another, nor would it make it feasible to reduce the diameter of the pipe. The pipe would serve merely as a gasometer. It would not function in any larger capacity, and speaking without careful inquiry, it might be found not as successful as a gasometer in meeting abnormal peaks.

Other advantages of a pipe line are that the coal would be carbonized where land is cheaper and where labor should be also. However, the disadvantage would be considerable in case of a strike or in case the area being mined should become exhausted. If pipes are to be used for the main transmission it would not do to have to haul coal to the plant by railroad and thus have a large portion of that expense the elimination of which was sought when the piping system was installed.

What Has Happened to Our Coal Dust?

NOTING the prevalence of explosions, ascribed as they usually are to coal dust, one begins to wonder what subtle change has taken place in the composition and condition of a substance that in early days was believed to be harmless and now is rightly regarded to be a chief cause of disaster.

The change is probably not so much in the dust as in other factors in explosions. True the dust is likely to be drier. We supply more air per man, we have

more men in the mines, and this air dries the dust. Our mines are deeper and therefore likely to be drier and a trifle warmer, the latter development being so slight that it only inconsiderably affects the dryness of the dust and therefore its explosibility. We are mining more extensively in dry, semi-arid and arid regions and in consequence the mines are drier. That doubtless had much to do with the Castlegate explosion and with the disasters at Dawson, N. M. The Western and Middle-Western coals also which are newer have more dangerous dust than Eastern mines.

Still with all these reasons arising from the nature of the dust why are we suddenly confronted with an increase in disasters such as we have had? There have been no incursions of ignorant foreigners on whom we used complacently to place the blame. Our mining population is more stable and experienced than in the past. There can be but two explanations—the mine-run scale of wages and more gas.

Now that the men are paid for all the coal they mine, large and small, they let powder do the work. They make more slack and dust and they use larger and thus more dangerous shots. But after all the principal cause of most of the recent explosions is gas. A small gas explosion occurs and is propagated by dust. The trouble is that our mines are gradually getting deeper. They possibly always had a little gas.

Without means to detect it no one knew it was there. Perhaps in some favorable part of the mine it might be induced even to burn. In mines that were closed up the methane emission was so slow and the formation of carbon dioxide so rapid that the mines when opened and not ventilated could be explored with a naked light without an explosion, though not without danger. The mines were said to be non-gaseous. Since then the operators, superintendents and foremen operating these mines have extended them under deeper cover.

Gradually they have become more gaseous but the progress has been slow toward recognizing the mines as really gassy operations. In fact accidents, larger or smaller, have dictated every move—first firebosses, then mixed lights, later abolition of smoking, then searches for matches, later permissible explosives, then a closed-light mine and yet again permissible machinery. There are more gradations than those mentioned and some of the changes were rather in the growth of discipline than in methods.

When men from non-gaseous mines went to gaseous they were mostly culpably lax. A superintendent, in a mine now operated by the Old Ben Coal Corporation, today one of the best conducted operations in the country, not so many years ago called attention of an editor of this paper to a blower proceeding from a shothole and before he could be restrained took a match and lighted it. It took some minutes of vigorous fanning with his cap to put the lambent flame out. Such superintendents are learning every day, but at what needless cost?

Times have changed conditions so much that we are wondering if all coal mines should not be rated as gaseous mines even at the risk of being a little unfair to some shallow, croppy operations. The disasters must cease. The industry must soon determine that the rank and file of mines must toe a common line. They are rapidly getting to be gaseous operations and that fact must be realized.

Twin-Rope Skip Hoist Works Well

Small Ropes Reduce First Cost of Installation, a Relatively Light Hoist Running at High Speed Thus Being Made Available—Two-Car Rotary Dump Cuts Down Payroll

BY ANDREWS ALLEN AND H. F. HEBLEY
Chicago, Ill.



USING two ropes of comparatively small diameter for hoisting coal skips containing eight to eleven tons of coal each is a somewhat novel practice that has fully justified its adoption at the recently completed Thermal No. 4 mine of the Donk Bros. Coal & Coke Co., in Madison County, Illinois. By this means, it has been possible to decrease the size of the drum upon which the ropes are wound and to use an engine smaller, though of higher speed, than would have been necessary had the ordinary single rope been installed. This decreased the initial cost of the installation. It constitutes, however, only one of several more or less radical departures from conventional practice adopted at this operation.

To some, interest in this plant may center in the layout of the shaft bottom, which was built around a two-car rotary dump that requires two less men for its operation than does the average cage-equipped mine of equal output. Others would be interested in the steel and concrete headframe, or in some of the various tippie refinements, such as the single-arm drive near the center of each shaker screen leaf and the triangular chutes that spread the coal from the screens evenly upon the picking tables.

This mine was designed to hoist 6,000 tons of coal per day, its capacity now amounting to between 3,000 and 3,500 tons. It was opened a few years ago and has been hoisting coal through the 2,000-ton-capacity auxiliary shaft since early in 1921. The first unit of this plant, including the first section of the power house, the various surface buildings and the auxiliary shaft tippie fitted with shaker screens designed to prepare lump and egg coal, also the overturning cages, were described in *Coal Age*, in the issue of June 9,

1921. During the summer of 1922 the company decided to complete the plant. This work was begun in September of that year and the first coal was hoisted from the main shaft and prepared at the main tippie on Oct. 11, 1923. The mine workings are still in process of development.

FURNISHES POWER TO ANOTHER COAL MINE

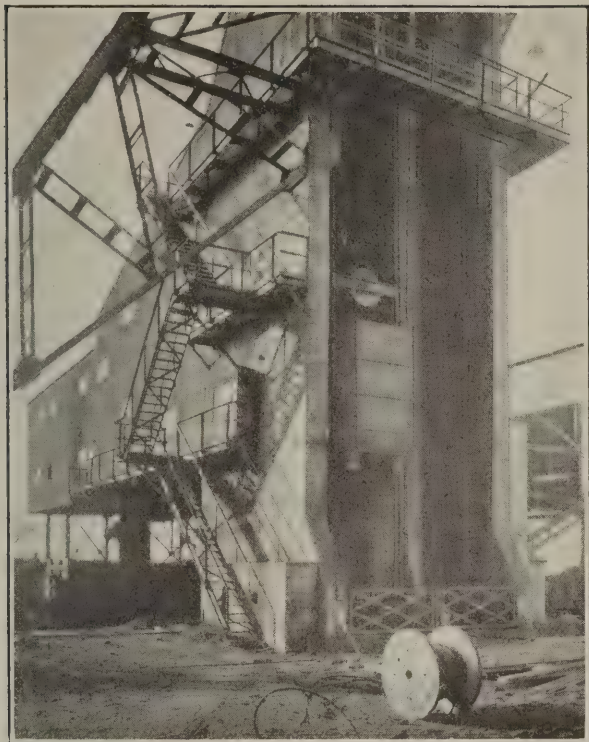
When the company decided that its entire plant at its No. 2 mine near Maryville, with the sole exception of the hoist, should be electrified by current from the power plant at No. 4 mine, the original design of that plant had to be modified slightly. The original selection of power units had to be changed and an outdoor step-up transfer station with a power line extending to No. 2 works had to be added.

In describing the plant at No. 4 mine, it will be advisable to consider it under four divisions: First, the tippie and preparation plant; second, the hoisting equipment; third, the bottom dumping station and, fourth, the power plant. The last division, however, will be considered separately in another article, which will appear next week.

The main tippie is designed for treating 6,000 tons of coal per day, preparing it in five sizes—6-in. lump; 6x3-in. egg; 3x2-in. No. 1 nut; 2x1½-in. No. 2 nut and 1½-in. slack, as well as various combinations of these sizes, all of which may be loaded direct. All sizes except slack will be carried into the cars over picking tables and loading booms. The clear height under the tippie is such that locomotives can pass under the tippie on any track. Degradation of prepared coal is avoided by the use of long loading booms which carefully lower the tippie product into the cars.

The arrangement of the yard necessitated the location of the through track for handling empties midway between the egg and No. 1 nut tracks. As the loco-

NOTE—The illustration used as a headpiece was made from a photograph taken from a point down track and shows not only the tippie structure but the "wine-glass" refuse bin and crusher shed. Both tippie and shed span six railroad tracks.



Skip Hoisted in Tippie Structure

The twin ropes and the equalizing sheave in the skip ball can be clearly seen. The concrete on three sides of the skip compartments protects the tippie from the shaft gases yet allows ready access to guides, buntons and the like.

necessary. In practice, four are employed on each lump table together with two pick men who break up the lumps of coal and gob so that the slate and bone may be dropped through a 6x6-in. grating into the gob conveyor, the coal being returned to the tables. The egg and nut tables usually employ four pickers each.

The gob conveyor consists of two parallel troughs, into which the burnable and unburnable pickings are sorted. The burnable material is taken by this conveyor to a bin adjacent to the shaft where it is crushed for use in the boiler house. The unburnable gob is delivered into a bin of the "wine-glass" type so situated that its contents may be discharged into a car standing on the No. 2 nut track below the end of the No. 2 nut loading boom.

The picking shed is entirely inclosed and provided with a line of windows across the end of the picking space. Consequently this portion of the building may be heated, and the pickers are well protected from the weather. The loading booms, however, extend into the open and are raised and lowered by counter-balanced, worm-gear hoists suspended from a steel-frame bridge situated down track but near the ends of the booms. The hoists raising and lowering these booms, however, are housed in a totally inclosed gallery.

INDIVIDUAL MOTORS DRIVE VARIOUS UNITS

All the various tippie units are fitted with individual motor drives equipped with helical gears and flexible couplings. The motors are operated from push-button control boards located in the picking shed over the engine track. Here the tippie man can overlook the operation of the entire tippie. Cars on the tracks are controlled by car retarders, and the booms are raised and lowered by the trimmer.

Down yard from the end of the loading booms is another structure spanning the tippie tracks. In this is installed a ring crusher mounted on skids. This machine may be moved into position opposite the end of the loading booms, the product from which may be crushed and loaded directly into a car. A small hopper is also mounted above the engine track so that a locomotive may be coaled with egg fuel which is held in this hopper for this purpose.

The tippie construction is heavy and rigid throughout. The shaker trusses are framed into the main structure instead of being carried on a separate support as is the usual practice. There is no sway to this structure and the vibration when the screens are running is barely perceptible. The tower above the shaft is of reinforced concrete up to a point 17 ft. above the rail. Above this elevation it is of structural steel, concreted on three sides, leaving the front entirely open thus affording ready access to the skip, guides, buntons, etc., and at the same time protecting the steel and the interior of the tippie from shaft gases and consequent deterioration.

The shaft is provided with overturning skips pivoted at the bottom and provided with latches to hold them in a vertical position within the shaft. They are operated by long-radius dumping angles at the top so as to afford an easy dumping cycle and diminish the drop given the coal during discharge. The dumping side of the skip is inclined at an angle of 30 deg. to the vertical, so that the skip has to overturn only 105 deg. in order to secure a 45 deg. angle for the flow of the coal. This inclination has been found sufficient in practice, and experience has shown that no excessive breakage of coal is incurred when a skip is operated in this manner.

The hoisting equipment includes a double-rope system which, so far as is known, is new in operations



Shaker Screens in Action

These screens are double-decked, but the details of greatest interest are the supports and the drive. Pendulum hangers support these screens, the latter being driven by single arms or connecting rods. The screen openings used are both circular and slotted.

of this kind. A 1-in. hoisting rope is employed, both ends of which are fastened to the drum. The two ropes then pass over a double-grooved sheave and around an equalizing sheave 3 ft. in diameter attached to the skip bail. This affords an excellent rope connection at the skip with an easily accessible arrangement for adjustment at the drum. The small rope diameter makes it possible to employ a cylindro-conical drum 5 to 7 ft. in diameter and a 24x42-in. hoisting engine operating at a fair speed.

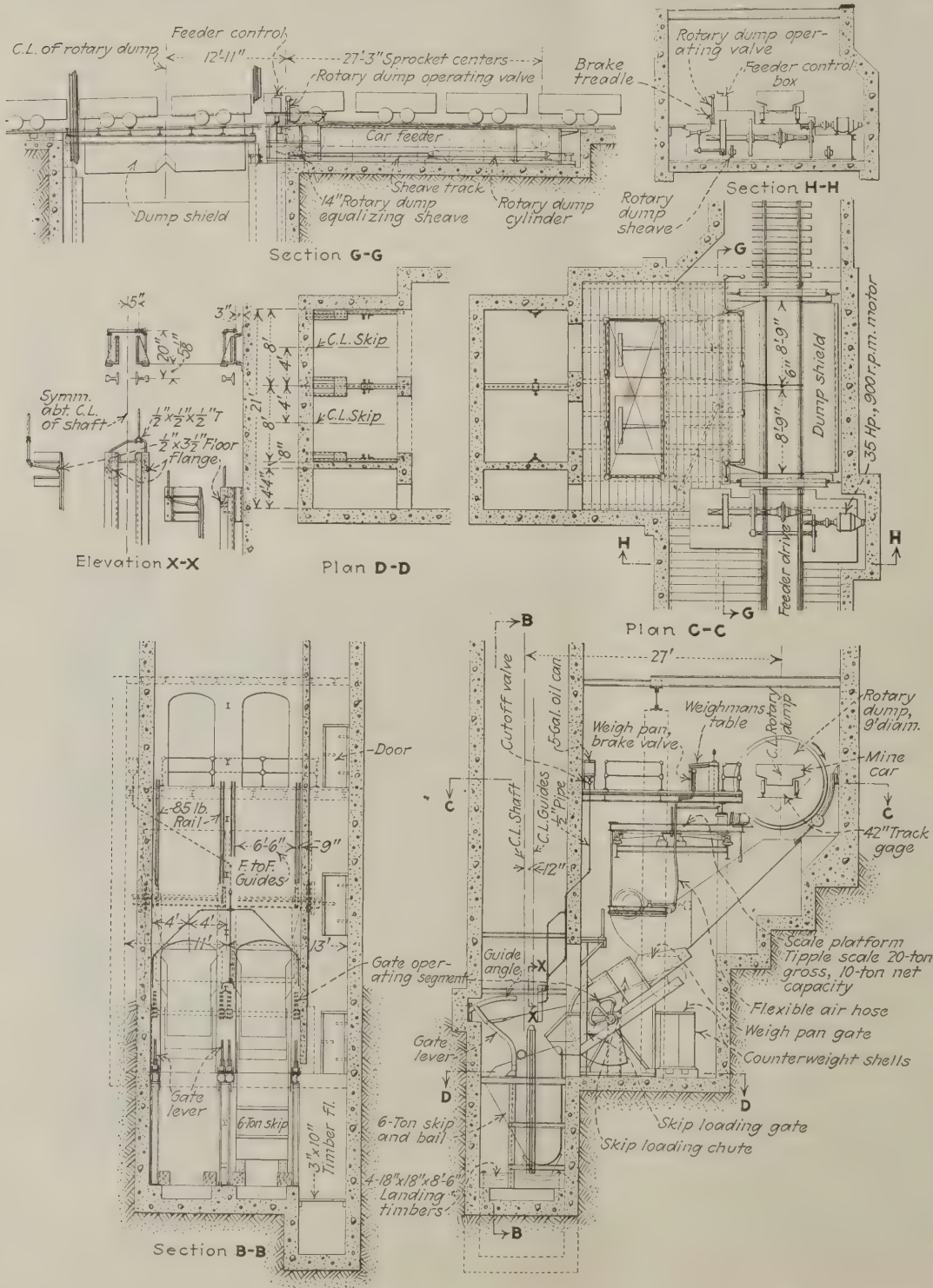
A single rope of equal strength would have been not less than 1½ in. in diameter and would have required a drum at least 8 ft. in diameter. This would have necessitated the installation of an engine of much slower speed and longer stroke entailing a considerably

increased first cost for the hoist. The double-rope system has afforded entire satisfaction in practice, and there is no reason why a similar system cannot be adopted at many operations especially those employing skip hoisting where speed is slow and the load heavy.

The skips have a nominal capacity of 320 cu ft., or about 8 tons of coal. They may, however, be surcharged without spill to a capacity of 10 or 11 tons. Each skip with its bail weighs a little less than 7 tons complete.

Exhaust steam from the hoisting engine is utilized for power purposes being passed through a pair of regenerators and a mixed-pressure turbine. These will be described in greater detail in the article on the power plant to appear later.

The mine is designed to use solid-end cars and



Shaft Bottom of Thermal Mine No. 4

Although the coal is dumped from the weighpan before the skip has landed, the gate in the skip chute is opened by the skip itself so that there is no spillage into the skip sump. As the skip starts to rise, also, this gate is closed so that it is unnecessary for the skip to remain standing until the last dribble of coal has run into it. This arrangement saves much time. The rotary dump handles two cars at a time. The skips will hold three cars of coal each but so far the regular loading has been only two cars or about 6 tons per skip. In the morning a single car is dumped in one weigh pan. At the next dumping two cars are discharged, one in each pan. The weigh pan with two carloads is discharged to the skip leaving one pan with no coal and the other with a carload. When the next two cars are dumped the pan with two carloads is discharged to the skip leaving the other pan ready to be discharged after the next dumping.



Pickers at Work on the Picking Tables

Four pickers and two pickmen on the lump table and four pickers on the egg table complete the usual complement of coal cleaners. This portion of the building is enclosed and may be heated. The loading booms, however, extend out into the weather.

overturning self-dumping cages at the auxiliary shaft. A two-car rotary dump is placed at the foot of the main shaft. The skips will hold three cars of coal each but so far have been regularly operated on a two-car basis. This gives a total load of about 6 tons per skip. The hoisting cycle at the present time actually consumes about 25 sec. This includes all the operations between hoists, about 8 sec. being consumed in loading the skip at the bottom. Cars are handled through the rotary dump in trips without uncoupling, the car hitchings employed embodying a swiveling spring drawhead at one end of the car and a single link between cars.

Cars are moved and spotted in the dump by means of a chain feeder about three car-lengths long. This is provided with lugs which engage lugs on the cars. Two sets of lugs are provided on the chain, one engaging the cars and one coming between them. Thus

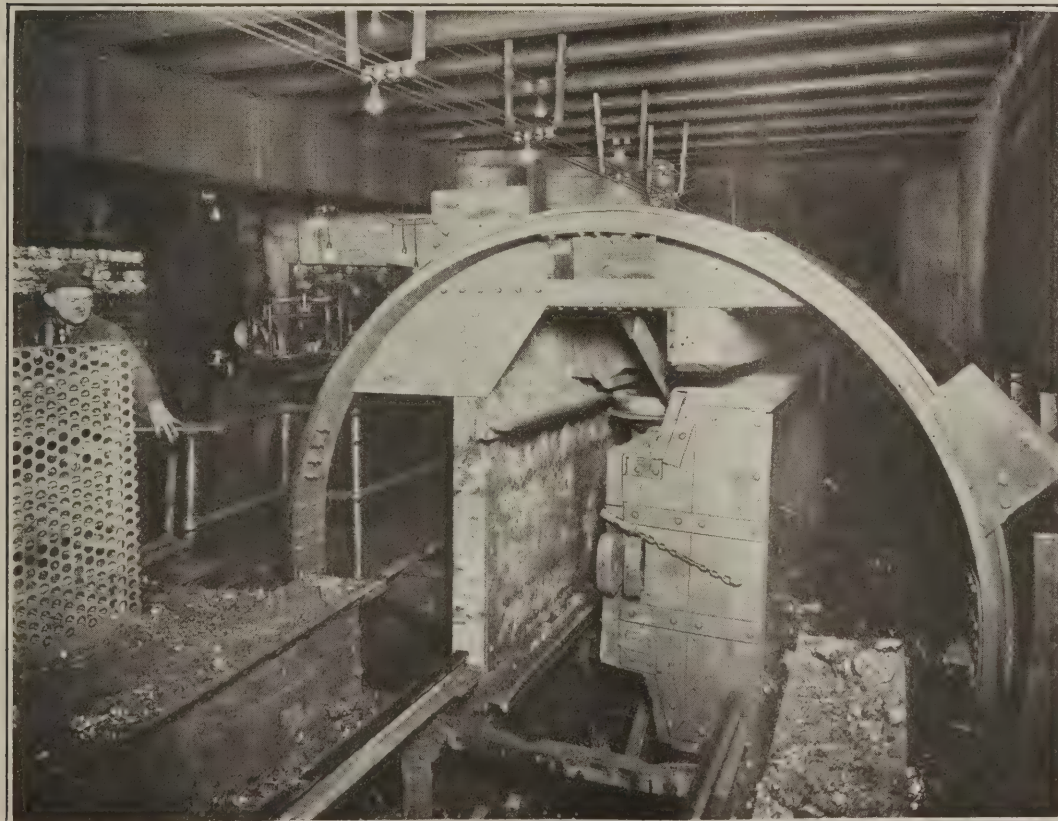
should one set miss the car, the next set would pick up and carry the trip along without interruption.

This car feeder is operated by a 35-hp. motor fitted with a solenoid brake. A foot brake also is applied to the headshaft as an auxiliary. The grade on the bottom is 6 per cent against the loads; that on the feeder is $1\frac{1}{2}$ per cent adverse, while the grade on the dump is 2 per cent with the loads, this inclination being extended for some distance below the dump in order to string out the cars and put tension on all of the couplings so that the pins will not fall out during the dumping process. Below this 2 per cent section the grade is gradually flattened out to level, so that trips when cut off at the dump run easily and uniformly to the end of the empty track.

Trips are brought in from the mine by the main haulage motor and left on the main bottom. The locomotive then proceeds by way of a crosscut to the empty bottom where it picks up its trip of empties and returns to the mine. The trip of loads left on the bottom is taken by a shunter locomotive which operates on a track beside the single-track bottom. This moves the trip forward until its first car may be coupled onto the string of cars on the feeder.

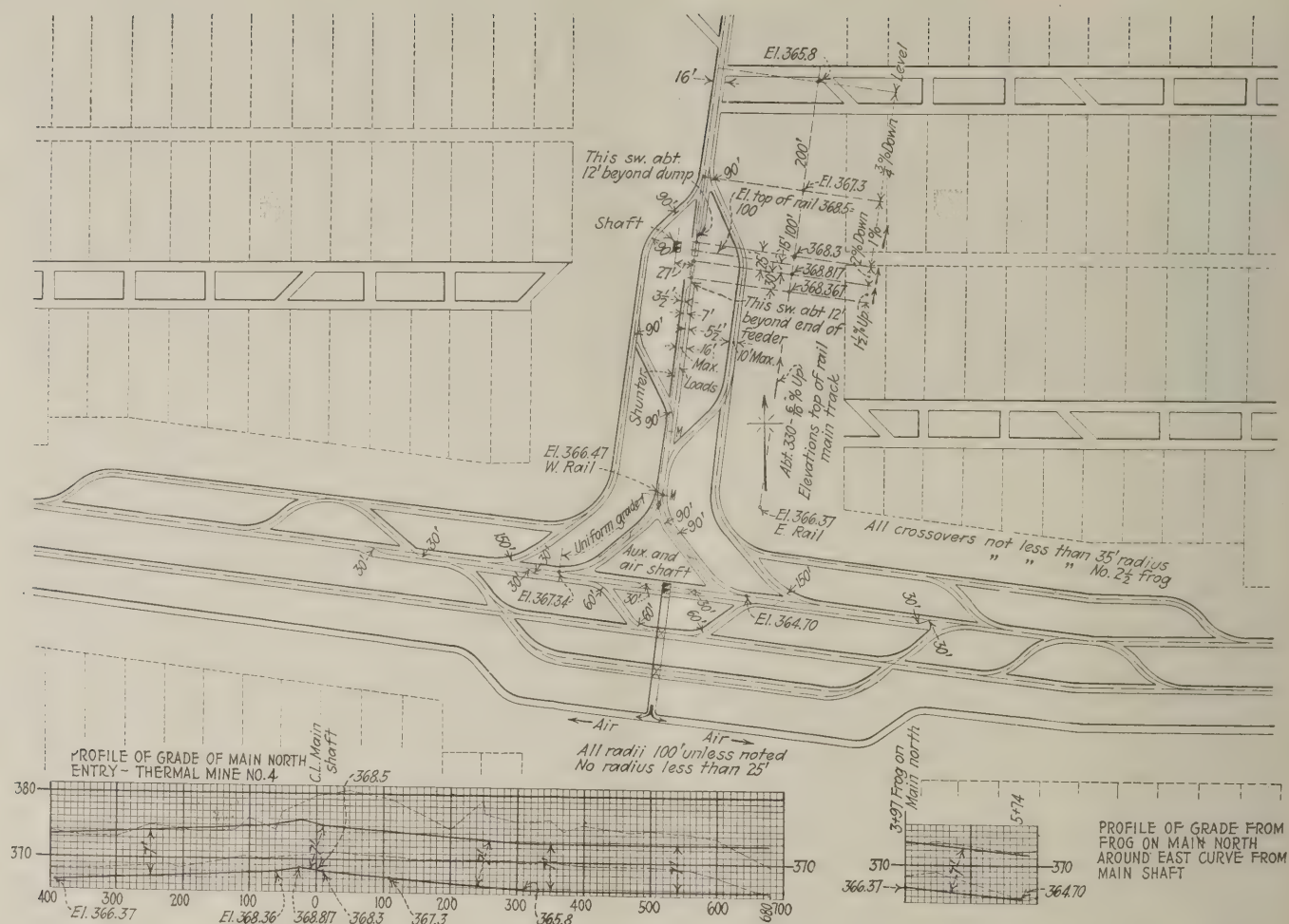
In this manner a continuous supply of cars is provided for the dump and feeder, and the whole string, sometimes as many as sixty cars at a time, is easily handled by the feeder. The trips are cut off just below the dump and a stop is provided so that the couplings may be slack when pins are to be pulled.

The car dump handles two cars at a time and is actuated by two air cylinders set horizontally in the shaft bottom alongside the feeder frame and under the floor. From the dump, coal from each car goes into a separate weigh pan. The second carload goes in on top of the first and is weighed with a double-beam scale. This scale is arranged for the ultimate installation of



Rotary Dump

This dump is air operated and controlled by one man, two cars being discharged at a time. It is unnecessary to uncouple the cars from the trip in order to dump their contents. The number of men employed at the bottom is thus appreciably reduced yet a steady stream of cars may be fed to the dump. Swivel couplings are of course used between cars which are of the solid-body type.



Bottom Layout of Thermal No. 4 Mine

Coal may be hoisted from either the main or auxiliary shafts, and the mine has been largely developed from this latter opening. Under ordinary circumstances, however, all hoisting will be done at the main shaft which is equipped to raise 6,000 tons per day. Careful planning was exercised in laying out this bottom.

either a weightograph or a self-recording device of some kind.

In ordinary manipulation, a single car is dumped in a weigh pan. On the next operation of the dump, two cars are discharged. This gives two carloads in one weigh pan and one in the other. From this time on, two cars are discharged at a time, and two loads of coal are ready for each skip as it lands. When three cars are handled in a skip the first car can either be dumped against the gate in the chute, or three carloads may be discharged successively into the pan and weighed cumulatively in the same manner as two cars. The weigh pan is of the ordinary gravity-operated type, with an air plunger to lift the brake weight.

When operating at maximum capacity, the weigh pan will be dumped as soon as the descending skip has passed the dumper level. The coal will thus reach the skip just as it lands. To prevent coal going into the sump and to avoid the necessity of holding the skip until the last dribble of coal has passed into it, a pivoted and counterweighted undercut gate has been placed at the lower end of the chute from the weigh pan to the skip. This gate is opened by the skip itself during the last 6 ft. of its descent. It is closed by a counterweight when the skip rises. This gate is provided with a discharge spout that projects over the side of the skip in the loading position and prevents spillage of coal between the chute and skip. At present the skip remains at the bottom only 8 sec. This time

interval, however, may be decreased as the operation of hoisting is speeded up.

All operations of handling coal on the bottom are performed by four men, a weighman, a check puller, a dumper who handles the feeder and the rotary dump, and a man on the shunter locomotive. In a cage-hoisting mine the weighman and check puller would be located in the tippie, leaving two men properly assigned to the bottom as against at least the four that would be needed for uncoupling, coupling and caging in a mine even approximately the size of this one if it were hoisting by means of cages.

It is anticipated also at this mine that the maintenance expense incurred in keeping cars in proper shape will be reduced at least 50 per cent on account of the solid-end construction and the easy manner in which these cars are handled at this operation.

The Donk Bros. Coal & Coke Co., owners of this property, is the largest company operating in the Standard District—or Belleville Field—of Illinois. This firm has now been in business for sixty years during which time it has controlled many coal properties. In addition to Thermal No. 4, it at present operates Maryville No. 2, with a capacity of 4,000 tons a day, and a coal washery with a capacity of 1,000 tons. The company also controls the St. Louis, Troy and Eastern R.R., on which coal is transported to the St. Louis market. Within this latter city and in East St. Louis, Ill., it operates fourteen retail coal yards.

Old Men More Subject Than Younger to Accidents

Habit Promotes Carelessness—Declining Activity Possible Cause of Accidents—Older Men Probably Succumb to Accidental Injuries—Men Who Have Had One Accident Liable to Have Another

BY THOMAS T. READ AND W. W. ADAMS*

IS THE new employee or the old and experienced one the more likely to suffer from accidents? is a question frequently asked at safety meetings. It is commonly thought that the new employee is the more liable to injury, because of his unfamiliarity with the hazards of his new job. On the other hand, it is often claimed that the man's very unfamiliarity impels him to use greater caution, which should compensate or more than compensate for his inexperience.

Again, it is argued that the old employee will avoid hazards through habit; but others claim that habit will more often cause a man to ignore hazards that would attract the attention of a less familiar workman who is conscious of his danger.

As a simple illustration of the latter argument, compare the two ways in which a small child and a grown person will button their clothes. The grown person, by force of habit gives no attention to what he is doing and fails to notice a needle left sticking in the buttonhole. On the other hand a child performing the same operation with conscious attention to each button and hole is more likely to see the needle and remove it before being hurt.

Doubtless there is truth in all these arguments, but their relative weight cannot now be determined, because we do not have sufficient statistical data from which to argue. Evidence supporting the view that accident frequently increases with the age of the individual and, presumably also, with his experience and length of service, is furnished by certain statistical data relating to fatalities among coal miners in England and Wales.

Statistics covering three three-year periods, 1890-92, 1900-02, and 1910-12, taken from the report of the Registrar General, Great Britain, show that accidental deaths are not only more frequent among the older miners employed in the mines, but fatalities are likewise more frequent among the older men engaged in other industries than mining. The latter fact is rather more surprising than the former, because older men, being less active and presumably, leading a more quiet mode of life, might be expected to meet with fewer hazards, considering all occupations. It is probable, however, that this factor is more than counterbalanced by the lesser degree of alertness of the older men.

Apparently a younger man, though engaging in

sports and activities making him liable to occasional injury, is yet able to escape under circumstances that might result in accident to an older man. The alertness of the younger and more active man seemingly more than compensates for the less active and therefore less hazardous occupation of the older class of workmen.

This view is further strengthened by the higher fatality rates among the older employees in mines.

The figures compiled from the reports of the Registrar General show that older miners almost invariably meet with a larger number of fatal accidents than younger men. The fatality rate for men about sixty-five years of age, for example, may be seven times as high as that for men under twenty-five years of age. In Table I are given the fatality rates, per thousand men,

in each respective age group indicated in the left-hand column. The rates are further classified as mine accidents and accidents in other industries.

One point not shown by these figures is the character of mining work performed by men of different ages. It is possible that many of the younger men are new employees, and hence are not assigned to the more hazardous jobs in the mines, until they have acquired the necessary experience to perform the work with a reasonable degree of safety.

Another point not considered is the lower bodily resistance of the older men, which may cause them to succumb to an injury from which a younger man might quickly recover. In the absence of evidence on these two points, however, the record indicates that, in the coal mines of England and Wales at least, fatality rates are higher among the older and presumably, more experienced employees.

Another factor that has attracted little attention as yet is what may properly be called the "personal accident hazard." This is recognized, to some extent at least, in the axiomatic phrase, "the best accident pre-

BORN UNDER AN UNLUCKY STAR

Though constellations and their groupings have nothing to do with the lives of men, the old belief is that there are individuals subject to unusual personal hazards who find danger even in relatively safe occupations. They are not necessarily reckless but may be temperamentally unable to scent danger or slow to avoid it. Most of us as years increase and strength declines fall under the influence of the unlucky star. Some men, for instance, are notoriously unsafe in the saddle and some become so with increasing years.

Table I—Fatality Rates of Miners in Great Britain
By Age Groups

Age Group	Mine Fatalities			Fatalities of Others		
	1890-92	1900-02	1910-12	1890-92	1900-02	1910-12
15-20.....	1.5	1.1	1.1	..	0.1	0.2
20-25.....	1.3	1.0	1.1	0.2	0.2	0.2
25-35.....	1.6	1.1	1.2	0.2	0.1	0.2
35-45.....	1.8	1.4	1.3	0.3	0.2	0.3
45-55.....	2.4	1.7	1.4	0.5	0.4	0.5
55-65.....	2.4	2.0	1.6	0.7	0.8	0.7
65 and upward	3.0	2.6	.8	1.1	1.3	1.5

NOTE—Published by permission of the Director, U. S. Bureau of Mines.
*Acting assistant to the director and statistician, respectively.

ventive is a careful man." It is probable, however, that this phrase implies, in the minds of most people, that any man who wishes can put himself in that category and so eliminate most of his accident hazards. But such reasoning is faulty. A deaf or blind man has a personal accident hazard owing to his disability, and no amount of care on his part will serve to eliminate though it will lessen the degree of hazard. There is good reason to suppose the existence of other personal characteristics that, though less evident than blindness or deafness, still constitute true accident hazards.

The only statistical studies that throw any light on this matter are those made by Karl Marbe, professor in the University of Würzburg, in an effort to support his hypothesis that a man's liability to accident can be measured by the number of accidents he has already experienced. The studies are based on the records of an insurance company that insured commissioned and non-commissioned officers in the German army against accidents of any kind.

Three thousand individuals, taken at random from among those who had been insured for ten years or more, were selected and their individual accident records plotted and compared. These were divided into three groups as follows: (a) Persons who had had no accidents in the first five years of their insurance period, (b) Those who had had but one accident in this period, (c) Those who had had several accidents in the same period. The average number of accidents for each group for the second five years was then computed, and is as in Table II.

Table II—Average Number of Accidents in Second Five-Year Period

(Of men grouped by accidents in first five-year period)

Group A (No accident in first five-year period).....	0.52
Group B (One accident in first five-year period).....	0.91
Group C (More than one accident in first five-year period)....	1.34

In other words, a man who has had an accident in his first five-year period is nearly twice as likely as a man who had no accident in the first five years to have an accident in his second five-year period. A man who had more than one accident in the first five years is more than 2½ times as liable to accident in the second five years as the man who had no accident in the first five years.

This computation was checked by dividing the same individuals into two groups: (a) Those who had no accidents in the first two years of the insurance period and (b) Those who had one or more accidents in the first two years. Computing the average accident rate during the last two years of the insurance period for each of these groups, they compare as in Table III.

Table III—Average Number of Accidents in Last Two Years of Insurance Period

(Of men grouped by accidents in first two years)

Group A (No accidents in first two-year period).....	0.24
Group B (One or more accidents in the first two-year period)....	0.42

In other words, a man who has had an accident in the first two years of his insurance period is, approximately, twice as likely to have an accident in the last two years as is a man who had no accident in the first two years of the same period.

The question immediately arises, however, as to whether the persons injured in the first two-year and five-year periods were not engaged in occupations

involving a greater hazard than those in which the persons who had no accidents in that period were engaged. For the purpose of checking this the individuals were divided into three classes of hazards; namely, the first class included bureau employees engaged in office work, the second those employees on foreign duties, the third class embracing those engaged in especially dangerous duties. Analyzing each of these classes it was again found that the persons who had accidents in the first two or five years of their insurance period were more liable to accident in the second or last two or five years of the insurance period.

The possibility of hazard outside of the occupation of the individual, such as habitually engaging in certain forms of sport, was also investigated statistically, and this method also confirmed the first general conclusion that people who have had accidents are more liable to have more.

The conclusion Professor Marbe draws from his study is whenever a man has an accident his insurance premium against subsequent accidents should be increased. A more important conclusion with respect to accident prevention, however, is the obvious necessity for increased care on the part of those who have had accidents. It is perhaps too generally supposed that an accident automatically makes a person more careful; but it is at least doubtful whether this is true. It seems safe to conclude from the statistical studies that when a man has had an accident it is, on the average, a notice to him that he needs to take unusual care to prevent future accidents.

British Also Taking Stock of Resources

GREAT BRITAIN is re-acquiring apparently that interest in industry that marked the end of the eighteenth century and the beginning of the nineteenth. With the Archbishop of Canterbury sinking the first pick into the downcast shaft of the Betteshanger Colliery and the Prince of Wales writing a foreword to the book on "Fuel," recently contributed to the Resources of the Empire Series, we see a revival of that interest in industry which made an England of an earlier day known as a "Nation of Shopkeepers." Our Canadian friends likewise have held celebrations as significant at the opening of briquetting works. For the volume on "Fuel" about to be reviewed not only the Prince of Wales but Sir Eric Geddes and Sir Robert A. Hadfield have written introductions. All of which open up on a book with 83 pp. on coal, lignite and peat, 15 on carbonization, synthetic processes and carbonaceous wastes, 67 on petroleum and 6 on power alcohol.

The first section on coal, lignite and peat is by Professor Henry Louis, a well recognized authority in the coal industry. However we fear an American reader will be somewhat dissatisfied because the analyses given are relatively few and not detailed as to origin though they are given much space. In justification it must be acknowledged that the British government has provided no such storehouses of information relative to analyses as has been afforded by U. S. Bureau of Mines.

In a country like Great Britain where the coals vary in volatile matter with depth and igneous intrusions if more analyses were given it would be easier to ascertain the range of carbonization in any one district. The book is issued by Ernest Benn, Ltd., of 8 Bouverie St., London, England, measures 7½x10½ in. and contains 208 pp.

Technical Sessions, Illinois Mining Institute

Tracy Describes the Twin Agents of Death—Open Door and Open Light — McCoy Tells How He and His High-School Boys Have Developed Telephony — Farnham Relates How India Mines Coal

THE OPEN light and the open door are the "twins" which endanger coal mining most seriously, said Mr. Tracy in an address on mine explosion causes and remedies before the Illinois Mining Institute. He attacked black powder as having killed 857 men in seventy-one United States explosions. Permissibles, properly used, he holds would greatly reduce accidents. The "twins" of the open miners' light and the carelessly opened door which shortcircuits mine air are most dangerous between Saturday at 6 p.m. and the following Monday morning at 8, and therefore should be guarded against during those hours most scrupulously. Bureau of Mines statistics show they have caused the deaths of 2,300 men.

The open door, so often left open by plain carelessness, is one reason why no mine is safe. Mr. Tracy said the fact that an ordinary safety lamp may not detect gas is no proof that the mine cannot have a gas explosion. Such a lamp cannot detect gas in a quantity less than one per cent. But even 0.03 per cent of gas, if allowed to accumulate during a period such as a week-end, especially by short circuiting of air, rolls up in sufficient volume to make trouble. There have been explosions by gas in mines which normally generate only that small volume.

He advocated the use of permissible explosives, more comprehensive state laws that would require the service of mine examiners with territories small enough to be carefully covered, and greater care by miners, fewer doors to give opportunity for accidental short circuits of air, the use of methane detectors, not lamps, in gas tests and the maintenance at every mine of auxiliary power for ventilating fans. He spoke favorably of the new code of safety accepted by the operators of Utah, following the Castle Gate disaster, which takes effect July 1.

President D. D. Wilcox, remarked that Utah is not likely to live up to the new stringent code very long. The mutual effect of the explosion at Castle Gate is about like that caused by the Cherry mine disaster in Illinois in 1908. In that year Illinois adopted some impracticable regulations, many of which are not enforced.

NOTE—The meeting was described in last week's issue, p. 917.



First Locomotive at an Indian Coal Mine

The Goodman company delivered this electric trinket to the Tata Iron & Steel Co. for use in its Jamadoba colliery in the Jheria field, about 180 miles northwest of Calcutta only eighteen months ago. It helped mark the transition in Indian mining from the primitive to the modern. The transition is slow but is getting a good start in the mines of one or two companies.



Indian Type of Loading Machinery

The common practice in India is to hoist coal out whenever labor is available and dump it on the ground until orders are received for shipment. When these come, the usual method of transporting coal from pile to car is by women like these, with baskets big enough to hold about 75 lb.

A discussion of the relative merits of black powder and permissibles followed in which Thomas English raised the point: Why does the Bureau of Mines advise the use of no more than 1½ lb. of permissible per hole, answering it by saying a greater quantity would generate too much carbon monoxide.

The story of the first real success in radio communication between the surface and the inside of a coal mine by ground conduction was told the Institute by A. B. McCall of the Springfield high school faculty and consulting engineer for the Bureau of Mines. He told the story of how he and the radio club of the high school had interested themselves in the problem and how they got the results at the Woodside mine near Springfield that have attracted the attention not only of the state department of mines and minerals but of the Bureau. A descriptive article on their work will appear in *Coal Age*.

SINK ELECTRODES BELOW GROUND WATER

The method they have developed depends upon vertical transmission of voice currents between a pair of electrodes sunk 15 or 20 ft. into the surface over a mine and another pair in the mine, each pair connected to a 39½-lb. telephonic set. The ground is almost constant and forms an excellent conductor unless thick deposits of metal ores or a heavy volume of water intervenes. These conditions will seldom be met in coal and were not encountered at the Woodside mine. There, the surface electrodes were sunk below the ground-water zone and easy communication established with a set underground. It was determined that the line of the underground electrodes should parallel that of the electrodes on the surface but that audibility can be secured with variations up to an angle of 60 deg.

The practical application of the method to assure communication between the top and entombed but not incapacitated miners caught by explosion or fire, would require the maintenance of such sets in refuge chambers in various sections of a mine. Pairs of electrodes would then be maintained on the surface to which



High-Grade Technical Men at an Indian Mine

This is the type of workmen that has to be depended upon to do much of the development of Indian coal mining from the primitive to the modern. The gentleman in the center wearing a black turban is the chief electrician at one colliery. However the equipment is nearly foolproof and is successfully operated by the natives after a little training.

a portable set duplicating those in the mine could be attached at any moment during an emergency.

NO WIRES OR RAILS USED IN CONDUCTING LINE

Previous radio communication with underground places have depended largely upon the presence of wires, rails or other metallic conductors, Mr. McCoy said, even though breaks might have existed in such conducting lines. This new system depends upon ground conduction alone and can be operated at depths limited by the distance between the electrodes of each surface pair. Mr. McCoy and his high-school boys learned that the operating depth can be up to five times the distance between electrodes. The experimenters hope to carry their work farther and prove the value of other radio circuits which will further simplify the already simple one that has been used successfully at Woodside mine.

Coal mining in India proved a most interesting and somewhat amusing process to the Institute as pictured in word and slide by S. W. Farnham of the Goodman Mfg. Co. While a storm raged outside sweeping chairs off the deck and eventually driving the boat to tie up for an hour, Mr. Farnham spoke of the immense deposits of India, especially of the Jharia and Raniganj fields where many beds exist, some of them 20 ft. or more thick, the mining methods in which have been most primitive.

WIFE AND FAMILY HELP HUSBAND UNDERGROUND

In the Jharia field the thickness of the coal is no less than 200 ft. so that a big mine could operate for years under a surface of not more than 40 acres. The miners are of the agricultural caste and mine and load coal only between crop seasons and at 32c. a ton, each man taking his wife and probably his whole family



Modern Coal-Mine Top Works in India

The plants at two mines are shown in this picture. They are close together because the coal deposits under some of the land in the Jharia and Raniganj fields often total 200 ft. in several workable seams. Thus a tract of 40 acres often has enough coal in it to justify the erection of an expensive and permanent top plant. The men in the foreground are part of the electrical gang of the mine.

down into the mine with him while he is at work. Ventilation such as American miners get would not be endured by the Indian who fears catching cold from fresh air underground. The result is mine atmospheres are usually foul but entirely satisfactory to the Indian while he gets out his 1½ tons a day which is pushed out of the mine by the women in 1,200-lb. "tubs" or larry cars at a haulage cost to the mine owner of five cents a ton. Most of the coal from both slope, shaft or strip mines is dumped on the surface as fast as the operator can get men to mine it. It is loaded onto railroad cars by women with baskets whenever there is a shipment to be made.

In underground mining the best practice calls for the driving of 12-ft. entries dividing the coal into blocks which are removed on a retreating basis so that extraction often is high. Usual practice at those mines which are near rivers is to flush sand into the worked-out areas thus supporting the roof behind the active operations.

But coal mining in India recently has been turning to more modern and bigger-scale methods, he said. The first electric locomotive was put to work in the fields only 18 months ago. Skip hoists are being installed in a few mines and the haulage equipment is steadily getting larger.

Removed Ventilating Tubes at Gartshore And Explosion Resulted

IN GREAT BRITAIN the reports on mine explosions come long after the event, perhaps because the inquiry is quite thorough but more often for reasons that extenuate rather than explain. The report on the Gartshore explosion has just come to hand though it occurred as long ago as July 28 of last year. The official inquiry was held at Glasgow, Jan. 23-24, and twenty-two witnesses were called. It appears that at this colliery, which is in Dumbartonshire, Scotland, a 6x8 ft. roadway had been driven for use as a sump from the bottom of a shaft 558 ft. deep. The roadway was 590 ft. long and crossed three pitching seams of coal. It was driven quite crookedly, so much so that it almost returned on itself. It was ventilated by a pipe of 17-in. diameter which carried air from the return current of the mine to the face of the roadway, about 3,000 cu.ft. of air being thus delivered. Naked lights were used, but a flame safety lamp was kept burning near the roof at the face.

The ventilating pipes were removed from the face outwards as soon as steel girders and brick walls had been erected to support the roof and sides. Walls were being erected near the mouth of the roadway when an explosion occurred killing eight men and injuring two. Safety lamps, a cap with an acetylene lamp attached, a cap with a "naked-light" lamp attached and a can containing calcium carbide were taken from the sump-road 20 ft. from the mouth. The use of ventilating pipes in Great Britain, the danger of withdrawing them before a positive air circuit is provided for their replacement and the deliberate way the British follow up even minor accidents are interesting features in the record.

IN SPITE of heartbreaking obstacles in the path of underground loading, there's Joy among the loading machine men.

Sleeve Bearing Keeps Oil From Spattering Motor

Oil and Dust Carrying Bearing Lubricant Causes Electrical Equipment Failures—Bearing Excludes Dirt and Prevents Oil Leakage

BY R. PRUGER*

LEAKAGE of oil from the housings of bearings is rather a common source of trouble not only in the case of electric motors but wherever machinery is used. However, as long as no damage results from such leakage, a little attention on the part of the operator will take care of any escaping oil and keep the installation neat and clean.

With electrical machinery, however, the trouble is far more serious, the escaping oil easily reaches the windings or commutator and finally causes a short circuit or other serious damage to the machine. This may interrupt operation and entail expense for repairs. It will also result in considerable waste of lubricant, which is quite an item where a large number of motors are used. Fig. 1 shows how leakage occurs.

In order to remedy such defects, a "sealed-sleeve" bearing has been designed. If a perfect air seal can be maintained, that is, if the air cannot get in, it is obvious that the oil cannot get out. Preventing air currents from passing through the housing should, therefore, eliminate the leakage.

HOUSING MADE ALMOST WHOLLY AIRTIGHT

Though it is not possible to maintain an absolutely air-sealed housing, yet the design can be made such that it will approach this condition, and when further supplemented by mechanical devices, for the purpose of taking care of what little oil might still get out, a housing can be made which permits operating at high speeds despite the resultant air suction set up by adjacent ventilating blades and other moving parts.

This has been accomplished in the design as shown in Fig. 2. It may be noted that the bearing shell itself was not changed but remained standard, thus being interchangeable with bearings formerly used. The housing, however, is of a new type.

The cover, ordinarily found at the outside of the

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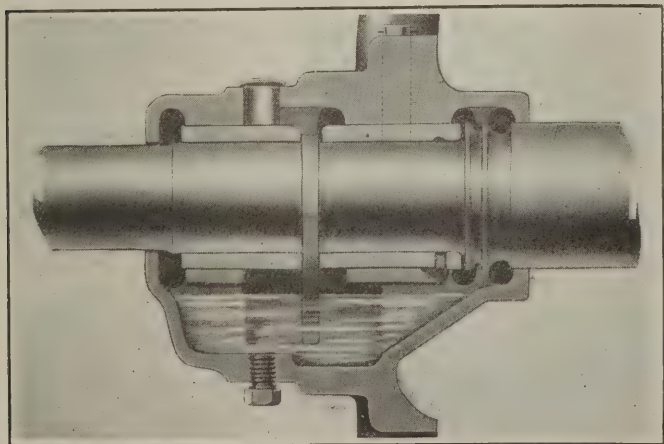


Fig. 1—Motor Bearing of Conventional Design

Note the openings in the housing through which air and dust can enter the bearing, mix with the oil and be carried into the motor windings.

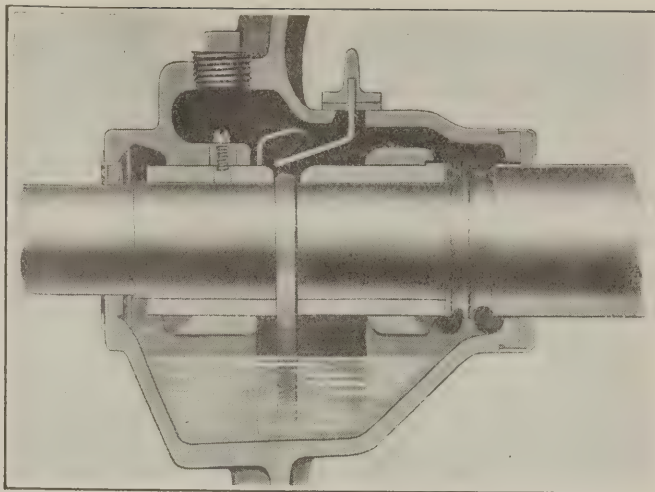


Fig. 2—Motor Bearing with Sealed Sleeve

This illustration shows how effectively this bearing is sealed against the entrance of air or dust and prevents the leakage of oil or oily vapor into the motor.

housing, that closes the opening through which the oil ring is admitted, was placed on the inside of the housing. This cover need not be removed, except for changing the bearing. This new location has the advantage that it permits the cover itself to be carefully bolted down, fully compressing the packing under it. As it is thus practically out of reach on the assembled motor, no one is likely to attempt to remove it.

For the purpose of inspecting the oil ring, a large pipe plug has been placed on the outside end of the housing. This plug can be removed easily and put back into place, air tight, with equal ease.

The dowel pin, which ordinarily keeps the bearing from turning and which is inserted from the outside wall of the housing, has been placed on the inside of the housing directly accessible through the pipe plug hole. Any sucking action has thus been rendered harmless, as it will be within the housing itself.

SHOULD NOT BECOME EVEN OIL SOAKED

The drain plug usually found at the lower part of the housing has been omitted. Such a plug certainly should not leak oil but that is not enough, it should not even become oil-coated. The effect of air currents passing over wetted surfaces and carrying oil vapors into the machine has been found quite an objectionable feature. For this reason every effort has been made to omit wherever possible all tapped holes, as it is found that pipe plugs below the oil level will leak. Even if plugged correctly at first, frequent unscrewing and oftentimes careless replacing will cause a small leak. This results in large wetted surfaces over which the intruding air passes. Experience has shown that a sealed housing which does not permit the air to enter will also exclude dirt and dust. With grinding of bearings, due to dirt in the oil, eliminated, the life of the bearing and the periods between changing of oil may be lengthened considerably.

Inasmuch as the shaft of an electric motor has a certain amount of end play, which at times may become quite pronounced, the shaft, when moving toward the inside of the housing becomes wetted by the oil vapors in the housing. On its outward movement this wetted surface is exposed, and at high speeds, small particles of oil are thrown off. As in the previous case, air currents pick up these particles and carry them into the

motor, where they are deposited upon the windings. It has been shown that on motors running at 3,600 r.p.m., this feature resulted in covering windings and adjacent parts with a film of oil within a few days' operation.

In order to eliminate this defect, a conical collar, forming a seal and acting as an oil thrower, has been placed upon the shaft on the inside of the housing of 3,600 r.p.m. machines. This collar is slotted to permit its being held on the shaft by reason of its own spring or clamping action, which permits automatic adjustment. This collar runs in a stationary cone-shaped piece of the same cone angle, leaving a small running clearance between the two conical surfaces. Any oil vapor reaching this clearance space is held there by capillarity when the machine is at rest and is quickly pulled toward the inside of the housing by centrifugal force when the motor is in operation and is thrown off by the lip of the revolving cone.

The oil thus thrown off is deposited on the inside of housing walls, where it is free to run downward. For this reason, the stationary cone is provided with a groove which guides the oil back into the oil well.

A similar action takes place on the inside end of the housing. Here, however, the shaft is provided with oil throwers of standard design, permitting the use of standard rotors the same as on the old standard machines. Again, the same action of small particles of oil being thrown off when shaft end play takes place is found. Such small quantities of oil as are thrown off at that point are caught by the outer chamber of the housing cap and rendered harmless. The soft felt washer placed on the inside and the soft felt lining in the outer chamber absorb this small quantity of oil and lead it back by capillarity into the oil well.

Soft felt washers at either end of the housing are primarily for the purpose of making the housing dust-proof and not to prevent oil leakage. In very dirty places, a double chamber cap, such as shown on the inside end of the housing, may also be provided at the outside end. Very fine dirt or grit deposited upon the shaft may find its way into the housing once it is worked under the felt by the end play. However, when the cap is provided with a double chamber, any dust

deposited upon the shaft can reach only up to the cap, and the shaft surface next to the felt washer and within this outer chamber is thus protected from any deposit. This, however, is found necessary only in very dirty places where much fine hard grit is found suspended in the air.

CIRCUMVENTING SUCTION OF FAN BLADES

As the action of fan blades and blowers driven at high speeds by the motor sets up quite a vacuum next to the inside end of the housing, it is obvious that this vacuum is communicated to the space within the housing itself, as it is impossible to seal the housing absolutely on account of the shaft passing through. As a result of the housing being divided into several separate chambers by the bearing supports, unbalanced air pressure may result in case the oil level is high enough to close the lower cored openings. It is for this reason that a cored channel which establishes communication between the chambers, thus balancing the air pressure, is provided at the top part of the housing, for the oil level next to the inside end of the housing may be raised if a vacuum greater than that found elsewhere in the housing exists.

At high speed, the action of the oil ring frequently sets up a surging of the oil, forcing it in the direction of rotation of the ring, which action may cause a slight overflowing at the overflow plug. This may be prevented by means of baffles which are cast into the housing and form a quiet level in the chamber next to the overflow plug.

It will be observed that where soft felt washers, such as are shown at the outside end of housing, are used, the metal cap has an inside bore diameter of at least $\frac{1}{4}$ in. larger than the shaft diameter, which is for the purpose of lending resilience to the soft felt. If the felt were compressed at a point close to the shaft, it would in a short time wear out, becoming glazed and hardened, causing it to burn and char. Soft felt of a good quality, if left free to expand, will act somewhat like a brush, and wear almost indefinitely, accomplishing its function as dust protector.

It is sometimes found, that machine operators fill the housing by removing the plug at the top. This is in-

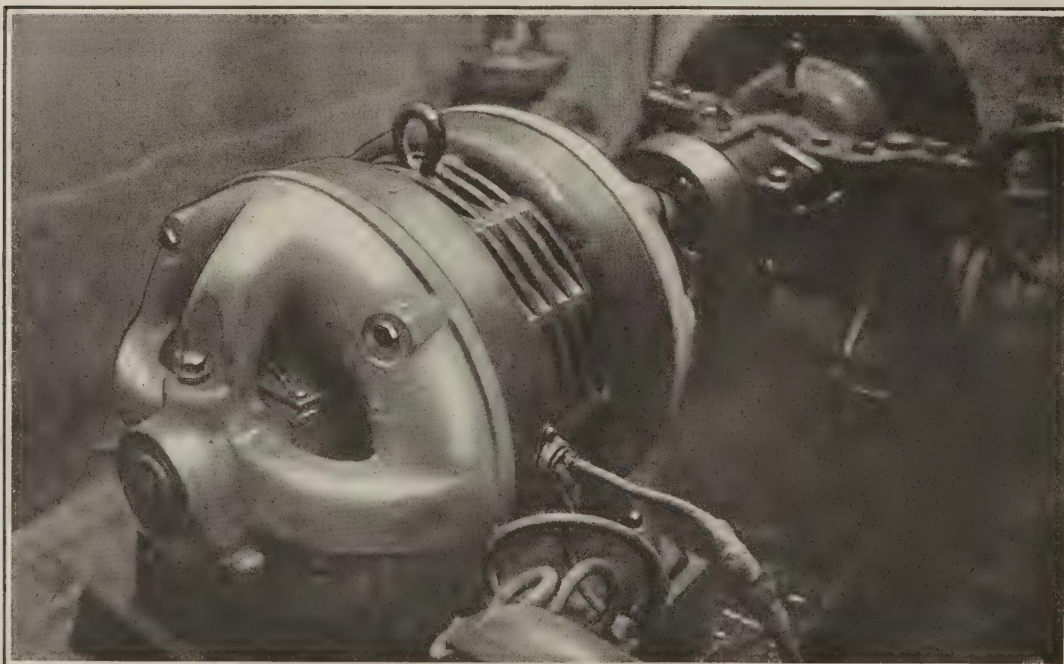
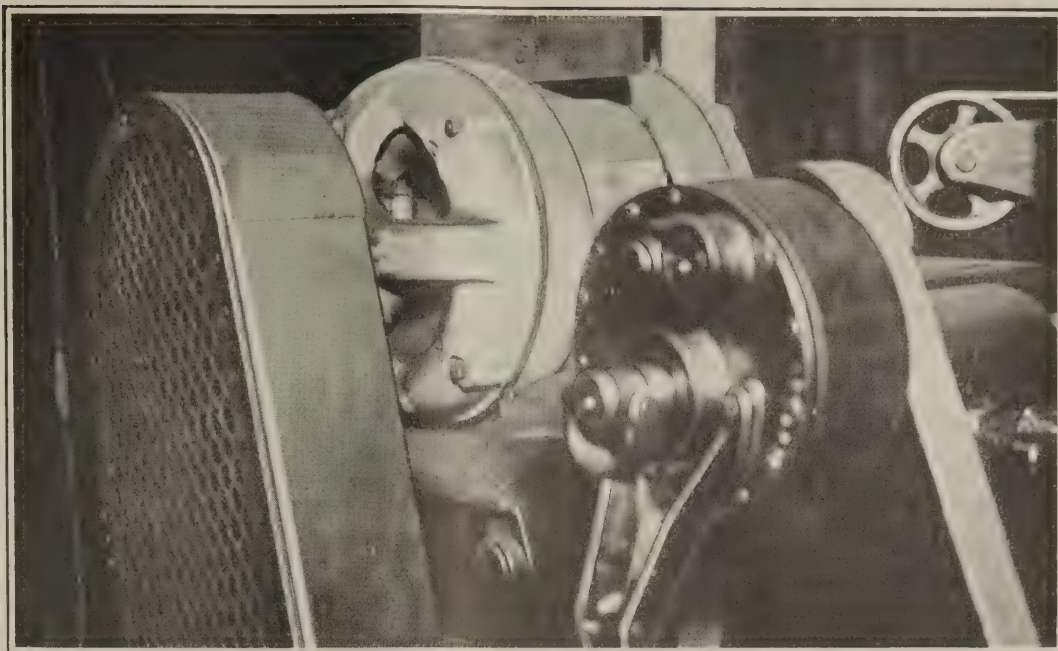


Fig. 3 — New Type Bearing

Although this bearing has been in service for many months, there is no leakage of oil into the motor, the shaft being actually rusty.

Fig. 4 — Dust-Covered Motor

This squirrel-cage motor has been operating continuously in severe machine-tool service for nearly a year with no oil being added to the bearings. The dust covering the bearing is perfectly dry and can be blown off easily.



correct and unless the overflow plug is watched closely when filling, the oil level may rise so rapidly that it may also overflow into the motor through the housing bore. The soft felt washer located at the face of the housing prevents this overflowing effectively for a long enough time that the oil can find its level.

FREEDOM FROM DIRT PROLONGS LIFE OF OIL

This type of bearing requires practically no attention, and it has been found that it is best to postpone oiling until the need for it becomes apparent. This may be due to the natural breaking down of the oil or to dirt which may eventually become mixed with the lubricant.

It is always advisable to renew the oil soon after a new motor has been put into service to make sure of

getting rid of core sand. Though the motor manufacturer removes as much of this as possible, some of the recesses in the housing may contain hard deposits which, when softened by the oil, become loosened. A test sample, drawn out of the oil reservoir by means of a small pump, would soon disclose this fact.

It has been proved that the sealed-sleeve bearing requires less attention than is now common with electric motor operation, and in fact an occasional inspection is sufficient to convince the operator that the proper oil level is being maintained and that no refilling is required. Operating conditions and quality of lubricant used will easily set the period required for oil renewals, which may be from three to six months or even longer. A good grade of light machine oil is preferred for use with the leak-proof sleeve bearing.

How to Ground Electrical Mining Machinery

With Bonded Track or Pipe Beware Lest Changes Destroy Ground — Interconnect Pipes Electrically — With Gathering Pumps Do Not Rely on Pipe

BY CHARLES M. MEANS
Consulting Engineer, Pittsburgh, Pa.

THE IMPORTANCE of grounding the frames, bed-plates and all metallic non-current carrying parts of stationary electrical equipment is fully evidenced by the fact that all safety rules require it. It is doubly important, when we are dealing with underground equipment because of the character of the surroundings. Close adherence to the rules for grounding is strictly necessary for all power equipment, regardless of the voltage of the circuit to which such equipment is connected.

The object of grounding is to maintain all metallic non-current carrying parts at zero potential or at the same potential as the surrounding earth. In order to create this condition such parts must be in intimate contact with the earth.

This naturally brings us to the problem of what can be considered an adequate ground connection and how to obtain it in a mine. The conditions existing in coal mines vary between wide limits and no definite rules for grounding can be laid down that will fit every case.

Where a well-bonded track or a relatively long pipe line laid on the bottom is available, the problem is not difficult of solution. But it is important to know that the track is not likely to be disturbed or the pipe line broken near the point where the ground is attached. This, however, is a problem of maintenance, for the permanency of the ground is dependent on inspection and upkeep.

When equipment is located remote from a bonded track or a pipe line, the problem may involve difficulties. In many mines the roof and bottom may be quite dry and therefore act as an insulator. Under such conditions it will be difficult to secure an adequate ground; but in turn the hazard involved under such conditions is likely to be of less consequence than in wet places.

It should be the rule, nevertheless, to apply a good ground to all stationary equipment, no matter where located. It may be necessary to run the ground wire a long distance to obtain an adequate connection to the earth. Such a wire should be run on insulating supports and in no case be allowed to lie on the bottom

NOTE—Article entitled "The Grounding of Electrical Mining Machinery" delivered at meeting of West Virginia Coal Mining Institute, Elkins, W. Va., June 17-18.

along the entries, or in contact with the sides of roof.

The method of installing the ground connection is important. It should receive the same care as the line wires. The wire should be accessible and in plain view at all times to admit of ready inspection. Its size can be determined by local conditions but should never be smaller than No. 6.

GIVE GROUND CONNECTION SAME CARE AS FEEDERS

In underground substations great care should be taken to provide adequate ground connection. It is to the interest of safety to provide more than one ground connection from all equipment so located. The ground wire may be soldered, brazed or otherwise connected to the machine in lugs that are held by clamps, bolts or studs. The frames and bedplates of motors and generators, all supporting metallic frames on the switchboards or controlling devices, as well as the metallic covering of all cables, should be connected to the earth or grounded return.

Motors and controls used to operate permanently located pumps should be treated in the manner described for substations. In pump rooms, however, the difficulty of securing a permanent ground is somewhat lessened by the presence of pipe lines which can be used for the purpose—but the ground connection should include interconnection of all pipe lines, either through the ground wire or by permanently connecting the pipes.

Gathering pumps present a somewhat different problem, and each case must be handled as conditions warrant. In general it is safest to run an independent line to a permanent ground from the suction or discharge line. This practice eliminates the possibility of shock when disconnecting pipe lines and is imperative where wood or fiber water lines are used. In many cases, where the motor and control is mounted on the same base as the pump, the elements of safety will be met by eliminating the ground connection entirely.

BEWARE OF STOPS ON HEAVILY SANDED RAIL

Trolley locomotives come under the head of portable equipment and are under all ordinary circumstances in intimate contact with a bonded track which answers every purpose of a proper ground. Exceptions to this assumption arise when the locomotive stops on a heavily sanded rail or is run onto a section of track that is not bonded. Both of these exceptions are the result of operating conditions that should not be allowed to exist.

The storage-battery locomotive represents a type of electrical equipment that does not require a ground connection, as its electrical circuit is complete within itself and should be insulated from the frame.

With machines for mining, loading, drilling and conveying coal, an entirely different problem has to be met, and one that does not always find a practicable solution. The legal requirements of certain foreign countries demand the grounding of frames of mining machines, but that is not required in this country.

It is a fact that in certain mines a hazard is created by not grounding the frames, but in most mines very little if anything is to be gained, for a ground wire might be a source of danger. When we speak of mining machines, we naturally think of the shortwall type which is in general use. While cutting across the face or being dragged to or from the truck the frame is in intimate contact with the earth.

There may be exceptions to this case. The frame

may happen to be insulated from the bottom to such an extent that a man, in the event of a short circuit between the winding and the frame, might get a shock while standing on the floor of the mine. In dry places this usually is not a hazard, but it may be a source of danger in a wet mine.

A greater hazard can exist when the machine is loaded on a truck, as at this time it may be on a track that is insulated from the earth. Even there the value of a ground wire is questionable, as it would be better to bond the rails. With machines that cut coal while resting on a track and with loading machines and conveyors a condition arises similar to that when a short-wall mining machine rests on a truck. This also can be met by bonding the rails where necessary. Equipment fitted with caterpillar trucks is in sufficiently close contact with the earth to be considered properly grounded.

A somewhat different problem is involved in the use of portable electric drills, and it is considered advisable to use a cable having a separate conductor for grounding. Grounding is deemed necessary by the fact that the drill may not be in contact with the earth and may be actually in the hands of the operator.

SURGES MAKE ALTERNATING CURRENT DANGEROUS

Up to this time the voltage or character of current has not been mentioned inasmuch as all power circuits present a certain hazard due to their ability to produce a shock that may result fatally. The hazard varies with respect to the voltage as well as with the character of current. Of ordinary underground current direct current of 250 volts probably presents the least hazard and 440-volt alternating current the greatest. The hazard of shocks from direct current at a given voltage is less than from alternating current having the same voltage reading. The alternating-current voltage shown on a voltmeter is the mean voltage and not the maximum and that must be remembered whenever shocks are being considered.

Alternating current has the added danger that the voltage may be materially increased by surges on the transmission line, or contact with a high-potential circuit due to an accident at the transformer or switching equipment.

It will probably be in the interest of safety to have all underground alternating-current circuits used for operating three-phase mining machines and similar equipment connected "Y" with the middle point grounded. The cases of all transformers connected to circuits supplying power for the operation of underground equipment should be properly grounded with a wire independent of that used for the grounding of lightning arresters.

The lack of proper grounding of electrical equipment has been responsible in the past for a number of fatalities in the coal-mining industry and still continues to be an important hazard, but with our increasing knowledge of the value of grounding and the exercise of reasonable care, it is being materially reduced.

THE LONGWALL SYSTEM of coal mining is being extended in the Sydney Mines district, N. S., having been found suitable to conditions in the collieries. It is expected to be particularly advantageous in the operation of the Princess mine, where, owing to its adoption, no further development will be necessary for ten years. It is asserted that labor costs will be reduced and the output increased.

West Virginia Mining Institute Discusses Safety Measures at Elkins and Views Conveyor Mine

Classify Your Accidents as You Would Your Operating Costs—
Interchangeable Copper Fuses in a Locked Fuse Box Favored—Socket
Box on Rib at Each Room and Repair of Cables Outside Mine Advocated

STATISTICS were given and analyzed at what is said to be the best meeting ever held by the West Virginia Coal Mining Institute, at Elkins, June 17 and 18, which show that in Pennsylvania second mining is more hazardous than first mining but that the relative positions of these two operations in the scale of danger and safety can be exchanged by concentration methods of mining. It was made evident also that much remains to be decided as to the best methods of grounding electrical mining machinery. Blowout fuses, what they should be and where they should be installed to protect machines and the men who operate them, also were discussed. J. W. Paul, chief of the coal mining investigations conducted by the Bureau of Mines, remarked, "Wherever the engineering profession devotes itself to accident prevention, it accomplishes something." The problem rightly should be regarded as the engineer's.

Though Elkins is inaccessible from many parts of the state all regions were represented. Several men from Logan County were en route for 36 hours to join with more than 100 men who attended the meeting. The afternoon of the first day was devoted to papers and discussions, the evening to entertainment, and the following morning to an inspection trip.

FOREPOLING ROOF MAY DO MORE THAN CAUTION

Newell G. Alford, consulting mining engineer of Pittsburgh, in his paper on "Engineering and Accident Prevention," conveyed the need for better engineering methods and more extensive use of labor-saving machinery. His theory is that machines and mining methods that facilitate their use will allow the coal to be extracted before the roof (which is responsible for most accidents) begins to work and come down. He let tables and charts do his talking. His paper will appear in next week's issue.

There was little discussion of Mr. Alford's paper because the majority of the coal companies represented do not so classify the accidents that occur in their mines that such information can be properly correlated. Nevertheless he impressed the operators with the advantages that might be derived by such systematic classification in measuring the efficiency of methods. The moral of his paper is that good engineering, not only saves operating costs but lowers accident rates.

According to Dr. Rutledge, one company mined 2,225,000 tons of coal in 47 months without a single fatality. This record for safety came to an end by a death that was due to the carelessness of the man who was the victim of the accident. Someone in the audience attributed this record to education, particularly by extension courses promoted by the state. Robert Lambie defended West Virginia by saying that the Gay Coal & Coke Co., Logan County, has a better record.

An example of how good engineering makes mining

comparatively safe even under hazardous conditions was given by Dr. Rutledge, referring to the methods now being used to recover pillar, roof and bottom coal from old mines in the Big Vein seam on Georges Creek. He said that forepoling and careful timbering has made it possible to tunnel through old workings and reach this valuable coal.

A telegram from E. C. Jones, Glen White, W. Va., who was scheduled to read a paper on "Stray Currents," informed the institute that sickness in his family deterred him from attending the meeting. Charles M. Means, consulting engineer, of Pittsburgh, read a paper on "Grounding of Electrical Machinery," which appears in this issue.

ALTERNATING CURRENTS NOT RATED BY MAXIMA

Dr. Rutledge opened the discussion of Mr. Means' paper by telling of some of his early observations of alternating-current installations. He said for a number of years this kind of current gave much trouble. The legislators and the labor interests wanted to prohibit its use underground. Mine inspectors and electrical engineers disagreed as to the way in which alternating current should be handled.

In answer to a question relative to voltages of alternating-current underground circuits Mr. Means warned against the use of 440 volts. A voltmeter reading registers only the mean voltage, whereas the maximum voltage may be 800. William Jarvis mentioned the English method of grounding in which a third wire is carried from a junction box to the generator in case of a two-wire direct-current system, and a fourth wire is similarly carried where alternating current is used. Dr. Rutledge asked what precautions might be taken in a scheme of that kind to prevent incorrect plugging of the terminals. Mr. Jarvis suggested that a color for each wire or some mechanical scheme would make identification easy.

WAY TO AVOID INSERTION OF WIRE IN FUSE

The discussion turned to cable and cutting-machine fuses. Dr. Rutledge sees a means of eliminating the dangers of copper fuses by the use of a locked fuse box. A piece of equipment of this kind is now on the market. It is so arranged that each of six fuses will burn out successively before a replacement is necessary. Mr. Lambie believes in having a socket on the rib tapped from the trolley wire to keep men away from the wire in plugging-in. He recommends the use of a fuse in the cable in addition to one on the machine to which it conducts power. Mr. Kingsland of the Consolidation Coal Co. said that he has a padlocked fuse box on one of his storage-battery locomotives. It contains three fuses; when all of these are blown they are replaced by the mine electrician who is the sole possessor of a key for the lock. This same equipment could be used on cutting machines.

In Alberta, power cables are often repaired on the outside of the mine, remarked Dr. Rutledge. This practice insures a thorough job. He also mentioned the fact that insulated cable nips with enclosed fuses are being introduced in a few mines.

In response to President J. W. Reed, Fairmont, Mr. Means stated that shocks from an ungrounded alternating-current circuit would be prevented, of course, if all three wires were thoroughly insulated. But leakage almost invariably occurs giving the man who furnishes the path between the ground and the wire with which he comes in contact the full benefit of the difference of potential between them.

Asked whether transformers should be placed inside or outside mines Mr. Means replied that virtually there is no difference between the two locations except that the inside location presents a fire hazard because the oil is likely to ignite. Fireproof stations are necessary therefore. Mr. Chapman asked if a person touching a 220-volt alternating-current line would get the maximum of mean voltage. Mr. Means replied that he would get the maximum voltage which is considerably greater than the mean potential of 220 volts.

Mr. Barrett is of the opinion that after all pains are taken to make the grounding of alternating-current equipment as thorough as possible, an added precaution should be taken to insulate it, as no ground is reliable.

In the second half of the program, three papers were presented. The first of these, on "Abuse of Explosives," was delivered by W. J. German, of Huntington, W. Va.; the second, on "Explosion Hazards Investigation in Coal Mines," by J. W. Paul, Pittsburgh, Pa.; and the third, on "Rock Dusting of Coal Mines; Efficacy, Methods and Cost," by Edward Steidle, Pittsburgh Pa. A general discussion followed the reading of these papers, led by John T. Ryan.

In discussing Mr. German's paper on explosives, R. D. Lambie remarked that the mine law of West Virginia requires explosives to be carried in fiber containers, Mr. German declaring that in most cases the men stuffed the explosives in their pockets. In a discussion as to whether it was a desirable practice to contract out the drilling, tamping and shooting of coal to be done at night and without supervision Mr. German said that some shotfirers unless carefully watched, especially at night, are liable to shoot two holes simultaneously. Mr. German favors air-spacing only where the thickness of the coal is less than the depth of the cut.

INFLAMMABILITY DEPENDS ON FUEL RATES

In his paper, which dealt entirely with the hazards of coal dust, Mr. Paul gave an empirical formula deduced from laboratory tests for determining the degree of inflammability of coal dust. It is $R = V \div (V + FC)$, in which R is the volatile ratio, V the volatile matter and FC the fixed carbon. This formula aids in establishing the minimum quantity of incombustible matter needed by any given mine dust to render it harmless.

In response to Mr. Alfred, Mr. Paul said that when the Bureau declared that 5 oz. of coal dust per lineal foot of entry would propagate an explosion it based that figure on dust from the Pittsburgh seam, which had a volatile percentage of about 36 and on an entry measuring 6x10 ft.

John T. Ryan said that with only a few months of experience the methods being used in the United States for rock dusting are superior to those used after years

of experimentation by Great Britain. This country should not follow European methods because conditions here are vastly different. In England, for instance, electric haulage is not used, labor costs are low and consequently mechanical means of distributing rock dust are not employed. The cost of rock dusting per ton of coal mined should be no higher in this country than in England for it will be done by machinery, whereas hand methods are often used in Britain.

Everett Drennen questioned whether all layers of rock and coal dust on roof, rib and floor should be considered in determining the percentage of incombustible matter, seeing that the two dusts might be stratified. It is certain, however, that when the waves in advance of the flame of an explosion dislodge and stir up the dust the stratification will be destroyed. Mr. Reed questioned the effectiveness of rock dust in a wet mine but Mr. Ryan explained that a mixture of wet rock and coal dusts is safe; when one dries out so does the other, for which reason a safe condition prevails, wet or dry.

Mr. Haas questioned whether the pulverizing plant should have as large a capacity as suggested by Edward Steidle, namely 1,000 lb. of rock dust per hour. Mr. Ryan replied that the crusher obtainable produces 1,000 lb. per hr., and furthermore that it is planned to have the plant operated by company men having other duties to perform.

The Institute adjourned at 6 p.m. It met again that evening at an informal dinner at the Hotel Tygart.

"V" SYSTEM NOW EXTENDS UNDER HEAVIER COVER

On the morning of the second day a party of seventy men drove in automobiles to the Norton mine of the West Virginia Coal & Coke Co., where mining by the "V" system with conveyors was observed. Better results are being obtained with this system as time goes on. When it was described in the Feb. 7 issue of *Coal Age*, coal was being mined in a section near the outcrop and under light cover. Two batteries are now working in as many sections under heavier cover. From 1,600 to 1,800 tons of coal are produced daily from these two sections. Room mining has been stopped; The Norton mine, therefore is a mechanical mine. A precaution has been taken recently to settle the dust raised where the coal discharges from one conveyor to another. Small water lines are tapped from the drainage pipes and conducted to these points where the water is sprayed on the coal through a stationary nozzle.

The action of the roof apparently can be better controlled under the heavier cover. Falls of roof have less tendency to encroach on the protruding points, which, to all appearances are being kept open after each cut with a fair degree of regularity. Stumps lost in the goaf as far as could be seen are neither long nor wide, indicating a recovery higher than that obtained near the outcrop.

The mine officials explained that some minor changes will be made in the layout of the system. Ten faces instead of eight faces will be worked in a battery. The distance between galleries, also, will be increased from 80 to 100 ft., so that, the faces, still maintained at an angle of 45 deg., will be increased in length to 100 ft. The face conveyors, accordingly, will be made 87 or 93 ft. in length depending upon the results obtained; and five men instead of four will put coal on the conveyor. Two batteries of this size will produce about 2,500 tons of coal per day.

Should Buffalo's Gas Be Made at the Coal Mines?

By So Doing One and One Quarter Cents Would Be
Saved per Thousand Cubic Feet, Provided There Were
No Leakage—Outlay of Two Million Dollars Required

SEARCHING for cheaper fuel to replace the natural gas which is coming in decreasing quantity to Buffalo, N. Y., and gas manufactured by obsolete equipment by a company in financial difficulties that city established a co-operative agreement with the U. S. Bureau of Mines for the purpose of solving its problem. A report entitled "A Fuel Problem for the City of Buffalo, N. Y." has been made by G. S. Brewer, assistant fuel engineer, U. S. Bureau of Mines and B. J. Hatmaker, consulting geologist, department of public works, Buffalo, N. Y. which is extremely valuable and interesting. Among other matters the authors discuss the possibility of making gas at the coal mines and piping it to Buffalo. The following is a quotation from that report:

Some of the gas journals of late have given much space to the possibility of producing gas from coal at the mine and transmitting it through a long pipe at high pressure to the point of consumption.

In order to indicate whether or not such a plan would be feasible for Buffalo, the estimates in Table I have been made:

**Table I—Estimated Cost of Transmitting Gas by Pipe
Line from Coal Mine to Buffalo**

(Compared to Shipping the Coal by Rail to Buffalo and Making Gas Locally.)

Cost of pipe line, capacity 1,000,000 cubic feet per hour (125 miles long @ \$1,000 per mile per inch of diameter of pipe using 12-in. pipe).....	\$1,500,000.00
Cost of compressor station.....	\$437,000.00
Interest and depreciation on pipe line at 10 per cent.....	\$150,000.00
Interest and depreciation on compressor station at 12 per cent.....	\$52,500.00
Operating cost of compressor station per year.....	\$49,200.00
Total cost of transmitting gas pumped per year based on present estimated requirement of 5,363,000 M. cu.ft.	\$251,700.00
Surplus coke produced at the mine.....	7,100 tons
Freight on coke assumed shipped to Buffalo for domestic use at \$2.60 per ton.....	\$18,500.00
Total cost transmitting gas and shipping surplus coke per year. \$251,700 plus \$18,500.....	\$270,200.00
Cost of transmitting 1,000 cu.ft. of gas and accompanying coke.....	0.0504
Cost of shipping coal to carbonizing plant in Buffalo per 1,000 cu.ft. of gas produced from it.....	0.0627

(1) Compiled from Weymouth, Thomas R., Transactions American Society of Mechanical Engineers, Vol. 34, 1912, page 133; and from minutes of hearings of the Buffalo Gas Case of 1918 before the Public Service Commission of New York.
Gain due to production of gas at the mine per 1,000 cu.ft. .00123
This does not take into account any gas loss due to leakage in the pipe line.

The cost of the pipe line was based upon figures given by Mr. Weymouth and from the cost of laying a pipe line from Cattaraugus Creek to Buffalo, a distance of 34 miles. The figures quoted are \$900 per mile per inch of pipe diameter, but because the cost of constructing a pipe line over the hills of Pennsylvania to the coal mine would probably be more than estimated for building it across the more level section of New York State, in this report \$1,000 per mile per inch diameter of pipe is assumed. Interest and depreciation charges are given at a rate of 10 per cent which is said by Mr. Weymouth to be a safe assumption.

The quantity of gas required per day was estimated throughout the year at 266 cu.ft., daily per meter with approximately 105,000 meters installed. A little allowance was made also for increase in demand, bringing the total estimated quantity up to 24 million cubic feet per day. By empirical formula, the horsepower of the

compressor was computed to be 4,370. This horsepower is sufficient to pump a maximum of twenty-four million cubic feet of gas per day.

Mr. Weymouth's figure of \$100 per installed horsepower as the cost of compressor stations was used making a total cost for the 4,370 hp. station \$437,000. Again using Mr. Weymouth's figures, interest and depreciation charges at 12 per cent = \$52,500 for the compressor station. Operating expenses at \$15 per horsepower per year assuming 75 per cent of the total capacity as the yearly average actually used mount to \$49,200. Therefore, the total yearly cost of operating a pipe line 12 in. diameter, 125 miles long using an initial pressure of 370 lb. per square inch absolute, a terminal pressure of 50 lb. per square inch absolute, pumping a maximum of twenty-four million cubic feet of gas per day and a total of 5,363,000 M. cubic feet per year, the specific gravity of which is assumed to be 0.60, figures to be \$251,700.

PIPE GAS FOR FIVE CENTS PER THOUSAND FEET

The cost of transmitting gas through this pipe line per M. cubic feet will therefore be,

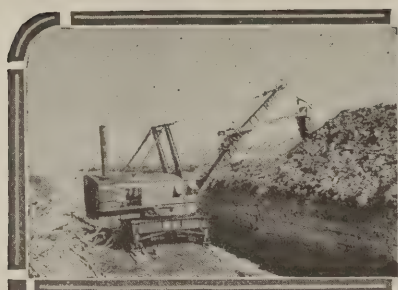
$$\frac{251,700}{5,363,000} = \$0.0469 \text{ per M. cu.ft.}$$

In the coldest weather it is assumed that large quantities of water gas will be made and mixed with the coal gas. In order that the gravity of the gas may not change too greatly, some water gas should be mixed with the coal gas even during the period of minimum demand for gas.

The total quantity of blue water gas required per year is estimated at 3,863,000 M. cu.ft. The coke required to make this allowing 39 lb. of coke per 1,000 cu.ft. blue water gas is 75,400 tons. Allowing 300 lb. of coke for bench or oven fuel per ton of coal carbonized, 150,000 tons of coal would require 22,500 tons of coke. Subtracting these quantities from a total of 105,000 tons of coke made per year, 7,100 tons remain to be sold, either in Buffalo or elsewhere. In this computation we shall assume that both the mixed gas and the excess coke are used in Buffalo. The freight on 7,100 tons of coke from the mine to Buffalo, assumed at \$2.60 per ton is \$18,500. The cost of transmitting gas and shipping coke to Buffalo, therefore totals to \$270,200 or \$0.0504 per M. cu.ft. of gas produced.

On the other hand, the freight on 150,000 tons of coal at \$2.24 per ton from Pittsburgh amounts to \$336,000 or \$0.0627 per M. cu.ft. of gas made, a gain of \$0.0123 per M. cu.ft. for gas made at the mine, assuming no pipe line leakage.

From a study of these figures it is apparent that the saving from the production of gas made at the mine over the production of gas made locally will be slight. If there is any appreciable leakage in the pipe line, and usually it is considerable, the gas that finally reaches Buffalo would have to be sold at a figure which would be substantially higher than that for gas manufactured locally.



News Of the Industry



Reorganization of Statistical Bureaus Beset by Thorny Path

Transfer of Compilation of Mineral Data Opposed by Census Department as Well as Geological Survey—Industry Interested Pending Clarification of Legality of Issuance of Association Data

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Correspondence reaching Washington indicates a misapprehension on the part of the mineral industries as to the status of the reorganization legislation. The proposed plan which would transfer the statistics of mineral production from the U. S. Geological Survey to an enlarged Bureau of the Census, to be known as the Bureau of Statistics, is far from being an accomplished fact. The whole question of reorganizing the government departments is so intricate and controverted that it is entirely possible that no legislation along the lines indicated in the Mapes bill will pass. Before any such plan is made effective it is safe to predict that it will have been amended in a great many particulars. The prospects are that the proposal with regard to the mineral statistics will not be approved, as it is opposed in the Bureau of the Census as well as in the Geological Survey.

Industry Depends on Survey Data

It is evident that the anxiety of the mineral industries concerned with statistical services is due to the reliance that must be placed on these figures as long as the status of trade associations remains in doubt. Many of these organizations have abandoned a portion of their statistical program pending the clarification of their legality. For that reason such statistics as are issued by the government assume an increased importance.

Various of these inquiries apparently were prompted by an article in this correspondence which appeared on page 885 of the June 12 issue of *Coal Age*. It was not the intention in that article to give the impression that any such change is imminent. That article was prompted simply by the fact that the joint committee on reorganization had submitted its report to Congress. Since four years have been required to initiate the legislation, an indication is given of the difficulties likely to surround its further progress. Likewise in that article there was no intention of reflecting on the general efficiency of the Bureau of the Census. In the effort to reflect the widely held opinion that such statistics as those of mineral resources should be compiled by the specialists who have to use them and

who are in a position to interpret them, reference was made to the difficulties surrounding the compilation of such figures by a central statistical agency.

The Bureau of the Census and the Geological Survey are typical of two distinct methods of approaching the statistical task. The Census Bureau deals with a wide range of subjects, in addition to the task of enumerating the population. In the accomplishment of such work its performance is remarkable. One of the striking accomplishments of the federal government is the effective way in which the Census organization, within a very few days, makes the count of the nation's people. The Bureau of the Census is the largest agency of its kind in the world and was the first to develop machine methods of tabulating statistical facts. Much of the tabulating and assorting machinery in operation in that Bureau was invented and developed by Census employees. In no other statistical organization in the world have costs been reduced to such a low level. As Secretary Hoover puts it, the Bureau dredges up great buckets of facts.

Statistics a Means to Larger End

The Geological Survey, on the other hand, produces a type of statistics in which the statistical results are regarded not as an end in themselves but as a means to a larger end—an understanding of the industry. The secret of their merit is the vital contact between the collection of the data and their application to the industry.

Industry is not interested in the department or in the bureau which handles its statistics. It is generally recognized by industry, however, that the work should be done by those who make it their permanent job to study some particular specialty. Thus the coal statistics are handled by coal specialists, the oil figures by petroleum specialists, rare metals figures by men who devote their entire time to that specialty, and so on through the list.

It has been the employment of this principle of specialization on commodities that has given such strength to the Bureau of Foreign and Domestic Commerce of the Department of Commerce. In that Bureau are specialists who deal

Hocking Miners Want Scale That Will Get Work

Forty-eight delegates, representing approximately 12,000 union miners in the Hocking Valley field, recently unanimously adopted a resolution inviting mine owners and operators in this section to meet in joint conference to discuss amendments to the wage scale and working conditions with a view to cheapening the cost of mining. It is understood that operators have signified their intention of accepting the invitation and the joint session probably will be held early in July. Mines in this section have been idle for months, owing to inability to compete with other mining fields.

with single commodities who can use and interpret statistics to the utmost advantage. The Geological Survey organization carries that type of co-operation one step further. It places the collection of commodity statistics under the supervision of the commodity specialists and weaves the quantitative results into one complete picture along with qualitative results of observation and intimate acquaintance with the field.

Lewis Again Warns Against Wage Reductions

John L. Lewis, president of the United Mine Workers, reiterated at union headquarters in Indianapolis, June 19, that the international organization, which suspended the autonomy of District No. 17, West Virginia, and assumed charge of the union affairs there June 14, will not submit to any reduction in miners' wages. The declaration was made in an official circular announcing the change in the West Virginia district.

"Strikes now in effect will be prosecuted until settlements are reached on the basis of the Jacksonville agreement," the official announcement reads. "There will be no modification of existing wage agreements now or later."

It was stated that operators in a few other districts have refused to sign contracts based on the Jacksonville agreement, and the union has declined to concede a wage reduction demanded by the operators, thereby causing strikes in places other than West Virginia. The declaration of policy regarding West Virginia in the official circular was said at union headquarters to be regarded as notice that no wage reductions will be permitted anywhere.

Strike in German Coal Mines Proves Unprofitable to Workers

Conceded 15 per Cent Increase from the First, Miners Obtain 20 per Cent Advance and Recognition in Principle of Seven-Hour Day—
Will Work Eight Hours Daily for the Present

Berlin, June 6.—After a strike lasting nearly four weeks and causing enormous losses, the Ruhr coal miners have resumed work, on condition that they get a 20-per cent increase of wages from June 1 and that, while the seven-hour day is recognized in principle for underground workers, eight hours will be worked for the present. As a 15-per cent wage increase was conceded from the first, the strike proved highly unprofitable. The wages lost by 450,000 strikers total 58,800,000 gold marks; and the production loss of 7,194,000 metric tons would have had a value of 149,850,000 gold marks, or nearly seven times as much as in the last important strike in 1912.

Production has now returned to about the post-war normal. Owing to the Ruhr troubles 1923 was not a normal year; but it is given here together with 1922 and 1913 for purposes of comparison, the figures (in thousands of metric tons) referring to the whole of Germany:

	Output	Imports	Exports	Consumption
1923..	97,607	25,000	2,000	120,676
1922..	175,500	15,427	23,577	167,550
1913..	219,186	16,200	44,043	189,403

Owing to the large imports and meager exports in 1923, the quantity available for home consumption was not so dangerously curtailed as would appear from the production figures taken alone. The home production in the first four months of 1924 was on the whole satisfactory, being as follows in thousands of metric tons:

	January	February	March	April
Coal.....	8,787	9,726	10,825	10,429
Lignite (b r o w n coal).....	9,553	8,327	10,931	10,247
Coke.....	1,474	1,742	2,102	2,219

In the first quarter of 1924 coal output exceeded that of the corresponding quarter of 1923 by 3,750,000 tons, whereas output of lignite (which was forced in 1923 owing to shortage of Ruhr supplies) was 7,320,000 tons less. The coal figures do not include the output of three mines which are worked directly by the French Régie. Imports of coal this year have fallen to about half those of 1923, as shown in the subjoined table in thousands of metric tons:

1924	Coal	Lignite	Coke
January.....	1,087	117	81
February.....	1,232	138	54
March.....	980	169	25

Against this, exports of coal and lignite, though not of coke, have fallen; and Germany's foreign payment balance is still heavily burdened by the coal import surplus, though not so heavily as last year. Exports were as follows in thousands of metric tons:

1924	Coal	Lignite	Coke
January.....	97	7	25
February.....	69	12	36
March.....	63	17	40

In spite of pessimism in business circles there has been no serious shortage of coal for industry since the war, except in 1923 and during the May (1924) strike. The reasons for this are the greatly increased output and direct use of lignite, increasing electrical generation with lignite, more economical methods of firing, increased imports and greatly reduced domestic consumption. The recent curtailment, however, was not due to a shortage. The rationing of fuel for domestic use ceased



H. K. Cortright

President of the American Wholesale Coal Association, elected to succeed C. L. Dering at the recent convention of the association at White Sulphur Springs, W. Va.

two years ago. The chief cause was the temporary inability of large classes to pay for fuel, which was burdened formerly with a 40 per cent tax, since abolished. High prices led to a general suspension of central heating in city houses. No figures for all Germany are available; but in October, 1923, the consumption of lignite briquets for domestic heating in Berlin fell to 41,165 tons against 160,690 tons in October, 1922. Owing to the rentenmark currency reform, which has largely increased the average citizen's buying power, central heating is now being resumed everywhere.

The German coal trade is in a confused condition. The abolition of state control and rationing has resulted in the disappearance of binding prices; thousands of small dealers have sprung up, who ignore the syndicates' attempts to keep prices steady. When short of money, as most German business men are today owing to the credit crisis, these new dealers sacrifice their stocks of coal at prices below production cost and willingly bear the loss rather than apply for bank credit, which costs 60 to 80 per cent per annum on

Every Stockholder A Coal Seller

Foreseeing a period in which retail coal selling will not be lucrative, the Consumers Co., of Chicago, is entering upon a most intensive sales effort. Fred W. Upham, nationally prominent Republican politician and president of the company, has sent out a letter to all his stockholders telling them the company has consistently paid a 7 per cent dividend every six months and hopes to continue it but that if there is to be any profit out of the business in this year of narrow margins the company must sell at least 25 per cent more coal. In order to do this every employee is under orders to consider himself a salesman and bring in business. The same appeal is made to every stockholder.

first-class security. At the Coal Dealers' annual Congress, held this week, the representatives of the big dealers appealed for united action to suppress the so-called "savage" (outside) dealers.

Germany's coal future is very doubtful, depending as it does upon restoration of her economic control over the Ruhr. Although such restoration is one of the main conditions of the Dawes reparations recommendations, not much confidence is felt. Meantime Germany's control over coal fields is so small that she has declined from first position to fourth among European coal powers. In 1913 her underground coal reserves were estimated at 424 billion tons, or 52.1 per cent of the reserves of all Europe; Great Britain coming next with 189 billion tons, or 23.2 per cent; European Russia next with 50 billion tons, or 7.4 per cent. Through the Versailles Treaty Germany lost the Lorraine fields with 800 million tons, and the Saar with 12,200 million tons; and through the Geneva decision of 1922 she lost the greater part of the East Silesian coal fields, estimated at 176 billion tons. In all her loss was 189 billion tons.

Allowing for Poland's gains and European Russia's losses, the position today is as follows: Germany, 235 billion tons, or 28.9 per cent of all Europe's supplies; Poland, 208 billion tons, 25.6 per cent; Great Britain, 189 billion tons, or 23.2 per cent; Russia, 47 billion tons, or 7 per cent. Germany, however, has since lost control over the greater part of the above share as a result of French occupation of the Ruhr and Left Rhine fields. She controls today (including lignite) only about 64 billion tons, or 7.9 per cent of all Europe's supplies, being behind Poland, whose supplies are given above; behind France, which now controls 202 billion tons, or 24.8 per cent, and behind England. Her directly owned and controlled fields contain the following estimated reserves in metric tons:

Lower Silesia.....	3,000,000,000
Upper Silesia.....	35,000,000,000
Westphalia.....	19,000,000,000
Saxony.....	1,900,000,000

In addition are 6 billion tons of lignite in unoccupied territory, mainly in central Germany.

St. Bernard Miners Take 20 per Cent Wage Cut

Some of the union employees of the St. Bernard Mining Co., in western Kentucky, have agreed to go back to work at a wage scale 20 per cent below the standard union rate. The company made the deal with certain of its men last week and expects to open four of its mines some time this week. It is still uncertain, however, as to how many will go to work. The agreement puts the St. Bernard properties on an open-shop basis with a wage scale paralleling that of the West Kentucky Coal Co., whose mines have been open-shop for a long time and whose men were reduced to the 1917 scale about two months ago. The St. Bernard mines were purchased last spring by the North American Co., which owns and operates the West Kentucky Coal Co.

Although it was announced at Earlington, headquarters of the St. Bernard company, that about 1,000 men had agreed to resume work, Lonnie Jackson, of Central City, president of the western Kentucky district of the United Mine Workers, hooted at the idea, declaring late last week that only a handful of St. Bernard men had agreed to the wage cut and that not enough men would report to man one mine, not to mention the four the company proposes operating. He did not openly issue any threats concerning what the union will try to do to stop this long-expected spread of non-unionism in western Kentucky, but he did say that the loyalty of his district is unquestioned and that there is no danger of a break in the ranks of the men who have been on strike since April.

It is generally known that President Jackson has frankly admitted that the union miners in western Kentucky ought to take a 20 per cent cut. He was rebuffed severely, however, when he and his district board went to Indianapolis, Ind., and tried to get International President John L. Lewis to sanction it. The delegation was sent back home with orders to fight it out. That is what Jackson is still trying to do.

Ever since negotiations between operators and miners were broken off in April, shutting down practically all of the field except the several mines of the open-shop West Kentucky Coal Co., it has been freely prophesied that the

Shake-Up in Bureau Of Mines

A number of changes have been made in the technical division and offices of the U. S. Bureau of Mines as the result of an order approved by the Secretary of the Interior, Dr. Hubert Work. The division of metallurgy has been placed under the direction of the chief metallurgist, who will have administrative charge of the field studies now being conducted at Miami, Okla.; Moscow, Idaho; the Massachusetts Institute of Technology and at the Bureau of Standards, together with the co-operative studies on oxygen enrichment of air blasts.

George S. Rice, chief mining engineer, has been relieved of most of his administrative duties and will serve as adviser to the director and assistant director on mining matters, with such special duties as may be assigned to him from time to time. For the present he will be in entire charge of matters relating to co-operation with the British Government in studies of safety in mines. The division of war mineral supplies has been abolished and its duties, records and personnel have been transferred to the division of mine research.

union would have to take a wage cut or quit business. The St. Bernard mines, normally employing 2,300 men, were at once the largest group in the striking field and the weakest spot in the union's front. Relations between that company and its men have been cordial and when the company recently issued a sort of ultimatum to the men through Frank D. Rash, operating head under the direction of C. F. Richardson, president of the West Kentucky Coal Co., showing the men how economically impossible it is for the mines to be opened at the union scale, the back of the strike gave evidence of breaking. Some of the men asked on what basis they could go to work. The company told them to determine that among themselves and come back with a proposition. The 20 per cent cut was the result.

The rest of the field remains on strike and watching St. Bernard activities with great interest.

Discuss Steps to Prevent Mine Accidents

Important steps to prevent mine disasters were discussed at a meeting at Elkins, W. Va., June 18, attended by mine owners, mine officials and miners, the first of a series called by Robert M. Lambie, chief of the West Virginia Department of Mines. Approximately 100 employers and employees were present at the meeting. Mr. Lambie opened the discussion by pointing out that six mine disasters, exacting a toll of 398 lives, had occurred this year. At least 90 per cent of explosions could be eliminated, he said, through proper precautions, pointing out changes that should be made in thirty-six sections of the mining law of the state. Plans and suggestions for changes and revision of the law were then submitted for open discussion.

Important among the changes submitted by the mine chief and which met the approval of those attending the meeting was the use of approved electric mining lamps in all mines. The law at present enforces this practice in mines known to contain dangerous quantities of gas, but it is urged that the electric lamp be used in all mines. In this manner, Mr. Lambie declares, explosion hazards from gas ignition can be reduced 80 per cent.

It was pointed out that the present laws prevent the department from enforcing restrictions and safety measures in cases where oil and gas companies sink drills through coal veins. Through the use of permissible explosives in all mines at least 60 per cent of explosions due to fuse ignition can be eliminated. The present law covers only certain mines, as in the case of miners' lamps.

Among other important measures discussed and favored for incorporation in the state mining laws was the use only of certified shotfirers, who should be required to pass a state examination before entering upon their work, improved systems of ventilation, especially in the cases of new mines; rock dusting and rock-dust barriers.

The salient points which those present at the meeting discussed and which received the endorsement of all were ample ventilation, proper inspection by firebosses before work starts, adequate supervision, use of approved electric lamps, of which more than 8,000 are now in use in the state, permissible explosives only, certified shotfirers, permissible machinery in gas-liberating mines.

After the discussion had been concluded a committee of four was appointed to call further meetings for drawing up the best measures favorable to local miners and officials. At each of the other six meetings like committees will be appointed and they will later meet at Charleston with a commission to be appointed by Governor Morgan.

When the recommendations evolved as a result of all the meetings are finally whipped into shape for presentation to the Legislature, West Virginia is expected to have the most thorough and modern mining laws in the United States.



Coal Haulage in India at Five Cents a Ton

The ordinary method of moving coal from the face out of slope mines in India is by woman-power, 12-ton coal tubs familiar in various parts of the British Empire. S. W. Farnham says the Indian miner, who is a farmer part of the time, always insists upon taking his women into the mine with him, whether they work or not, in order to keep them in the straight and narrow path.

World's Production of Coal in 1923, 3,337,000,000 Tons, Largest Since 1917

World's production of coal in 1923, according to the U. S. Geological Survey, was the largest in any year since 1917 and fell somewhat short of that in 1913, the last year preceding the World War. The total output is estimated at 1,337,000,000 metric tons, as compared with 1,342,000,000 tons in 1913.

The failure of production to reach the pre-war level is the more significant when it is remembered that the world's consumption formerly increased by leaps and bounds. The average rate of increase in the 20-year period preced-

ing August, 1914, was 38,000,000 tons a year. In part the present low production is due to the economic disorganization wrought by the war, particularly in Germany, France and England. In part it is due to more efficient use of fuel, stimulated by the high prices of recent years. A factor of still greater influence is the extraordinary increase in the supply of petroleum. The world's production of crude oil in 1923 exceeded that of 1913 by 625,000,000 barrels, equivalent to approximately 170,000,000 tons of coal.

The term "coal" as used by the Geo-

Railroads Buy 28 per Cent Of Soft-Coal Output

Class 1 railroads of the United States in 1923 purchased directly from the industries of the country fuel, materials and supplies to the value of \$1,783,703,000, R. H. Aishton, president of the American Railway Association told the fifth annual convention of Railway Purchasing Agents in session at Atlantic City, June 16.

Of the total amount, \$617,800,000 was expended for fuel, Mr. Aishton said, or about one-third of the total expenditure. More than 28 per cent of the total amount of bituminous coal produced in the United States in 1923 was purchased by the railroads at a cost of \$519,007,000, while they also purchased 5.2 per cent of the total anthracite production at a cost of \$18,195,000. Fuel oil amounting to \$75,867,000 and consisting of about one-fifth of the total production and consumption in the United States also was purchased by the railroads, while \$4,731,000 was expended for other kinds of fuel such as coke and gasoline. These amounts represent expenditures on account of fuel for all purposes, whether for locomotives, shops or the heating of buildings.

Coal Produced in Principal Countries of the World in Calendar Years 1921, 1922 and 1923

(In metric tons of 2,204.6 lb.)

	1921	1922	1923 (Preliminary)
North America:			
Canada { Coal	10,684,259	10,587,611	11,254,007
{ Lignite	2,975,598	3,162,907	3,246,378
Greenland	2,200	2,100	(a)
Mexico	731,022	949,677	(a)
United States { Anthracite	82,076,000	49,607,344	86,585,000
{ Bituminous and lignite	377,316,000	383,073,174	494,772,000
South America			
Argentina	(a)	(a)	(a)
Brazil	(a)	500,000	(a)
Chile	1,275,117	1,053,001	(a)
Colombia	(a)	(a)	(a)
Peru	345,481	249,492	(c)
Venezuela	(b) 22,094	(b) 20,782	(a)
Europe:			
Austria { Coal	137,633	165,727	158,183
{ Lignite	2,478,862	3,135,902	2,658,907
Belgium	21,750,410	21,208,500	22,916,074
Bulgaria	939,586	1,030,036	1,063,662
Czechoslovakia { Coal	11,648,399	9,906,261	11,624,748
{ Lignite	21,050,712	18,942,920	16,202,496
France { Coal	28,211,839	31,163,032	37,682,235
{ Lignite	748,634	777,813	861,435
Germany { Coal	136,227,231	(c) 129,964,597	62,224,535
{ Lignite	123,010,036	137,207,125	118,248,735
Saar	9,574,484	11,240,000	9,121,285
Greece	168,576	131,515	(a)
Hungary	6,417,960	7,717,610	7,709,775
Italy { Coal	114,236	195,352	168,922
{ Lignite	1,026,035	745,402	938,229
Netherlands { Coal	4,243,000	4,866,371	5,598,555
{ Lignite	121,715	28,919	(a)
Poland	7,842,533	(d) 24,194,797	36,097,997
Portugal	135,732	(a)	(a)
Rumania	1,804,687	2,116,221	2,366,068
Russia	7,550,800	7,781,400	(f) 11,707,393
Spain { Coal	5,012,229	4,435,843	5,929,202
{ Lignite	408,674	329,680	359,582
Spitzbergen	210,000	316,000	340,942
Sweden	376,692	378,861	(a)
Switzerland	10,714	3,380	(a)
United Kingdom:			
Great Britain	165,781,404	253,613,054	282,970,535
Ireland	89,958	(a)	(a)
Yugoslavia	3,063,198	3,726,568	(g) 4,000,000
Asia:			
British India	19,612,759	19,316,112	19,019,000
China	19,876,375	21,300,000	(a)
Chosen	310,590	317,330	(a)
Federated Malay States	304,156	286,351	(a)
Indo China	920,900	988,991	(a)
Japan (including Twaina and Karafuto) (e)	27,375,367	29,150,000	27,800,000
Russia	1,363,800	1,276,900	(f)
Turkey	(a)	(a)	(a)
Africa:			
Algeria	9,541	8,855	(a)
Belgian Congo	2,990	33,000	(a)
Nigeria	216,262	123,027	173,422
Rhodesia, Southern	521,404	467,787	559,999
Tunisia	22,207	343	620
Union of South Africa	10,339,044	8,830,774	10,809,501
Oceania:			
Australia:			
New South Wales	10,966,671	10,346,572	10,646,693
Queensland	970,087	973,903	1,155,079
Tasmania	67,543	70,349	82,014
Victoria	603,618	660,113	(a)
Western Australia	476,341	445,480	(a)
British Borneo	(a)	88,948	(a)
Dutch East Indies	1,212,665	1,032,310	(h) 1,000,000
New Zealand	1,838,131	1,887,637	(h) 2,000,000
Philippine Islands	39,445	(a)	(a)
	1,134,000,000	1,223,000,000	1,337,000,000

(a) Estimate included in total. (b) Exclusive of the State of Falcon (about 8,000 tons), for which estimate is included in the total. (c) Includes entire output of Upper Silesia for January-May; for June-December only that part of Upper Silesia allocated to Germany. (d) Includes for June-December that part of Upper Silesia awarded to Poland. (e) Exclusive of lignite from Japan (annual production of about 200,000 tons) for which estimate included in the total. (f) Russia in Asia included with Russia in Europe. (g) Estimate based on 11 months' production. (h) Estimated on incomplete data.

logical Survey includes lignite, and the production for the world is simply the total of quantities reported, no attempt being made to reduce the statistics for inferior coals to an equivalent tonnage of coals of higher rank. Where possible, however, coal and lignite are shown separately.

In comparison with 1922, the year shows an increase of 114,000,000 tons, in which the principal element was a recovery of 149,000,000 tons in the production of the United States. All of the large producing countries, however, except Germany, Japan and British India, reported an increase, and the output of France was but 3,000,000 tons below the pre-war level. The outstanding feature of the year was the tremendous decline in the production of Germany, associated with the economic disorders that attended the occupation of the Ruhr. The figures from Germany are official.

World Production of Coal, 1910-1923

(In metric tons of 2,204.6 lb.)

Year	Production, In Part Estimated	Per Cent Produced by United States
1910	1,160,000,000	39.2
1911	1,189,000,000	37.9
1912	1,249,000,000	38.8
1913	1,342,000,000	38.6
1914	1,207,000,000	38.7
1915	1,193,000,000 (a)	40.5
1916	1,291,000,000 (a)	41.5
1917	1,356,000,000 (a)	43.6
1918	1,333,000,000 (a)	46.3
1919	1,173,000,000	42.8
1920	1,319,000,000	45.3
1921	1,134,000,000	40.4
1922	1,223,000,000	35.2
1923	1,337,000,000	43.5

(a) Revised from earlier reports to conform with more accurate information on certain of the warring countries.

Midwest Dealers Still Fight Snowbirding

Charges against it and investigations into the affairs of its commissioner by the Federal Trade Commission have not dampened the ardor of the Midwest Retail Coal Association in its battle against "snowbirding." At its fourth annual convention, in St. Louis, Mo., last week, the association decided to continue its active existence and to back Commissioner E. J. Wallace in the work he has been doing. Mr. Wallace lambasted "government by commission" in his characteristic vitriolic language.

The association adopted resolutions demanding that Congress find out why the Federal Trade Commission fails to protect legitimate business against the doubtful advertising and questionable methods of coal "snowbirds," demanding that the commission compel concerns with no coal mines to cease using the word "mining" in their corporate names, asking the Interstate Commerce Commission to extend the unloading period on coal before demurrage begins, and calling the Commerce Commission's attention to the unsuitability of some of the railroad equipment now used in the Midwest and asking that at least half the coal cars built in the future be flat bottoms. A committee was appointed to study the feasibility of a state license system for retail coal dealers.

The association was addressed by L. P. Coan, an old-time St. Louis coal man, and by Walter Heinecke, D. H. Derbster, Arthur Hull and W. R. Schneider. A banquet wound up the one-day convention. The officers elected for the coming year are:

President, R. D. Kelly, Springfield, Mo.; first vice-president, W. A. Storrs, Hannibal, Mo.; second vice-president, H. R. Oglesby, Warrensburg, Mo.; third vice-president, F. W. Schramm, Farmington, Mo.; fourth vice-president, S. P. Guthrie, Mexico, Mo.; secretary, James P. Adriano, St. Joseph, Mo.; treasurer, F. L. Keightley, 1616 S. 39th St., St. Louis; commissioner, E. J. Wallace, Pierce Bldg., St. Louis.

Next year's convention will be in Springfield, Mo.

Ralph Clements Arrested On Fraud Charge

Ralph Clements, of Cleveland, former president of the defunct Valley Coal & Dock Co., Milwaukee, was arrested in Cincinnati recently charged on 19 counts by the federal grand jury with using the mails to defraud.

With him was named Bertram M. Ainesworth, Milwaukee, alias Bertram M. Altheimer, who is believed now to be a fugitive from justice. Clements was arraigned before a court commissioner in Cincinnati and upon entering a plea of not guilty was released on \$2,500 bonds.

The officers caused to be issued 10,000 circulars and numerous financial statements from time to time to creditors and coal operators from whom they solicited credit in which they claimed they had taken over the entire assets of the Valley Coal Co. and that the new capitalization was then in excess of \$300,000, paid in cash, when in fact they did not have any paid-in cash capital whatsoever.

Northwest Rate Changes Are Delayed a Month

Although the Interstate Commerce Commission ordered higher rates from southern Illinois into the Northwest to take effect Aug. 21, a 30-day postponement already has been granted at the request of the railroads, and the lines are asking for another 30 days. They claim the complicated business of making new rate schedules and issuing the tariffs cannot be done even by Sept. 21 and that the date should be Oct. 21.

Thus begins the expected series of delays and counter movements against the new ruling which gives the Northwest docks an advantage over the all-rail shippers into Minneapolis and St. Paul and into certain other rate zones of the Northwest. The decision ordered advances of 8c. and 15c. a ton on rail coal from southern Illinois into two zones of southern Minnesota and 28c. into the Twin Cities, whose coal consumption is about half that of the entire State of Minnesota.

Bureau of Mines Awards Coal Contracts

The U. S. Bureau of Mines has awarded to the Philadelphia & Reading Coal & Iron Co. contracts for anthracite on the basis of bids opened May 28. The contracts call for the delivery during the coming fiscal year of 1,320 tons of broken at \$8.65 per ton; 5,730 tons of egg at \$9.25; 5,940 tons of stove at \$9.40; 1,650 tons of nut at \$9.25; 100 tons of pea at \$6.25, and 250 tons of red ash at \$9.90.

The only contract so far awarded by the Bureau of bituminous coal is for 54,000 tons of New River run of mine for delivery to the Government Fuel Yards, purchased from the Minter Fuel Co., Inc., Beckley, W. Va., at \$2.19 per ton.

Miners and Guards in Battle At Brady Mine

For the second time since the Brady-Warner Coal Corporation started the operation of its mines on an open-shop basis an attack was made on the mining settlement at Brady early in the morning of June 19 and four union miners have been arrested. One man was wounded during the attack, the union hall at Brady was destroyed by fire and a number of houses occupied by mine guards and non-union miners were riddled by bullets during the course of a two-hour battle.

Trouble started during a demonstration staged by an organization known as the "Regulators," to which many union miners and their sympathizers belong, according to the testimony of miners. During this demonstration dynamite was set off and then the firing of shots from a steep hillside was started. The mine guards in the settlement returned the fire and for a time there was an exchange of several hundred shots.

When Sheriff Yost, of Monongalia County, arrived at Brady the union hall was on fire but shooting had ceased. Officers found the settlement panic stricken, many of the miners and their families having hidden in cellars. The four union miners placed under arrest admitted that they were formerly in the Brady mines.

During the attack on the Brady mining settlement, the mining community of the Francois Coal Co., about three miles away, also was attacked and a few shots fired.

Samuel D. Brady, president of the Brady-Warner company, stated following the attack that "We propose to operate the mine at all hazards," adding that the constitution "gives the company the right to enjoy its property and to operate as long as the plan is within the law."

Attributes Outlaw Strikes to Disbelief in God, Gospel or Hell

The investigation into the numerous petty strikes that have tied up collieries in anthracite district No. 1 got under way in Wilkes-Barre, Pa., June 18, when five International board members, comprising an investigation committee appointed by John L. Lewis, International president of the United Mine Workers, heard testimony from district union officials on the causes ascribed for the outlaw strikes.

Rinaldo Cappelini, president of District 1, threw much light on the underlying cause of the outlaw walkouts in the following statement to the committee: "Almost every morning when I get out of bed I read in the papers of another unauthorized strike called by a local union or a general grievance committee. There are men in District 1 who do not believe in God, the gospel or hell, and these men

would do anything. There are several nests of I. W. W. in the district and other miners, believing it will be a nice day tomorrow and who want to go fishing, strike or declare a holiday. This must be stopped if the United Mine Workers are to act as a unit."

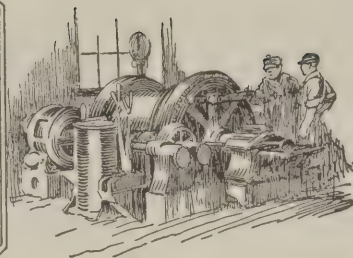
Cappelini also declared that the refusal of company officials to hear grievances has resulted in several strikes.

The investigation will continue into this week, with a session in Scranton. Many district officials will be called before the investigating committee, and it is also expected that alleged radical leaders in the Pittston field will be summoned for examination.

No hint has been given as to the resultant action of the committee following the probe. It is understood that a full report of the investigation will be turned over to President Lewis.



Practical Pointers For Electrical And Mechanical Men



Minor Changes to Locomotive Reduce Haulage Costs Ten Cents a Ton

Storage-battery locomotives have filled a great need for some form of haulage equipment which may be used more safely than a trolley locomotive near the coal face. However, they have other advantages, especially where the expense of bonding rails, installing trolley and feeder lines would be large.

In low coal, battery locomotives obviate the necessity for blowing down roof rock or taking up bottom in the haulageway. Even if height were made so as to give minimum headroom for the trolley wire it nevertheless would be so low as to be dangerous to the workmen and that fact probably would cause annoying delays to the system whenever a car jumped the track and grounded the circuit or tore down the wires.

Another advantage of the storage-battery locomotive, which will become increasingly more important as years go by and thinner beds must be mined, is the fact that it may be made small. Mining costs in some mines largely depend upon the width of the roadways. A wide locomotive requires so much room to turn curves that it is frequently necessary to do much special and expensive mining work to accommodate them.

At one of the Pennsylvania Coal and Coke Corporation mines near Cresson, Pa., a saving of 10c. a ton was made in one section by decreasing the width of a locomotive. Originally the locomotive was equipped with outside wheels but had a relatively wide bearing housing as shown in Fig. 1.

By reducing the width of the housing 2½ in. and obtaining a narrower roller bearing to suit, the total width of the locomotive was reduced 5 in. Upon further inspection it was found that another reduction of 1 in. could be obtained by shortening the inside hub of the wheels. By doing this the hous-

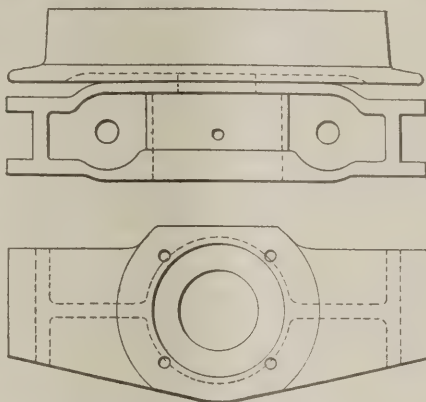


Fig. 2—How Housing Was Narrowed and Wheels Relocated

A new type of roller bearing was obtained for the narrower housing and the inside wheel hub cut off to reduce the total width of the locomotive 6 in.

ing fits closer to the recessed part of the wheel as shown in Fig. 2. By making other changes to the driving axles, bumpers, side frames and battery boxes the width of the locomotive was reduced 6 in.

Keeps Controller Fingers and Segments from Burning

There are two essentials to the satisfactory and economical operation of controller fingers. They are lubrication and contact pressure.

Large-capacity fingers, ¾ and 1 in. wide, are made of copper and slide over copper contact segments. Both finger and segment, being of the same composition and comparatively soft, will wear excessively unless properly lubricated. The quality of lubricant used varies somewhat with the climate and temperatures, but vaseline will be satisfactory for summer and for moderate winters, and engine oil is satisfactory during cold seasons.

It has been general practice in the past to use large quantities of lubricant, with the idea that the more used the longer it will remain on the contact segments. This is erroneous, as the surplus soon wipes or burns off and accumulates on arc barriers, fingers and drum castings, collecting copper dust and dirt, with a resulting tendency toward insulation failure. The contact segments also become sticky and dirty. The best practice is to spread the lubricant as smoothly over the segment as possible with a cloth, operate the controller fingers over the segments several times, and then wipe around the finger and the segments to remove any surplus.

The preceding information is pri-

marily for fingers and segments for arcing duty. Where non-arcing duty is performed, much less lubricant can be used, and it should be of a lighter grade. Contact segments and fingers become roughened by arcing and should be carefully smoothed up with emery or a file before lubrication is applied. Contacts usually start cutting in two or three days. A wire-drawn contact surface should be carefully smoothed and wiped off.

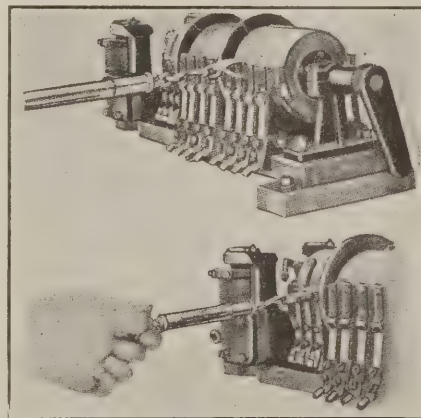
Small fingers, ¼-in. and ⅜-in. wide, are usually made of different material from the contact segments, thus causing less cutting.

The safe current density on a finger depends on the width of the contact surface, the pressure at the point of contact and the mass and radiation of the finger and segment. The capacity for a given width increases with the pressure, but too heavy pressure causes excessive wear and stiff controller drums.

Average practicable finger pressures for general service, copper fingers on copper segments, are listed below. For different contact materials these values may be increased somewhat.

Sizes of Finger in Inches	Pounds Pressure
1	8
¾	6
½	4
¼	2

By means of a small spring balance and a wire stirrup the pressure is easily checked, as shown in Figs. 1 and 2, and inspectors soon become accustomed to the feel of a finger with correct pressure.



Figs. 1 and 2—Testing the Pressure of Contact Fingers

Depending upon its width a finger should have a pressure of from 8 to 2 lb. This pressure should be measured when the finger is making contact with a segment. Otherwise incorrect results may be obtained. The finger is usually resting against a stop when not making contact on a segment, and therefore may be quite loose.

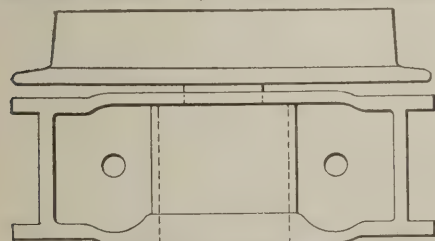


Fig. 1—Original Arrangement of Bearing Housing and Wheel

Although the locomotive had been equipped with outside wheels so that the overall width would be small, the bearing housing was unusually wide and could be greatly reduced.

Pressure is varied by changing the bend in the flat finger spring. After bending see that the finger is making contact along its full width. Most fingers have an adjustable stop, which limits the drop of the finger tip when it leaves the contact, but this stop does not vary the finger pressure. Its sole purpose is to prevent stubbing. The drop should be set at $\frac{1}{16}$ -in. to $\frac{1}{8}$ -in. or enough to allow the finger to lift entirely free from the stop when the finger is on the contact. This allows full pressure at the contact surface. The lift should be checked in all positions of the drum, as an eccentric drum, or one having worn bearings and shaft may have good finger pressure in one position and weak pressure in another.

The considerations just mentioned are equally important when installing new fingers or contact segments. A new finger should preferably be ground in with emery cloth to give a contact area at least $\frac{1}{8}$ -in. in width along the contact line, and the finger should make contact over at least three-fourths of its breadth. Drum-controller maintenance cost can be kept at a minimum and failures reduced by keeping in mind these simple instructions.

Theory of Transformers

A transformer is an electrical device used to change alternating current from a given voltage value to alternating current of the same frequency but different voltage value. Generally this device is distinguished from a rotary-

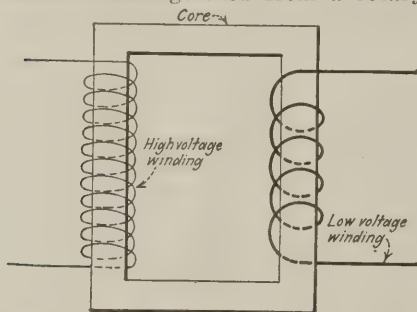


Fig. 1—Construction of Transformer

The usual type of transformer consists of two separate windings. One coil generally consists of many turns of fine wire and is called the high voltage winding; the other coil consists of heavier wire and is called the low voltage winding. The magnetic linkage from the coil to which power is supplied to the other coil produces the secondary voltage.

converter or rectifier, which changes alternating current to direct current, or vice versa by being termed a static transformer.

Transformers are therefore used to raise or lower the voltage of alternating-current circuits. Their principal application is in the transmission and distribution of alternating-current energy. Aside from this transformers are used for regulating voltage and for measuring purposes.

By means of transformers, we may transmit large amounts of electrical energy at high voltages which permit the use of small wires correspondingly long without prohibitive expense for copper, line construction or excessive loss of energy. At any point along such a line where we may need power it is only necessary to tap on a trans-

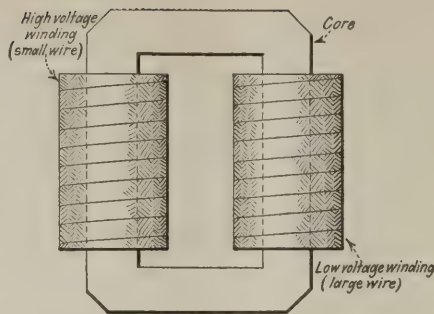


Fig. 2—Core-Type Unit

In this construction the coils surround the laminated iron core. This arrangement is similar to Fig. 1, however, the two coils are usually built one inside the other.

former and change the voltage down to any desired value.

Structure of the Transformer.—A transformer consists of two independent mutual induction coils of insulated wire, strap or bar placed on an iron core. One coil is called the high-voltage winding and the other the low-voltage winding. See Fig. 1. One or the other of these windings is connected to a source of alternating current and the other delivers alternating current to a given load. Irrespective of whether it be the high- or the low-voltage winding, that coil which is connected to the source of power is called the primary and the other the secondary.

Principle of Operation.—The alternating-current flowing in the primary winding produces in the iron core an alternating magnetic flux which links with the secondary winding and produces in it an induced alternating-current voltage. By properly selecting the number of turns of wire in each coil a transformer may be designed to raise or lower a voltage of any value to another of any desired value. When a transformer is used to change a voltage to another of lower value it is called a "step-down" transformer and when it is used to raise a voltage it is called a "step-up" transformer.

Core-Type and Shell-Type Transformers.—Transformers are made in two general types; core-type and shell-type. The first construction, the so-called core-type, is shown in Fig. 2. The primary and secondary windings surround the core, and are placed as close as possible to each other in order to obtain the most effective inductive action and to minimize the magnetic leakage. A shell-type transformer is one in which the iron core surrounds the coils as shown in Fig. 3. The de-

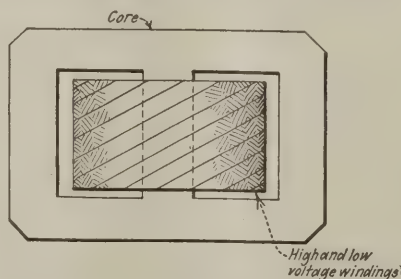


Fig. 3—Shell-Type Construction

Note that the iron core mostly surrounds the coils. The theory of operation is the same as for the core-type transformer and the windings are generally built in sections laid close to each other.

tails of construction are very similar to the core-type transformer. Electrically the two types are the same, the difference being merely in the mechanical construction. Both types are generally made by all manufacturers.

It will be noted in most diagrams representing transformers that one winding is shown as a coil of many turns of fine wire and the other as a coil of fewer turns of coarse wire. This is because a certain amount of power at high voltage and low current would require a small wire, while the same amount of power at low voltage would necessarily be of high current value and require a relatively larger wire.

The cores of transformers are made of thin sheets of special non-ageing iron cut to shape and stacked together. This is necessary to keep the transformer losses as low as possible. The rapidly reversing magnetic flux in the core produces both a hysteresis and eddy-current loss which is large or small depending upon the kind of iron and thickness of the laminations.

Methods of Cooling.—Depending upon the type, kind, size and service a transformer may be cooled by natural radiation, oil, water or air blast. Metering transformers and transformers used for short intervals of time such as motor starting transformers are often cooled by natural radiation. Most all other transformers are immersed in oil which dissipates the heat or is assisted by water-cooled coils near the surface of the oil. Air-blast cooled transformers are only feasible in central and substation practice where a suitable air-blast fan can be installed.

Don't Lengthen Your Wrench

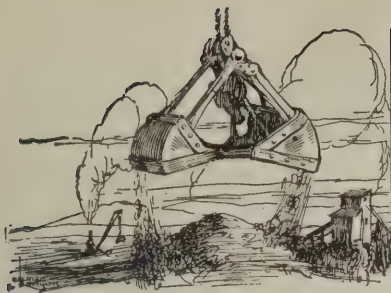
I have several times seen in print the kink which shows how to make a wrench longer by "slipping a gas pipe over the handle." It is a simple procedure, and it may look and sound good to some, but I don't believe in making a wrench longer in order to tighten nuts.

Wrenches for small nuts are invariably short; for medium nuts, medium in length; and for large nuts, they are long. The manufacturers have some system in making wrenches. The pitch of the thread, the cross-sectional area of the bolt at the bottom of the threads and the strength of the man who does the tightening are all considered in the design of the wrench.

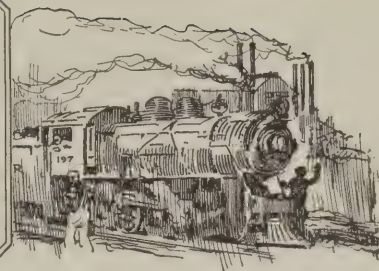
By making a wrench twice as long you therefore double the twist on the bolt when the pull on the wrench is the same. By increasing wrench lengths I have frequently actually stretched bolts until they broke in two, unless I stopped turning as soon as I thought the bolt was beginning to stretch. This is poor practice, and I do not do it any more. I do not increase the length of the handle because I realize that the elastic limit of a bolt should never be reached.

If you feel like making a wrench longer for unscrewing a nut do so. But don't make it longer for tightening.

W. F. SCHAPHORST



Production And the Market



Bituminous-Coal Trade Begins to Take Hope As General Business Shows Signs of Upturn

Straws showing which way the zephyrs are headed are to be seen in the heavier dumpings at Hampton Roads and at the Lakes as well as in the increased movement to tidewater at New York. The increases do not amount to much in themselves, but as premonitory symptoms of the long-awaited turn for the better in the coal business they are fraught with far-reaching interest. As during the nationwide depression of the last few months, the coal situation reflects general business conditions, which are reported to be gradually improving. There has been no change in the textile and shoe industries, which are at an extremely low ebb, but a turn for the better in the steel trade is looked for soon. A prominent coal operator predicts an increase in coal production within thirty days, saying there will be a spurt after July 1 to replenish dwindling stockpiles, which are nearing the danger line.

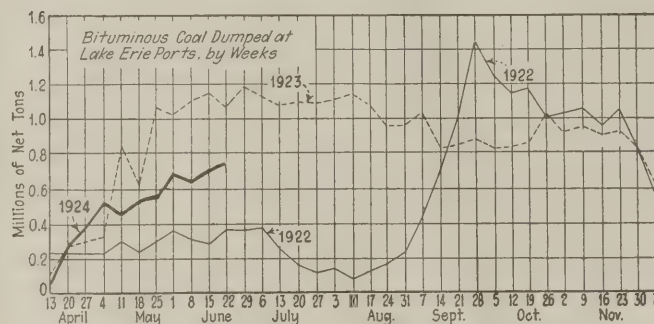
Bureau of Mines Places Orders

The U. S. Bureau of Mines has awarded a contract for 54,000 tons of New River run of mine coal, to be delivered to the Government Fuel Yards, at \$2.19 per ton. Contracts for several small lots of anthracite, totaling 14,990 tons, also have been let.

Coal Age Index of spot prices of bituminous coal failed to register any change during the week, standing at 166 on June 23, the corresponding price being \$2.01, the same as on June 16.

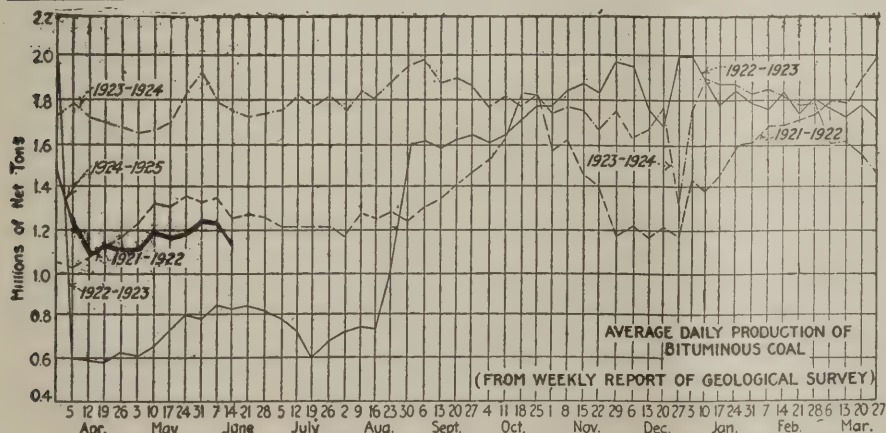
There was a pronounced pick-up in activity at Hampton Roads, dumpings of coal for all accounts during the week ended June 21 totaling 350,821 net tons, as compared with 265,222 tons during the preceding week. Coal dumped at Lake Erie ports during the week ended June 21, according to the Ore & Coal Exchange, was as follows: Cargo, 699,519 net tons; fuel, 41,168 tons. The previous week's figures were 645,978 tons of cargo coal and 39,184 tons of fuel coal.

Production of bituminous coal again took a tumble during the week ended June 14, the upturn of the preceding week proving to have been only a post-holiday spurt. Output for the week ended June 14, according to the Geological Survey, was 6,999,000 net tons, a decrease of 374,000 tons from the week before. Nevertheless, there has been a tendency toward a gradual increase in the rate of output since April 12, and the Geological Survey reports that telegraphic returns of car loadings for June 16 and 17 indicate the probable continuance of this slow recovery. Anthracite produc-



tion also declined slightly, the output for the week ended June 14 being 1,823,000 net tons, compared with 1,846,000 tons during the previous week.

Activity in anthracite continues to taper off steadily. Demand is gradually but surely slowing down, consumers showing a disposition to hold out for the particular size they want and refusing a mixture of chestnut in order to obtain stove. Demand is still far the strongest for stove, though there is a fair call for egg. The movement of pea has slowed down to such an extent that some operators are reported to be storing it in large quantities.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
May 31	10,091,000	6,708,000
June 7 (a)	10,676,000	7,373,000
June 14 (b)	10,573,000	6,999,000
Daily average	1,762,000	1,167,000
Cal. yr. to date (c) ..	249,931,000	211,490,000
Daily average to date ..	1,773,000	1,501,000

ANTHRACITE

May 31	1,606,000	1,294,000
June 7	2,046,000	1,846,000
June 14	2,053,000	1,823,000
Cal. yr. to date	47,245,000	41,885,000

COKE

June 7	405,000	150,000
June 14	406,000	131,000
Cal. yr. to date (c) ..	9,205,000	5,827,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Midwest Hunts Market

The deadly dullness shows no new signs of brightening. The scattering inquiries of a week ago continue to come in, thus giving some encouragement to an otherwise sluggish trade, but little business is developing out of it and none is expected now for a few weeks. However, the trade is not so much pessimistic as it is callous to hard going. From now on, any change will be for the better. Heat waves sweeping the middle belt of the nation have killed retail business and few yards are stocking with Midwest coals. There is a little constant business for eastern Kentucky and smokeless coals among such buyers.

Steam trade is slower. For the first time screenings "no bills" are beginning to accumulate at some of the mines of Illinois and Indiana. This aggravates the tendency to lower steam prices which began last week. Little southern Illinois fine stuff brings more than \$1.90 and most of it is clear down to \$1.75. Fourth Vein Indiana is at the same level. Fifth Vein and central Illinois screenings range from \$1.50 to \$1.65 with emphasis on the low figure.

The Illinois fields show no improvement in running time. Crushers are busy making small coal out of large. Commercial mines hardly ever get more than two days' work a week. Railroad tonnage generally is light in the southern

Illinois regions but continues moving slowly in the Mt. Olive territory. Standard district mines are hardly able to sell anything. The region is full of empty storage cars and a good many "no bills." Little smoke rises from mine plants.

Business is practically at a standstill in St. Louis. No domestic coal is moving except for current needs and that is small. Storage does not seem to have begun. Dealers' yards are well filled with everything. Both wagonload and carload steam business has stopped. Country domestic shows a little activity but it is hard to find, and country steam, which was active two weeks ago, has eased up. There are no changes in prices.

Kentucky Foresees Stocking Demand

The feeling in the Kentucky coal trade is somewhat better than it has been, as it is felt that the worst of the dull season is past and that normal summer stocking will now create a demand for coal. Domestic sizes are moving better, and this with Lake business is resulting in better production of screenings and slight weakness in the market for those sizes. This should influence some of the big steam consumers to place orders. In eastern Kentucky screenings are selling at from 85c. @ \$1.15, as against \$1.25 @ \$1.50 in western Kentucky.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	June 25 1923	June 9 1924	June 16 1924	June 23 1924†
Smokeless lump.....	Columbus....	\$6.10	\$3.50	\$3.65	\$3.75 @ \$4.00	
Smokeless mine run.....	Columbus....	3.60	2.30	2.30	<i>2.10 @ 2.35</i>	
Smokeless screenings.....	Columbus....	3.60	1.85	1.25	1.10 @ 1.50	
Smokeless lump.....	Chicago....	6.10	3.35	3.60	3.50 @ 3.75	
Smokeless mine run.....	Chicago....	3.85	2.00	2.00	2.00	
Smokeless lump.....	Cincinnati....	6.00	3.60	3.75	3.75 @ 4.00	
Smokeless mine run.....	Cincinnati....	3.50	2.10	1.85	1.75 @ 2.00	
Smokeless screenings.....	Cincinnati....	3.25	1.50	1.50	<i>1.35 @ 1.65</i>	
*Smokeless mine run.....	Boston....	5.60	4.40	4.30	4.25 @ 4.40	
Clearfield mine run.....	Boston....	2.35	2.00	2.00	1.65 @ 2.40	
Cambria mine run.....	Boston....	2.85	2.35	2.45	2.15 @ 2.75	
Somerset mine run.....	Boston....	2.60	2.15	2.15	1.85 @ 2.50	
Pool 1 (Navy Standard).....	New York....	3.75	2.65	2.70	2.50 @ 2.90	
Pool 1 (Navy Standard).....	Philadelphia....	3.65	3.00	3.00	2.75 @ 3.25	
Pool 1 (Navy Standard).....	Baltimore....					
Pool 9 (Super. Low Vol.).....	New York....	2.75	2.20	2.20	2.00 @ 2.40	
Pool 9 (Super. Low Vol.).....	Philadelphia....	2.85	2.20	2.20	2.00 @ 2.45	
Pool 9 (Super. Low Vol.).....	Baltimore....	2.75	1.85	1.85	1.80 @ 1.90	
Pool 10 (H.Gr. Low Vol.).....	New York....	2.50	1.85	1.85	1.75 @ 2.00	
Pool 10 (H.Gr. Low Vol.).....	Philadelphia....	2.25	1.85	1.85	1.70 @ 2.00	
Pool 10 (H.Gr. Low Vol.).....	Baltimore....	2.45	1.65	1.65	1.60 @ 1.70	
Pool 11 (Low Vol.).....	New York....	1.95	1.60	1.60	1.50 @ 1.75	
Pool 11 (Low Vol.).....	Philadelphia....	1.90	1.50	1.50	1.30 @ 1.70	
Pool 11 (Low Vol.).....	Baltimore....	2.25	1.55	1.55	1.50 @ 1.60	
High-Volatile, Eastern		Market Quoted	June 25 1923	June 9 1924	June 16 1924	June 23 1924†
Pool 54-64 (Gas and St.).....	New York....	1.80	1.50	1.50	1.40 @ 1.65	
Pool 54-64 (Gas and St.).....	Philadelphia....	1.70	1.55	1.55	1.45 @ 1.70	
Pool 54-64 (Gas and St.).....	Baltimore....	1.75	1.50	1.50	1.40 @ 1.65	
Pittsburgh sc'd gas.....	Pittsburgh....	2.80	2.40	2.40	2.30 @ 2.50	
Pittsburgh gas mine run.....	Pittsburgh....		2.10	2.10	2.00 @ 2.25	
Pittsburgh mine run (St.).....	Pittsburgh....	2.05	1.85	1.85	1.75 @ 2.00	
Pittsburgh slack (Gas).....	Pittsburgh....	1.50	1.35	1.35	1.20 @ 1.25	
Kanawha lump.....	Columbus....	3.00				
Kanawha mine run.....	Columbus....	1.85				
Kanawha screenings.....	Columbus....	1.35				
W. Va. lump.....	Cincinnati....	3.25	2.10	2.25	2.00 @ 2.50	
W. Va. gas mine run.....	Cincinnati....	1.75	1.35	1.35	1.25 @ 1.50	
W. Va. steam mine run.....	Cincinnati....	1.75	1.35	1.35	1.25 @ 1.50	
W. Va. screenings.....	Cincinnati....	1.10	.85	.85	.85 @ 1.00	
Hocking lump.....	Columbus....	2.75	2.40	2.45	2.25 @ 2.65	
Hocking mine run.....	Columbus....	1.85	1.70	1.70	1.60 @ 1.85	
Hocking screenings.....	Columbus....	1.20	1.40	1.35	1.30 @ 1.45	
Pitts. No. 8 lump.....	Cleveland....	2.70	2.45	2.40	<i>2.00 @ 2.75</i>	
Pitts. No. 8 mine run.....	Cleveland....	1.90	1.85	1.85	<i>1.80 @ 1.90</i>	
Pitts. No. 8 screenings.....	Cleveland....	1.25	1.20	1.15	<i>1.05 @ 1.15</i>	
Midwest		Market Quoted	June 25 1923	June 9 1924	June 16 1924	June 23 1924†
Franklin, Ill. lump.....	Chicago....	\$4.05	\$2.85	\$2.75	\$2.50 @ \$3.00	
Franklin, Ill. mine run.....	Chicago....	3.10	2.35	2.35	2.25 @ 2.50	
Franklin, Ill. screenings.....	Chicago....	1.80	2.00	1.90	1.75 @ 1.90	
Central, Ill. lump.....	Chicago....	2.60	2.35	2.35	2.25 @ 2.50	
Central, Ill. mine run.....	Chicago....	2.10	2.10	2.10	2.00 @ 2.25	
Central, Ill. screenings.....	Chicago....	1.60	1.60	1.60	1.50 @ 1.65	
Ind. 4th Vein lump.....	Chicago....	3.35	2.85	2.75	2.75 @ 3.00	
Ind. 4th Vein mine run.....	Chicago....	2.60	2.35	2.35	2.25 @ 2.50	
Ind. 4th Vein screenings.....	Chicago....	1.80	1.95	1.80	1.75 @ 1.90	
Ind. 5th Vein lump.....	Chicago....	2.85	2.35	2.35	2.25 @ 2.50	
Ind. 5th Vein mine run.....	Chicago....	2.10	2.10	2.10	2.00 @ 2.25	
Ind. 5th Vein screenings.....	Chicago....	1.55	1.60	1.60	1.50 @ 1.75	
Mt. Olive lump.....	St. Louis....		2.85	2.85	2.75 @ 3.00	
Mt. Olive mine run.....	St. Louis....		2.50	2.50	2.50	
Mt. Olive screenings.....	St. Louis....		2.00	2.00	2.00	
Standard lump.....	St. Louis....	2.25	2.15	2.15	2.00 @ 2.35	
Standard mine run.....	St. Louis....	1.75	1.80	1.80	1.75 @ 1.85	
Standard screenings.....	St. Louis....	1.35	1.60	1.50	1.40 @ 1.60	
West Ky. lump.....	Louisville....	2.25	2.00	2.05	1.90 @ 2.15	
West Ky. mine run.....	Louisville....	1.75	1.55	1.50	1.35 @ 1.75	
West Ky. screenings.....	Louisville....	1.15	1.55	1.50	1.40 @ 1.75	
West Ky. lump.....	Chicago....	2.35	1.85	2.00	1.75 @ 2.00	
West Ky. mine run.....	Chicago....	1.45	1.60	1.50	1.50 @ 1.75	
South and Southwest		Market Quoted	June 25 1923	June 9 1924	June 16 1924	June 23 1924†
Big Seam lump.....	Birmingham..	3.05	3.00	3.00	2.90 @ 3.10	
Big Seam mine run.....	Birmingham..	2.05	1.85	1.85	1.75 @ 2.10	
Big Seam (washed).....	Birmingham..	2.35	2.00	2.00	1.75 @ 2.25	
S. E. Ky. lump.....	Chicago....	3.25	2.10	2.10	2.00 @ 2.25	
S. E. Ky. mine run.....	Chicago....	2.35	1.60	1.50	1.25 @ 2.00	
S. E. Ky. lump.....	Louisville....	3.35	2.10	2.10	2.00 @ 2.25	
S. E. Ky. mine run.....	Louisville....	2.10	1.50	1.55	1.25 @ 1.75	
S. E. Ky. screenings.....	Louisville....	1.35	.95	1.05	.80 @ 1.15	
S. E. Ky. lump.....	Cincinnati....	3.25	2.35	2.25	2.25 @ 2.75	
S. E. Ky. mine run.....	Cincinnati....	1.60	1.45	1.50	1.25 @ 1.65	
S. E. Ky. screenings.....	Cincinnati....	1.10	.90	.85	.75 @ 1.10	
Kansas lump.....	Kansas City..	4.00	4.50	4.50	4.50	
Kansas mine run.....	Kansas City..	3.25	3.50	3.50	3.50	
Kansas screenings.....	Kansas City..	2.60	2.50	2.50	2.50	

* Gross tons, f.o.b. vessel, Hampton Roads.

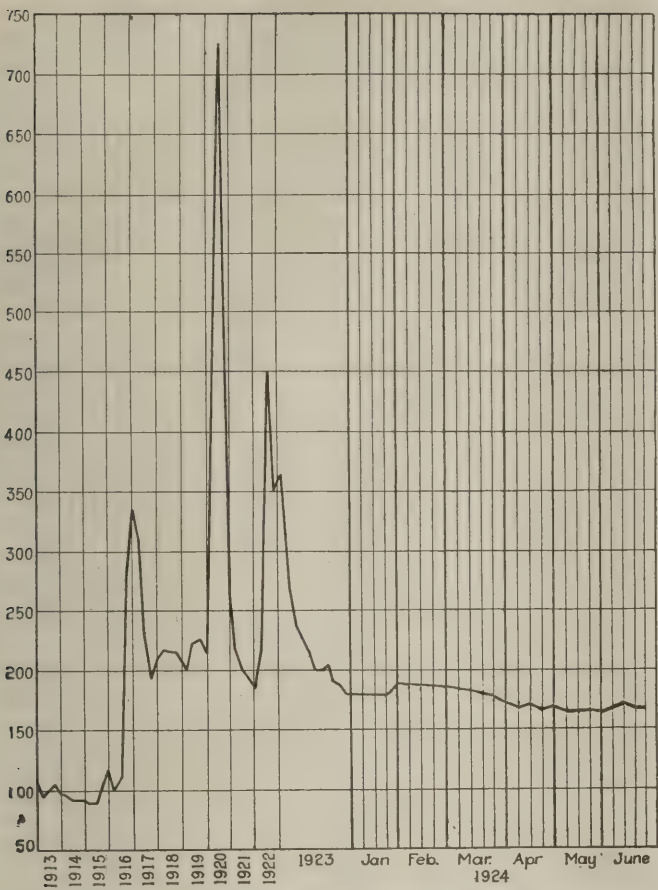
† Advances over previous week shown in heavy type, declines in italics.

‡ On strike.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Market Quoted	Freight Rates	June 25, 1923		June 16, 1924		June 23, 1924†	
				Independent	Company	Independent	Company	Independent	Company
Broken.....	New York....		\$2.34		\$7.75 @ \$8.35		\$8.00 @ \$8.85		\$8.00 @ \$8.85
Broken.....	Philadelphia....		2.39		7.00 @ 8.10		8.70 @ 8.85		8.70 @ 8.85
Egg.....	New York....		2.39	\$8.50 @ \$11.50	8.00 @ 8.35	\$8.75 @ \$9.25	8.45 @ 8.85	\$8.75 @ \$9.25	8.45 @ 8.85
Egg.....	Philadelphia....		2.39	9.25 @ 10.50	8.10 @ 8.35	8.80 @ 9.60	8.80 @ 8.85	8.80 @ 9.60	8.80 @ 8.80
Egg.....	Chicago*.....		5.06	7.60 @ 10.25	7.25 @ 7.45	7.86 @ 8.00	7.83 @ 7.90	7.86 @ 8.00	7.83 @ 7.90
Stove.....	New York....		2.34	8.50 @ 11.50	8.00 @ 8.35	9.00 @ 9.25	8.45 @ 9.10	9.00 @ 9.25	8.45 @ 9.10
Stove.....	Philadelphia....		2.39	9.25 @ 10.00	8.15 @ 8.35	9.15 @ 9.80	8.85 @ 9.00	9.15 @ 9.80	8.85 @ 9.00
Stove.....	Chicago*.....		5.06	7.60 @ 10.25	7.25 @ 7.45	8.17 @ 8.30	8.13 @ 8.23	8.17 @ 8.30	8.13 @ 8.23
Chestnut.....	New York....		2.34	8.50 @ 11.00	8.00 @ 8.35	8.75 @ 9.25	8.45 @ 8.95	8.75 @ 9.25	8.45 @ 8.95
Chestnut.....	Philadelphia....		2.39	9.25 @ 10.50	8.15 @ 8.35	8.85 @ 9.70	8.80 @ 8.85	8.85 @ 9.70	8.80 @ 8.85
Chestnut.....	Chicago*.....		5.06	7.60 @ 10.25	7.25 @ 7.45	8.00 @ 8.13	8.08 @ 8.13	8.00 @ 8.13	8.08 @ 8.13
Range.....	New York....		2.34		8.30		8.70		8.70
Pea.....	New York....		2.22	7.25 @ 8.00	6.00 @ 6.30	5.50 @ 5.50	5.00 @ 5.50	5.50 @ 5.50	5.50 @ 6.00
Pea.....	Philadelphia....		2.14	7.00 @ 7.25	6.15 @ 6.20	5.75 @ 6.25	5.75 @ 6.25	5.75 @ 6.25	5.75 @ 6.25
Pea.....	Chicago*.....		4.79	6.25 @ 7.25	5.50 @ 5.65	5.13 @ 5.45	5.36 @ 5.91	5.13 @ 5.45	5.36 @ 5.91
Buckwheat No. 1.....	New York....		2.22	2.75 @ 3.50	3.50 @ 4.15	2.15 @ 3.00	3.00 @ 3.15	2.15 @ 3.00	3.00 @ 3.15
Buckwheat No. 1.....	Philadelphia....		2.14	2.75 @ 3.50	3.50	2.50 @ 3.00	3.00	2.50 @ 3.00	3.00
Rice.....	New York....		2.22	2.00 @ 2.50	2.50	1.75 @ 2.25	2.25	1.75 @ 2.25	2.25
Rice.....	Philadelphia....		2.14	1.75 @ 2.50	2.50	2.00 @ 2.25	2.25	2.00 @ 2.25	2.25
Barley.....	New York....		2.22	1.25 @ 1.50	1.50	1.25 @ 1.50	1.50	1.15 @ 1.50	1.50
Barley.....	Philadelphia....		2.14	1.15 @ 1.50	1.50	1.50	1.50	1.50	1.50
Birdseye.....	New York....		2.22		1.60		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924	1924	1924	1923
	June 23	June 16	June 9	June 25
Index	166	166	170	205
Weighted average price	\$2.01	\$2.01	\$2.06	\$2.49

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Prepared prices are very steady at from around \$1.75 for egg to a peak price of \$2.75 for best 4-in. block in eastern Kentucky. Eastern Kentucky mine run is steady at \$1.35 @ \$1.75. Other than a little weakness in western Kentucky screenings, prices have been very firm throughout the Kentucky coal fields over the week, eastern Kentucky having lost 5c. or so from the low on screenings.

Southern West Virginia mines are now producing as much tonnage as they sometimes do under more favorable market conditions. There has not been any further increase in the high-volatile output and yet about 600,000 tons per week is coming from the mines, more than half of which is originating in the Logan district. Shipments from Logan to the lakes is unusually large. Comparatively little high volatile is being consigned to Eastern markets owing to the extremely low prices prevailing in that section of the country. There is a little more mining activity in the smokeless area, the average working time being around three days a week.

Prices Drop at Duluth

Trade at the Head-of-the-Lakes is virtually at a standstill, with the railroads supplying some of the activity in out shipments, and a few small orders from industrial concerns which are buying from hand to mouth supplying the balance. Arrivals keep up to the mark, however, with 21 cargoes landed during the week, of which two were hard coal. It is estimated that this market will be strong in hard coal this year and that 1,400,000 tons will be needed to meet the demand. Of this only about 65,000 tons has been brought up so far. The Steel Corporation is moving coal up again, which is a good omen.

Prices have taken a tumble in bituminous as shown in this circular list: Kentucky lump, \$6.25; run of pile, \$5.75; screenings, \$4.25; Youghiogheny lump, \$5.75; run of pile, \$5; screenings, \$3.75 @ \$4; Hocking lump, \$5.50; run of pile, \$4.75; screenings, \$3.75; splint lump, \$5.50 @ \$5.75; run of pile, \$5; screenings, \$4; Pocahontas lump, \$7; run of pile, \$5.50; screenings, \$4.50.

The only sign of real life in the market is the bidding which is being done for municipal contracts among the towns of the iron ranges. It is asserted that docks are sticking fairly close to prices in this.

Summer dullness pervades the Milwaukee coal market. Retailers profited in a small way by prolonged wet and cool weather, but everything is quiet now. There is little doing in the wholesale trade. The soft-coal market is weak. The regular price of Youghiogheny pile run, f.o.b. car or truck, is \$6 a ton. The United Coal & Dock Co., however, is delivering 2,000 tons of this coal to a Milwaukee institution at \$4.49. Other bids ranged from this price up to \$5.31 per ton. Last year the county paid \$6.19 for the same coal. Oil is affecting the anthracite trade quite seriously. June witnessed quite a spurt in receipts by lake, but midsummer promises to be slow in this respect. Receipts of anthracite for the season aggregate 210,398 tons, and of soft coal 474,420 tons.

Western Business Is Slim

Little activity is reported through the Southwest. Domestic storage, principally of Arkansas semi-anthracite, has started, but is slow. There has been a steady increase in the pre-season demand for threshing coal. The industrial demand remains quiet. Retailers are making a storage price of \$10.85 on Arkansas semi-anthracite lump, from \$2 to \$2.50 below the regular midwinter price.

The demand for Colorado coal continues very quiet with mines working two or three days a week, which, in the opinion of the operators, is hardly worth while. Although many of the smaller mines have been closed entirely, very little improvement is shown in the production of the others. Operators report 42 per cent of the working time lost last week on account of no market. Prices are unchanged.

Mines in Utah are working less than two days a week. The demand, such as it is, is for intermediate sizes. The sugar industry is storing a little slack coal, however. There is no contracting right now, but a few bids have been published. It is thought that screened slack will soon be off the market as a result of the new mine regulations, which will make it difficult to get this grade hereafter. Price cutting is reported, especially on slack coal, which is said to be selling as low as 90c., though \$1.25 is supposed to be the price.

Cincinnati Sees Cheering Signs

Better demand for bituminous nut and slack was the high point of Cincinnati market this week. Inquiry and orders came largely from industrial plants, some of which had been out of the market off and on for several months. Lump and block business has slowed down considerably, due in great measure to the torrid days that have set in and inability to get raw labor to handle the shipments to the smaller places. In the smokeless line-up the principal cause for comment is the strength of prepared and the weakness of the residue. The undertone is better, the belief being that the worst of the situation has been seen. River business, because of the excellent stage, is good. Retail prices show no change.

The trade at Columbus continues quiet, but some producers and shippers profess to see signs of improvement. Signs of a better demand from retailers are apparent and buying is slightly heavier. Householders show a preference for Pocahontas, splints and Kentucky grades, although some Hocking and Pomeroy lump is moving. Steam business is rather quiet with prices low and irregular. Utilities and railroads probably are the best customers now, although iron and steel concerns also are buying to a small extent. School coal is moving in good quantities. Contracting is quiet, as most users are content to buy on the open market in preference to renewing contracts. Demurrage coal is not so common since many of the larger mines have closed down. Loading of bottoms at the lower lake ports is rather brisk, but Kentucky and West Virginia are getting the business.

Shippers to the Cleveland market are pessimistic, believing the hoped-for upturn still distant. Prices have eased off a trifle further, the general tendency being weaker. No doubt this is due to the tapering off of industrial and manufacturing activity and a tepid demand for Lake cargo coal. Distress coal arriving at industrial centers unconsigned is being disposed of in small lots at 5c. to 10c. under the market to avoid demurrage charges.

Consumption of coal at Pittsburgh continues to trend downward, both on the railroads and in the industries. The steel industry, however, probably is not far from its turning point now. There is no change in quotations except that slack is down about 10c. for both steam and gas.

The trade at Buffalo is quite as dull as ever. The offices of operators whose mines are shut down are little now but hanging-out places, unless they go into the jobbing trade, which some of them have not done. The general slowing down of business has given the coal trade a second downward turn.

Better Undertone in New England

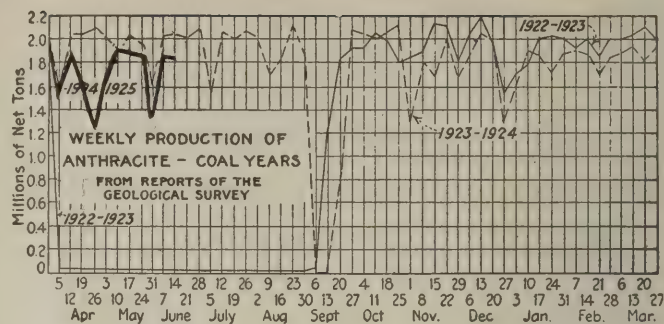
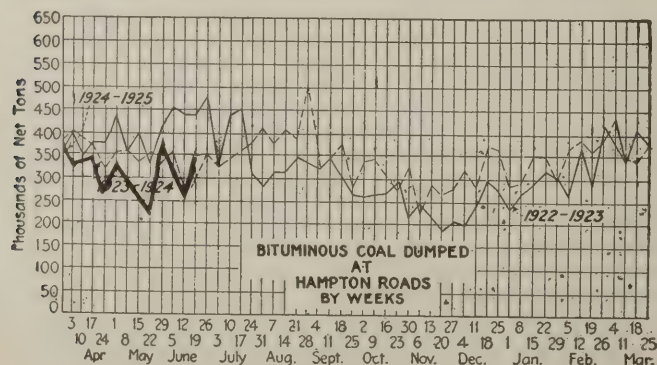
While there is no marked improvement in New England trade there is perhaps a less unsatisfactory undertone than a fortnight ago. Prices are reasonably well maintained at the levels quoted last week and there is less shading of spot quotations. There are of course as yet no signs of comprehensive buying, but current inquiry is being closely watched and especially for inland delivery from rehandling wharves at this end there is a disposition to net more money the moment the situation warrants. It is noticed, too, that all-rail coals are in somewhat better request in the territory where they are accessible in competition with Pocahontas and New River.

At Hampton Roads the No. 1 grades are being held at \$4.25@4.40 per gross ton f.o.b. vessel, and here too there are fewer indications of price shading. Smokeless coal of No. 2 grade is still to be had at levels down to \$4, but accumulations are less heavy and output generally is being rigidly curtailed. There is enough tonnage applying on contracts and on purchases offshore to take care of a fairly good proportion of the Pocahontas and New River now being mined.

For distribution at Boston, Providence and Portland prices are still nominally \$5.75 per gross ton on cars; \$5.50 coal is less heard from and there are more quotations of \$5.65 than has hitherto been the rule. This situation naturally improves the prospect for higher grade coals all rail from central Pennsylvania and there have been several instances lately where rail coal has been sold in areas that have been regarded this season up to now as practically closed to the rail route. In this quarter also there is an inclination to advance prices mildly, although as yet not more than 5c. or 10c. more has been paid even on the choicest grade.

Outlook Brighter on Atlantic Seaboard

While no one is willing to admit that business shows a slight improvement the fact remains that shipments of soft coal to the New York tidewater during the past week show an improvement. Receipts for the first five days of the week indicated a daily average of about 1,500 cars whereas for the past few weeks the average has been between 1,300 and 1,400 cars. No one would give an opinion as to why the extra shipments were made in view of the low prices prevailing. There is a better feeling, however, and, while the order books do not show it, the outlook is becoming brighter. Consumers continue to use their re-



serves rather than follow the advice of the federal authorities and railroad officials to stock up before the fall rush begins.

Calm has overspread the trade in Philadelphia. Rumors of strikes in regions where efforts are being made to cut the union scale, it was thought, might spur consumers into buying coal, but so many of them are now contending with poor business prospects that they pay scant attention to their coal supply. Prices remain firm.

A renewal, in some measure at least, of the export movement, along with the announcement that a fair number of charters are now being made for loadings over the end of June and the first part of July, is probably the most encouraging feature of the situation at Baltimore. Local demand is confined almost entirely to small immediate needs. The city government plans the substitution of lump bituminous for anthracite in school houses, fire department houses and other city buildings now being heated by anthracite.

The Birmingham market continues to be much depressed and no indications of improvement are in sight. Slowing down in operations at industrial plants throughout the territory has caused a restricted demand for steam coal in the spot market, and sales agencies and operators are receiving requests to defer regular shipments against contracts. Production is being gradually decreased to accommodate the dull market.

Anthracite Market Still Losing Zip

Stove coal continues to hold the other domestic sizes of anthracite in line at New York, thereby preventing a marked drop in independent quotations. Demand centers almost entirely around stove size, although there is a fair demand for egg. Movement of hard coal is slowing gradually. Demand is much slower, and consumers are maintaining an attitude of demanding the size wanted and of refusing to take a mixture of stove and chestnut when the former coal is wanted. Chestnut is the longest of the three sizes and is quoted at lower figures than either egg or stove when taken alone. Egg coal brings a better price when it is not taken in conjunction with chestnut, which is not in good standing in the New York market. Pea moves slowly. There is a lull in the demand and some operators are reported as storing heavy tonnages. Demand for the steam sizes has slackened considerably. Only the better grades of independent No. 1 buckwheat are bringing full company circular, the average maximum hanging around \$2.75. Rice and barley are in better movement.

At Philadelphia the hard-coal trade has slowed down to a marked degree with the appearance of the first warm weather. Ordering has almost ceased and the public has quickly lost interest in coal. Stove and egg are most in demand, but much of the edge has been worn off these sizes. There are numerous dealers who want more of this coal, but balk at taking nut and pea to get it.

Despite a well organized campaign on the part of a number of Baltimore dealers to induce customers to place orders early, there has been no general response. The fact that the public is fairly well acquainted with the virtual certainty of a retail increase on July 1 seems to have but little effect.

Car Loadings

	Cars Loaded	
	All Cars	Coal Cars
Week ended June 7, 1924	910,707	143,353
Previous week	819,904	120,215
Week ended June 9, 1923	1,012,312	189,765

Foreign Market And Export News

British Coal Market Reviving Slowly; Output Slips Further

The British coal markets are gradually reviving from the usual depression that accompanies the holidays, but new business is scarce. Quoted prices are being shaded in some instances to obtain orders. It is reported that German and American competition is keener. The South Wales market reflects a slight improvement in demand. Exports are expanding and the attempts of foreign buyers to depress prices are not meeting with success. Notices of approaching shutdowns have been posted at additional pits as a result of the unremunerative operating conditions.

A cable to *Coal Age* states that the production by British collieries during the week ended June 7 was 5,120,000 tons, according to the official reports. This compares with an output of 5,308,000 tons during the week ended May 31.

House Trade Dull, Industrial Demand Normal in France

Business in household coal in the French market is dull. Activity in industrial fuels, however, is normal and satisfactory, but there is no rush on the market and deliveries are quite regular. Increased output from the devastated collieries is being placed without difficulty.

In the import field there is much surprise in seeing prices raised at the British shipping docks at the same time that the pound is rising; ordinarily French dealers expect some compensation. Owing to the unsteadiness of exchange, there is much hesitation in the purchase of British coals. However, some exporters are making offers in pounds based on a certain rate and provide in their contracts a stated difference per ton applicable per point of increase in the value of sterling on receipt of the order.

From Belgium deliveries are plenti-

ful and the transportation problem seems less acute because shipments are less abundant.

Deliveries of indemnity fuels remain weak as compared to the tonnages received before the strike. During the first seventeen days of May, France and Luxemburg received 156,700 tons of coal, 248,100 tons of coke and 15,770 tons of lignite briquets, a total of 420,620 tons, or a daily average of about 24,800 tons. Although no statistics have been given out on the amount of fuel received during the last days in May, the deliveries are said to have fallen off. It is hoped, however, that they will soon improve with the gradual resumption of work in the Ruhr mines. But, as the amount of fuel that should have been delivered to the Allies has not been received, the Reparation Commission has seized stocks at the mines.

The Dusseldorf agreements having expired on June 15, negotiations will be started as soon as the new French Ministry for Public Works is appointed.

Hampton Roads Sees No Let-Up In Dullness

Dullness continues to feature the market at Hampton Roads, with supplies at tidewater dwindling but with the price level holding steady. A large contract for South American shipment has been wound up, leaving the foreign movement outlook unpromising. Coastwise movement is only fair, while the bunker trade is holding its own.

Washouts on the Virginian Ry. have caused a delay of several days in coal movement and have tended to curtail output to some extent, being partly responsible for the low supplies at tide.

The tone of the market is dull and the outlook is described by shippers as not bright, although they had expected a slow spell at this season.

New Coal-Loading Plant at Brazilian Port

Pernambuco, Brazil, is to have a new mechanical coal-loading plant, which will be installed at an expenditure approximating \$287,000. A traveling gantry crane will be used to deliver coal on shipboard by clamshell buckets, or other similar device. A minimum loading capacity of 250 metric tons per hour is contemplated.

Export Clearances, Week Ended June 21, 1924

FROM HAMPTON ROADS

For Brazil:	Tons
Dan. Str. Denevirke for Santos.....	3,897
Br. Str. Kayeson for Rio de Janeiro..	4,707
Br. Str. Golden Sea for Rio de Janeiro.	6,256
For Chile:	
Dan. Str. Gudrun Maersk for Antofagasta	6,085
For Cuba:	
Br. Str. Mayari for Banos.....	2,237
For France:	
Fr. Str. P.L.M. 24 for Marseilles.....	8,049
For Hawaii:	
Amer. Str. Orinoco for Pearl Harbor..	6,747
For Mexico:	
Nor. Str. Tjorsdal for Puerto Mexico..	3,227
For West Indies:	
Nor Str. Bjornefjord for Fort de France	5,412
Swed. Str. Ada Gorthon for Curacao.	3,515

FROM BALTIMORE

For Canada:	
Amer. Schr. Cora F. Cressy.....	1,205
For Costa Rica:	
Br. Str. North America.....	3,017
For France:	
Belg. Str. Eliazier	7,449
Br. Str. Lancaster Castle	8,085
For Italy:	
Ital. Str. Aster.....	9,155
Br. Str. Lancasterian	3,684
For Porto Rico:	
Am. Str. Major Wheeler.....	391

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	June 14	June 21
Cars on hand.....	1,261	327
Tons on hand.....	77,329	22,096
Tons dumped for week.....	73,016	99,561
Tonnage waiting.....	15,000	10,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	912	776
Tons on hand.....	70,250	59,409
Tons dumped for week.....	72,535	100,531
Tonnage waiting.....	13,419	12,746
C. & O. Piers, Newport News:		
Cars on hand.....	1,405	1,521
Tons on hand.....	72,740	76,735
Tons dumped for week.....	91,255	113,141
Tonnage waiting.....	10,485	7,710

Pier and Bunker Prices, Gross Tons

	PIERS	June 14	June 21†
Pool 9, New York.....	\$4.85@ \$5.00	\$4.85@ \$5.00	
Pool 10, New York.....	4.60@ 4.75	4.50@ 4.75	
Pool 11, New York.....	4.40@ 4.50	4.40@ 4.50	
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05	
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80	
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55	
Pool 1, Hamp. Roads....	4.35	4.35	
Pool 2, Hamp. Roads....	4.25	4.25	
Pools 5-6-7, Hamp. Rds..	4.20	4.10@ 4.15	

BUNKERS

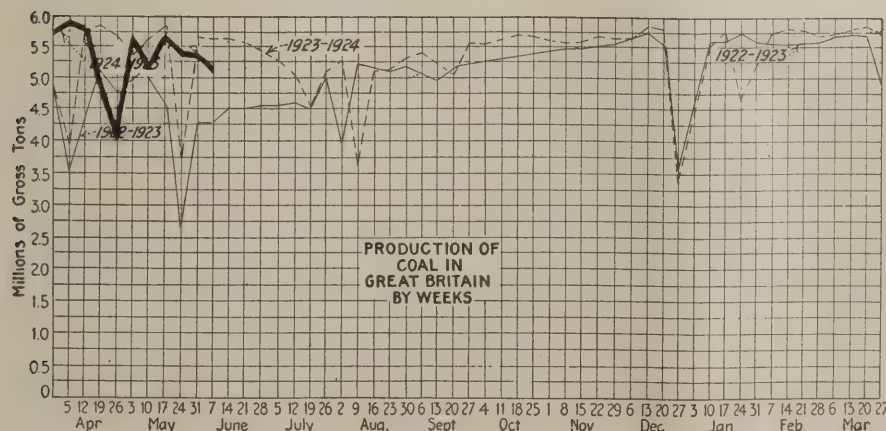
Pool 9, New York.....	5.15@ 5.30	5.15@ 5.30
Pool 10, New York.....	4.90@ 5.05	4.80@ 5.05
Pool 11, New York.....	4.70@ 4.80	4.70@ 4.80
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80
Pool 1, Hamp. Roads....	4.40	4.45
Pool 2, Hamp. Roads....	4.25	4.35
Pools 5-6-7, Hamp. Rds..	4.20	4.20

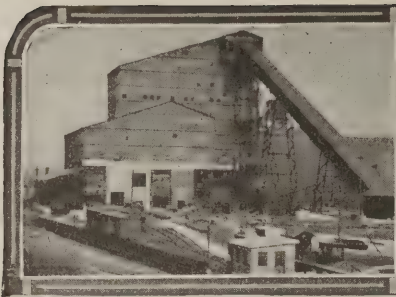
Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to Coal Age

	June 14	June 21†
Admiralty, large.....	27s.3d. @ 28s.	27s.6d. @ 28s.
Steam smalls.....	18s.6d.	18s.6d.
Newcastle:		
Best steams.....	22s.6d. @ 23s.6d.	22s. @ 23s.
Best gas.....	23s. @ 23s.6d.	23s. @ 23s.6d.
Best bunkers.....	20s. @ 21s.	20s. @ 21s.6d.

† Advances over previous week shown in heavy type; declines in italics.





News Items From Field and Trade



ALABAMA

The Alabama Coal & Iron Co. has given an option on 158,000 acres of coal lands in Etowah, Jackson, Marshall, Cherokee and DeKalb Counties to the Jasper Trust Co., of Jasper. The Etowah Investment Co., which owns a large tract of coal lands in the western part of Etowah County, also has given an option on its holdings to the same company. The Jasper Trust Co. is the holding company for the Deepwater Coal & Iron Co., recently organized with a capital stock of \$10,000,000 and with headquarters at Jasper. The company is preparing for the extensive mining of coal at a number of places in northern Alabama.

A new board of state mine examiners has been appointed by Governor Brandon as follows: F. G. Long, Maylene; Sam Y. Leith, Dolomite; C. M. Parker, Newcastle; J. S. Kellum, Boothton; C. E. Bowron, Birmingham, with C. H. Nesbitt, chief mine inspector, as ex-officio chairman. The board will hold an examination of applicants for eligibility as mine foremen and fireboss during the latter part of July, the date not having been fixed as yet.

The Gadsden Coal & Clay Products Co. has been incorporated at Gadsden and will mine coal from a new opening near that point and also will remove a vein of fireclay underlying the coal, the clay to be used in the manufacture of brick. E. N. Smith is president of the company.

COLORADO

Edward H. Denny, formerly of the Bureau of Mines safety section, in Washington, has succeeded Dan Harrington as the bureau's district mining engineer for Colorado, Wyoming and New Mexico. He is already on the job, with headquarters in Denver. Mr. Harrington now lives in Salt Lake City, Utah, and is consulting safety engineer for two Utah coal companies.

CONNECTICUT

The Commonwealth Fuel Co., of Pennsylvania, has been granted \$73,856.65 damages against the Karm Terminal Co., at Bridgeport, one of the largest dealers in coal in Connecticut. Mr. McNeil, of the Karm Terminal Co., has filed notice of appeal.

NEW YORK

W. C. Atwater, president of Wm. C. Atwater & Co., Inc., New York City, has been elected president of the Pocahontas Operators' Association, suc-

ceeding Isaac T. Mann. Mr. Atwater has been in the coal business nearly 30 years, beginning as a salesman in 1886 and taking over a retail yard at Fall River, Mass., two years later. He soon entered the producing field, being first associated with W. D. Ord in the Empire operation and later purchasing the Elkhorn mines at Maybeury. The holdings of the firm of Wm. C. Atwater & Co., established in 1900, now include the Elkhorn operation, the Fall River Coal Co., the Williams-Pocahontas Co. and an interest in the American Coal Co.

The city of Buffalo has given up the use of anthracite for school fuel and asked for bids to furnish 26,000 tons of smokeless bituminous and 10,000 tons of ordinary soft coal. This will provide supply from July to April.

The name of the Maxim Coal & Coke Corporation, Buffalo, has been changed to the McCarthy Coal & Coke Co., a copartnership, with D. J. and F. H. McCarthy owners, L. P. Zimmerman having retired.

The Lehigh Valley Coal Co. in 1923 had a net income of \$5,237,083 after bond, interest and federal taxes, against an average net of \$3,651,935 for the five years to Dec. 31, 1923. This was equal to \$4.32 a share on the 212,160 certificates of interest offered to stockholders of the Lehigh Valley R.R., compared with \$3.01 a share for the five-year period. The company's deduction for bond interest did not include provision for any interest on \$15,000,000 of 5 per cent bonds for the reason that the issue was dated Feb. 1 of this year and did not enter into the financial structure of the company during 1923. Interest on this issue for the eleven months of the current year will be a charge against this year's income.

OHIO

The New Pittsburgh Coal Co., of Columbus, announces that the Minerton mine, in the Pomeroy field, will not be abandoned, as reported, but the tonnage will be run through the tippie of the Thomas mine, which adjoins.

The federal court at Covington, Ky., has named William S. Harmon and Frank L. Stein, both of Columbus, ancillary receivers for the Maynard Coal Co. They had been named by the federal court in Ohio upon the original application. A considerable holding of the company is located in the Hazard field of Kentucky.

One of the few coal saleswomen,

Mrs. G. W. Kuhn, secretary-treasurer of the Big Mountain Coal Co., which has offices in the Hadden-Clinton Bank Building, Columbus, has been on the road at various times this spring and has disposed of quite a tonnage. Recently she made a trip to Toledo, Detroit and Cleveland.

The Marcoll mine of the Maher Collieries Co., near Powhatan, partly completed, was the scene of an explosion June 12, which wrecked the shaft, hurled the mine cage to the level of the surface from the bottom of the 200 ft. shaft and tossed safety doors to earth. There was no one in the mine at the time of the explosion, about half an hour before engineers had planned to enter the mine in order to make a survey. The explosion is believed to have been caused by an accumulation of gas. Not quite a year ago William Maher and his brother, sons of the head of the Maher Collieries Co., of Cleveland, were killed in an explosion in the same mine just as they were preparing to enter the mine after descending to the bottom of the shaft.

As soon as estimates of the amount of coal needed are received, John E. Harper, Director of Public Welfare, will ask the State Purchasing Agent to advertise for bids and the contracts for coal for Ohio state institutions during the next 12 months will be let. The State uses more than 150,000 tons of coal annually, and, following the order of Governor Donahey, all of this is Ohio-mined coal. No coal from out of the state has been purchased in the last two years, and all contracts are let on competitive bidding. It will be impossible to award the contracts before July 1, when the appropriations for the next fiscal year will be available, but Director Harper will have all requisitions in before that date, and there should be no delay in placing the order.

PENNSYLVANIA

The Mather Colliery Co., in Greene County, followed the lead of a number of the large coke region companies and reduced wages last week to the 1917 scale.

Coal mining men of the anthracite region are much interested in the segregation of the Lehigh Valley Coal Co. from Coxe Bros. & Co., which must be effective March 15, 1926. The Coxe lands were operated by the Coxe family for many years, but about twenty years ago the Lehigh Valley took the collieries over. If the Valley loses the Coxe holdings, its operations in the lower

field will be materially reduced. It will have only the Shaft and Hazle mines and part of Stockton, Jeansville and Yorktown, unless it reopens the Humboldt. Shaft colliery is largely dependent upon Coxe coal from the Black Creek Valley and Jeansville takes Coxe coal from Oneida.

W. J. Rainey, Inc., has blown out a few hundred ovens at a number of its Connellsville plants, but is running its mines about full, shipping more coal than heretofore. The H. C. Frick Coke Co. has reduced the running time of some of its plants to four or five days per week.

Union officials of District 7 entertained Thomas Kennedy, president, and James A. Gorman, secretary of the Anthracite Conciliation Board, at a banquet in the Hotel Loughran, Hazleton, on June 11. The honor guests left two days later for Europe, where they will attend the world labor conference.

Separate benefit funds of \$1,000 each have been contributed by the district and the international union of the mine workers to the families of the fourteen mine workers who were killed at the Loomis colliery of the Glen Alden Coal Co., Hanover Township, over a week ago.

The Buckeye Coal Co., subsidiary of the Youngstown Sheet & Tube Co., closed down its Nemaquin mine, at Nemaquin, Greene County, last week. Its Brier Hill operation in Fayette County has been down for some time, so that this company is now entirely idle in this section.

The Crawford Coal & Coke Co., of Connellsville, has enlarged its holdings by the purchase of 70 acres adjoining the present property in Georges township, Fayette County. It is reported that \$140,000 was paid for the tract, which is underlaid with Connellsville coking coal.

More anthracite is being taken from the Lehigh River and the numerous dams throughout the Lehigh Valley this spring than in many years past, owing to the continued high water, which washes the coal down the river from the collieries and culm banks along the different tributaries of the Lehigh River.

For the first time in the history of mining circles in the hard-coal region, representatives of the United Mine Workers a week ago visited the main offices of the Hudson Coal Co. in New York to take up with the president of the company and other company officials grievances presented by the local unions. In the past grievances were adjusted at the Scranton offices of the company.

Nearly a million dollars has been expended on equipment and improvements at the Candlemas colliery of the Haddock Mining Co., at Silver Brook, composed of Scranton and Wilkes-Barre capitalists, in a little less than two years, since a long-term lease was obtained from the Philadelphia & Reading Coal & Iron Co., the Lehigh Valley Coal Co. and the Coxe Estate, on a 300-acre tract. A breaker with a

capacity of 2,500 tons daily is operated by electricity; mine slopes have been put in readiness; ground has been cleared to begin stripping operations on a large scale; five steam air compressors have been installed and nearly 500 men are at work.

William Gilbert, contractor, of Hazleton, has started to drive a slope on the extreme eastern end of the Silver Brook tract, on land near O'Gara's in Quakake, controlled by the Coxe estate. This is among the few remaining tracts that can be classed as virgin coal land. The coal will be mined under a royalty distribution arrangement with the Reading, Lehigh Valley and Coxe interests owners.

While closed down the Buckeye Coal Co., a subsidiary of the Youngstown Sheet & Tube Co., is building at the Nemaquin Mine, in Greene County, a new and permanent steel tibble to replace the temporary wooden one erected when the first shafts were sunk. The company also will install skips for hoisting and is concreting the shaft bottom landing and main entry for a considerable distance therefrom.

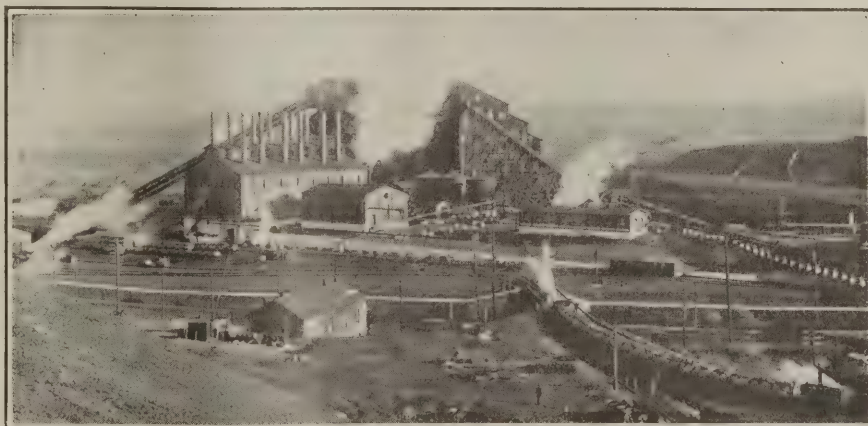
The entire cave area over the workings of the Glen Alden Coal Co. is being equipped with a gas ventilator devised by W. W. Inglis, president of the company, to carry off gas. The ventilator is an arrangement of a terra cotta pipe placed over the service gas pipes of all houses in the district where settlement of the service mains might occur. Escaping gas generally follows the pipes and by placing a vent some distance from the houses in the district, it is declared, the gas will come to the surface instead of continuing into the homes.

Most of the fatal roof fall accidents occurring in the anthracite mines are traceable to carelessness on the part of the mine workers, it was agreed at a mine safety meeting conducted by mine inspectors and various coal company officials in the offices of the Glen Alden Coal Co., Scranton, last week. Upon motion, a resolution was adopted asking that the mine workers be represented at another conference to be held soon. Last week's conference was the second within a short time and

manifests the desire of the anthracite operators to do all in their power to prevent mine fatalities. In attendance at the meeting were State Mine Inspectors P. J. Moore, Augustus McDade, Jenkin T. Reese and L. M. Evans, and representatives of the Temple, Glen Alden, Scranton, Pennsylvania and Hillside, Von Storch, Price-Pancoast, Moffat, and Mid-City coal companies.

The State Bureau of Workmen's Compensation during the month of May received reports of 157 fatalities in Pennsylvania's industries. Of this total 62 occurred in the bituminous and anthracite mines. During the first five months of 1924 there have been 934 fatal accidents in the state's industrial establishments, and since Jan. 1, 1916, the date of the inception of the compensation law, there have been 21,402 fatal accident reports filed with the bureau. There were 108 permanent disability cases reported in May 1924, making the total for the year, up to June 1, 661. Since Jan. 1, 1916, 5,160 cases of permanent disability has been reported. In May there were also 13,832 cases of temporary disability reported, the total for the year being 73,291 and the total for the period of the act, 1,531,074. In May the Compensation Board awarded \$572,042 in fatal cases, the largest monthly total with the exception of March, when \$618,985 was awarded. The 1924 total award for fatal cases so far has been \$2,677,306 and since the beginning of 1916 the total has been \$45,822,525. The fatal compensation paid last month was \$358,607, making the total for the first five months of 1924, \$1,518,224. Since the beginning of 1916, \$16,437,964 has been paid in compensation to dependents of persons killed in Pennsylvania's industries. The disability compensation paid in May was \$691,212, making the total for 1924 up to June 1, \$3,003,347. Since the compensation system was started \$37,938,098 has been paid in disability compensation. The total compensation paid for all causes has been \$54,376,062 since Jan. 1, 1916, and of this sum \$4,521,571 was paid by the board since Jan. 1, 1924.

Approximately 900 men and women employed by the Glen Alden Coal Co. were guests of the company at a ban-



Courtesy U. S. Distributing Corp.

No. 9 Colliery, Pennsylvania Coal Co., Pittston, Pa.

At this plant is both a shaft and a slope and no less than seven seams in operation. The mines are in Luzerne County.

quet, concert, entertainment and dance in Irem Temple, Wilkes-Barre, a week ago. The affair was tendered the employees in recognition of the excellent work performed during the past year. W. W. Inglis, president of the company, presided. At the banquet a silent toast was given in honor of the fourteen men who lost their lives in the gas explosion at the Loomis colliery.

WASHINGTON, D. C.

F. G. Tryon, geologist in charge of coal statistics for the U. S. Geological Survey, is en route to London to attend the World Power Conference.

WEST VIRGINIA

The Talbott Fuel Co. has begun operations at its new mine at Arnettsville in the Monongalia County field, where it has sunk a 160-ft. shaft to the Sewickley vein. The company has about 475 acres available for development.

Operations have been resumed at the No. 5 mine of the Craw Orchard Improvement Co., at Eccles, after an idleness lasting since Dec. 15. Although the Eccles plant has been shut down for so long, the property was in readiness for operation whenever it was possible to resume.

The Central Pocahontas Coal Co., operating in the vicinity of Welch, in McDowell County, has resumed operations at its mine. The first group of miners reported for duty June 6 and by June 9 there was a full complement of men at work. It is understood that there are enough orders on hand to keep the mine running full time for a period of 30 days.

The entire crop of graduates of the department of mining engineering at West Virginia University has been absorbed by the Hudson Coal Co. One of the graduates was J. L. Orr, son of J. M. Orr, general manager of the Hudson company. Another is C. Y. Shih, of Fukien, in southern China. Both men received the degrees of Bachelor of Science in Mining Engineering this spring. Shih eventually expects to return to his native land and aid in developing rich tracts of coal land in Fukien and adjacent provinces. A post graduate student at the University was a Mr. Kwong and he too after a tour of the anthracite fields expects to go to work with the Hudson company.

At the Pinnacle operation of the American Coal Co. on Crane Creek, in southern West Virginia when a pile of slate near the tipple of the coal company exploded as the result of high water; the explosion buried a dwelling at the foot of the pile, seven people being killed. Two men of a rescue party who attempted to rescue those in the dwelling are believed to have been killed when a second explosion occurred. It was necessary to dynamite a railroad bridge in order to save the commissary and several dwellings of the Rolfe Colliery Co., also in the flooded area, where much damage was done. In many places there were such

serious washouts on the Norfolk & Western that it was not possible to use the main line either for freight or passenger transportation for several days.

CANADA

The Pacific Coast Coal Mines, which formerly operated the Morden mines, near South Wellington, B. C., is being reorganized and is expected to resume shipment this fall. The Morden mine is one of the best equipped on the coast. The company, which has been in liquidation also owns a coal concession at Hequach, near Alert Bay, where some development work has been done.

The possibility of Nova Scotia Coal providing a solution of Ontario's fuel problem was given a general canvass at a conference in Toronto last week between Premier Ferguson and representatives of Nova Scotia coal interests. The meeting was arranged by Premier Armstrong of Nova Scotia and strong representations were made by the eastern representatives of the ability of Nova Scotia Mines to aid fuel conditions in Ontario.

The Dominion Government has established a minimum price at which coke may be bought by buyers in the Province of Ontario. The established rate is \$7 at Black Rock and \$7.50 at Detroit for any kind or size of coke. The regulation was passed, it is stated, at the instance of the Hamilton By-Product Co., which alleges that it cannot manufacture the product and sell at a lower price. Seventy-five per cent of the coke coming into Ontario is used for domestic purposes, which means that the government is penalizing the domestic consumers for the benefit of a plant which does not produce 2 per cent of the coke consumed in Ontario.

Output of coal from Canadian mines during March was 1,537,000 net tons, an increase of 25 per cent over the tonnage for the previous month and 15 per cent above the average for the month for the five preceding years. The output showed an increase of 352,000 tons in Nova Scotia, but decreases of 14,000 tons in Alberta, 13,000 tons in British Columbia, 7,000 tons in Saskatchewan and 3,000 tons in New Brunswick. The cumulative output from all mines for the first three months of 1924 was 4,282,000 tons, an increase of 3 per cent over the preceding five-year average for the same period. Comparison of March and February figures covering the total importation of coal from the United States and Great Britain showed an increase of 22 per cent. March imports amounted to 1,576,000 tons, while in February 1,281,000 tons was brought in. The March importations this year were 14 per cent greater than the five-year average for the month. During the month, 1,200 tons was imported from Great Britain. Total importations of all coal for the three months of 1924 was 4,090,000 tons, an increase of 8 per cent over the preceding five-year average for the same period. Imports of anthracite for March totaled 390,300 tons. This was 36 per cent more than in January and 4 per cent higher than the five-year average for the month.

Anthracite imported from the United States amounted to 389,100 tons, while 1,200 tons came from Great Britain during the month. The total amount of anthracite imported during the three months of 1924 was 1,021,600 tons, a decrease of 3 per cent from the five-year average for this period. Exports of Canadian coal for March were 32 per cent more than in February. The quantities were: March, 94,600 tons; February, 71,800 tons. Comparison of the March exports with the preceding five-year average showed a decrease of 54 per cent. Cumulative exports for the three months amounted to 249,100 tons, or 58 per cent less than the five-year average for the same period.

New Companies

The Oshaba Domestic Coal Co. has been incorporated in Birmingham, Ala., by E. J. Blackwood, E. R. Blackwood and others.

The Superior Briquet & Fuel Co., of Tacoma, has been incorporated with a capital stock of \$99,000 by A. F. Plant, A. E. Burkhalter and F. C. Hewson.

The New Beaver Coal Co. has been incorporated in Cleaton, Ky., with a capital stock of \$100,000, by John W. Price, John W. Basin and R. S. Lytle.

The Rainbow Coal Mining Co. has been incorporated in Montgomery, Ala., with a capital of \$10,000, by Homer F. Baird, Q. M. Selcer and others.

The American Coal & Power Co. has been incorporated in Denver, Colo., with 10,000 shares of no par value, by H. W. Newcomb, C. M. Tausig and F. W. Herres.

The McArthur Coal Co. Ltd., of Toronto has been incorporated with an authorized capital of \$40,000. The provisional directors are Wilfred C. James, Warwick H. Noble and Charles T. S. Evans.

Coal Service of Canada, Ltd., with an authorized capital of \$300,000, has been organized at Montreal and a Dominion charter granted. The company will engage in business as wholesale and retail dealers and operators. Montreal lawyers are mentioned as the incorporators.

Publications Received

U. S. Government Specification for Lubricants and Liquid Fuels and Methods for Testing. Bureau of Mines, Washington, D. C. Technical paper 323A. U. S. Government standard specification No. 2c. Pp. 89; 6x9 in.; illustrated.

Conduit Wiring, by Terrell Croft. Pp. 458; 5½x8½ in.; illustrated. Price \$3. A complete and practical explanation of modern practice in the installation of conduit wiring. McGraw-Hill Book Co., 370 Seventh Ave., New York City.

Handbook on Engineering (Steam and Electrical), by Henry C. Tulley. Seventh edition, fully revised and enlarged by James F. Hobart. Three volumes. Pp. 1,155; 5½x8 in.; illustrated. Price \$7.50. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

Principles of Electric Motors and Control, by Gordon Fox. Pp. 492; 5½x8 in.; illustrated. Price 3.50. Explains the principles, construction and performance of all types of motors and controllers in commercial use, for both direct-current and alternating-current equipment. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

Alternating-Current Armature Winding, by Terrell Croft. Pp. 352; 5½x8 in.; illustrated. Price \$3. Explains how to assemble and connect the new winding into the stator, how to determine whether or not it is feasible to reconnect a given winding for operation at a voltage, frequency, phase or speed other than that for which the machine is rated and how to make the reconnection. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

Traffic News

Denies Lower Coal Rate On Gauley Branch of C. & O.

The Interstate Commerce Commission has denied an application by the Chesapeake & Ohio Ry. for authority to continue to maintain rates on bituminous coal from mines on the northern portion of the Gauley branch of the C. & O. to destinations in numerous states lower than from intermediate points on that branch.

Hearing on Coal Rates to Iowa Transferred to St. Louis

After two weeks of taking testimony in Des Moines, Iowa, Examiner Disque, of the Interstate Commerce Commission, late last week transferred to St. Louis, Mo., the protracted hearing on coal rates from Illinois, Indiana, Kentucky, Tennessee, Ohio, West Virginia and part of Virginia into Iowa. The hearing is to be resumed again in Des Moines some time in July. The State of Iowa and various associations representing coal consumers charge in their complaints that freight rates on coal into Iowa are excessive as compared to rates into other states of comparable distance from producing fields.

Dakota Lignite Rates Hang Fire

The Interstate Commerce Commission has handed down another of its split decisions in the North Dakota lignite case. The proposed increase in rates suggested by the railroads, of 40 to 50 per cent, was held to be unwarranted and the suggested rates cancelled. At the same time it was held that the old rates were too low, but there was lacking sufficient evidence to indicate what they should be. A suggested schedule of the examiner who conducted the hearing is named for consideration. This merely puts the whole question off for another complete hearing. It apparently accepts the suggestion that as lignite is of a lesser fuel value it is entitled to a lower schedule, but does not determine what that rate should be.

Mines on Greenbrier & Eastern Want New River Rates

The Interstate Commerce Commission is being urged vigorously by coal operators on the Greenbrier & Eastern R.R. to affirm its original findings which makes New River district rates applicable from their mines. The commission handed down a decision in this matter on Dec. 9 of last year. In this decision the Chesapeake & Ohio and other carriers were required to establish eastbound and westbound rates from the Greenbrier mines which are identical with those applying to mines in the New River district. In January, however, the Chesapeake & Ohio filed an application for a rehearing, which was granted by the commission. The appli-

cation for rehearing was made on the basis that inaccurate information had been furnished by the complainants. This has been denied by them. They contend that the coal mines on the Greenbrier & Eastern produce coal similar in character to the smokeless coal of the New River, Winding Gulf, Pocahontas and Tug River districts located on the C. & O., the Virginian, the N. & W., the Sewall Valley and the Kanawha, Glen Jean & Eastern.

It is contended, for instance, that the Virginians policy is to restrict the movement of coal to Eastern destinations, having built an impregnable rate wall at one end of its railroad and succeeded in forcing the flow of traffic to satisfy best its own revenue needs.

Obituary

F. Murray Olyphant, for forty years secretary of the Delaware & Hudson Co., died on June 17 at his home in Englewood, N. J. He was 68 years old. Among the many charities to which Mr. Olyphant had long given active support, the one that most deeply enlisted his sympathies, was the Jerry McAuley Mission.

Charles M. Lilly, of Beckley, W. Va., a prominent coal operator, was killed by a flash from an electric wire at Packs Branch last week. Born near Hinton, Mr. Lilly was 49 years of age at the time of his death. When a young man he went to work in the mines in Raleigh County and by constant work and perseverance won his way to the top. At the time of his death he was president of two large operating companies, the Four Vein company, at Lanark, and the Packs Branch company, at Packs Branch. He also had other large interests.

Recent Patents

Mine-Rail Fastener and Anti-Spreader. Charles E. Fowler, Allais, Ky.; 1,479,131. Jan. 1, 1924. Filed Dec. 13, 1922; serial No. 606,569.

Mine Car. Hugh W. Sanford, Knoxville, Tenn.; 1,479,322. Jan. 1, 1924. Filed June 3, 1922; serial No. 565,567.

Art of Treating Coal. Walter E. Trent, Washington, D. C., assignor to Trent Process Co., Wilmington, Del.; 1,479,757. Jan. 1, 1924. Filed Nov. 12, 1919; serial No. 337,531.

Manufacture of Coal or Other Briquets. H. G. Lloyd, Surbiton, England, assignor of one-half to George St. Barbe, London, England; 1,479,822. Jan. 8, 1924. Filed Sept. 28, 1922; serial No. 591,116.

Coming Meetings

World Power Conference, Wembley, London, England June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

First International Management Congress, Prague, Czechoslovakia, July 21-24.

Rocky Mountain Coal Mining Institute. Summer meeting, Aug. 7-9, Rock Springs, Wyo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New York State Coal Merchants Association, Inc., 14th annual convention, Sept. 4-6. Stamford-in-the-Catskills, N. Y.; headquarters Churchill Hall. Executive secretary, G. W. F. Woodside, Arkay Building, Albany, N. Y.

New Equipment

Splash-Lubricated Gathering Pump for Mine Use

The Columbus Gear & Pump Co. has recently placed upon the market the new gathering pump for mines shown in the accompanying illustrations. This machine is only 36 in. high, and consequently is well suited to installation in low coal beds. Its other dimensions are, width 30 in. and length 55 in.

This pump is built in three sizes,

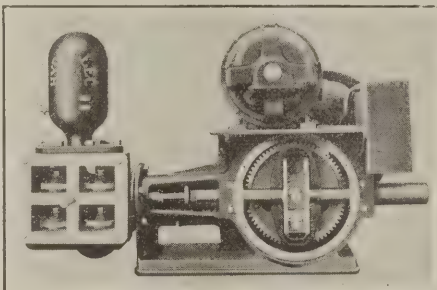


Fig. 1—Side View of Pump

In this picture the valve-chest and yoke-case covers have been removed, showing the simplicity of the internal parts. The yoke case normally is kept half full of oil, thus affording effective lubrication to all parts within.

that is, with cylinders of 4-, 5- and 6-in. diameters, the length of stroke in all cases being 7 in. The capacities of the three sizes are respectively 50, 75 and 110 gal. per minute. The speed in all cases is 66 r.p.m.

Several somewhat unusual features are embodied in the construction of this pump. Thus, motion is transmitted from the crank to the piston rod by means of a crank block working within a yoke. The piston rod is thus given a true harmonic motion. This yoke reciprocates within an oil-tight case that is kept nearly half full of oil.

In the construction of this machine

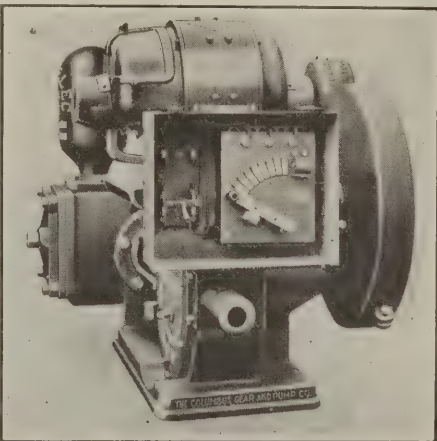


Fig. 2—End View of Pump

This shows how the motor and control apparatus are mounted directly on the pump frame. Possibility of relative movement between these parts, such as might result in misalignment of the gears, is thus rendered remote.

a tip has been taken from automobile design. Thus shafts, crank pin and like parts are turned, case-hardened and ground affording members that fit perfectly and endure long wear.

Both motor and starter are mounted directly on the machine frame and thus in reality form an integral part of the pump. This machine is regularly made with a bronze-fitted cast-iron cylinder but may also be supplied with cylinder and valve chest of acid-resisting bronze.

Truck-Mounted Electric Welding Outfit

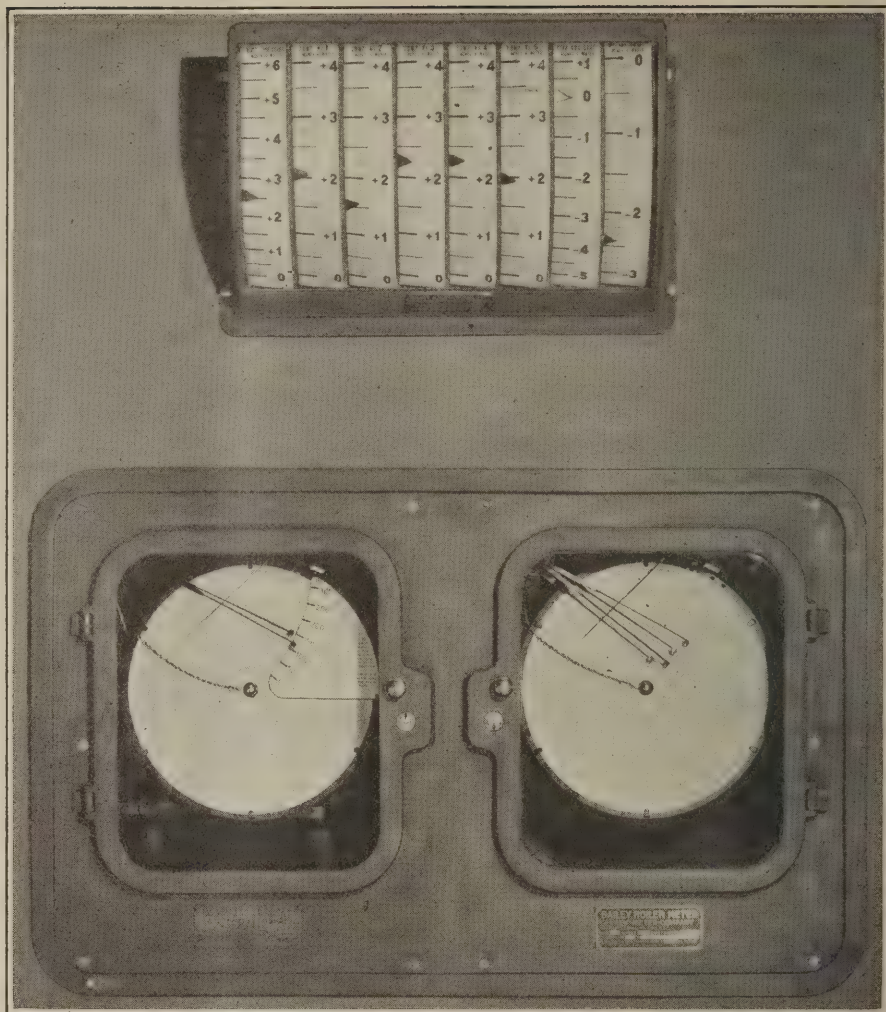
A new portable arc welder, said by the manufacturer to be designed to insure smooth and rapid deposition of metal with thorough penetration, delivers continuous power and permits rapid production, both with high current and large electrodes, as well as with low current and small electrodes.

This welder, made by the General Electric Co., is a two-unit set, consisting of a motor and a generator. The latter is self-excited, the current being regulated entirely by turning a hand-wheel on the generator. A self-adjusting, stabilizing reactor is provided, which automatically steadies the arc under all welding conditions. It can be used with any of the commercial sizes of metallic electrodes from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. diameter. The voltage of the generator can be adjusted to suit the character of the work. High voltage for complete penetration on heavy work and low voltage to prevent burning through on light work are thus obtained at will. Many current values between 75 and 300 amp. can be obtained.

Among the operating advantages of this outfit are: an arc easy to start and maintain, roller-bearing wheels, holes in base for crane hooks and adaptability to long or short leads, for working close by or at a distance from the set.

Among the mechanical advantages are included motor and generator insulation designed to withstand severe operating conditions both with regard to duty cycle of the load imposed and general atmospheric conditions under which ordinary insulation fails. Bearings are waste-packed and oil cannot be spilled if the set is tipped when being moved.

This welding generator is a two-pole, self-excited, constant energy, single-operator machine with a dual magnetic circuit designed to operate at 60 volts open circuit and 20 to 25 volts under



Meters and Gages Give Direct Indication of Power Plant Operations

The multi-scale indicator at the top of the panel tells at a glance just how every device in the plant is functioning. On the charts at the bottom, records are made for comparative data.

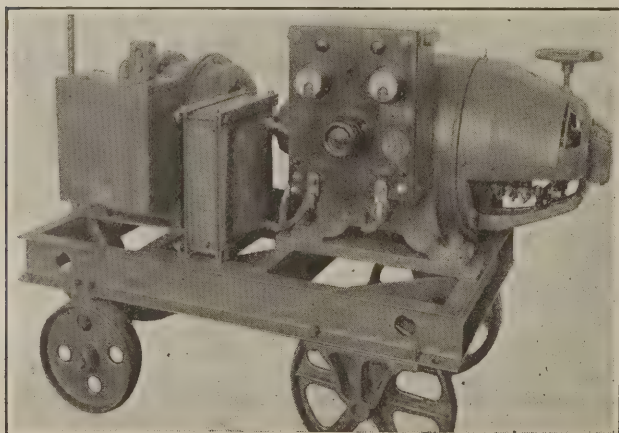
load. It is rated at 200 amp. for continuous service, 250 amp. for one hour and 300 amp. for short periods. The motor is a standard 10-hp. unit. The complete set has three bearings, the two units being close-coupled by a solid flange coupling. All parts, including generator, motor, generator control panel, motor starter and stabilizing reactor, are mounted on a welded structural steel base of rigid construction and light weight.

The assembled unit is about 63 in. long, 29 in. wide and 47 in. high and weighs about 1,600 lb.

Improved Steam-and-Air-Flow Recording Meters

It has long been known that boilers can be operated efficiently only when suitable recording meters are continually in operation to check up the various processes of converting latent heat energy in the coal to mechanical or electrical energy. The designing engineers of modern power plants have appreciated the desirability of incorporating certain features in all indicating and recording instruments. The Bailey Meter Company, of Cleveland, Ohio, has recently placed on the market several new type flush-front meters and gages. These instruments are designed for panel-board mountings, and are so constructed that the meter casings are behind the panel.

A double flush-front meter, to be used with a boiler equipped with an economizer, is one of the most interesting of this new line. Steam flow and air flow are recorded on the left-hand chart while temperatures of the feed water entering and leaving the economizer are recorded on the right-hand chart. The multi-pointer gage above this meter is suitable for installation on a boiler fired with a forced draft chain grate stoker. It indicates wind-box pressure, fire compartment pressure, firebox draft, and chimney draft.



Arc Welding Outfit

Current regulation easily may be obtained by a slight turn of the hand-wheel. A stabilizing reactor automatically steadies the arc under all welding conditions. Either high or low voltage can be provided so that all welding may be done with current of the required pressure.

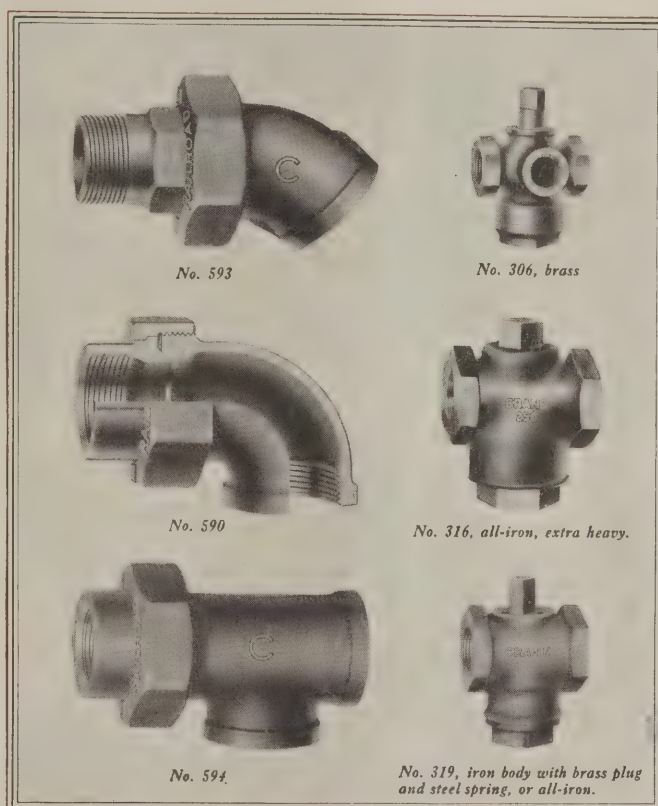
COAL AGE

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June 26, 1924



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Crane railroad union fittings make it possible to reduce the number of joints in pipe-lines carrying steam, air, oil or gas. Gaskets are eliminated. Their brass-to-iron seats insure tight connections.

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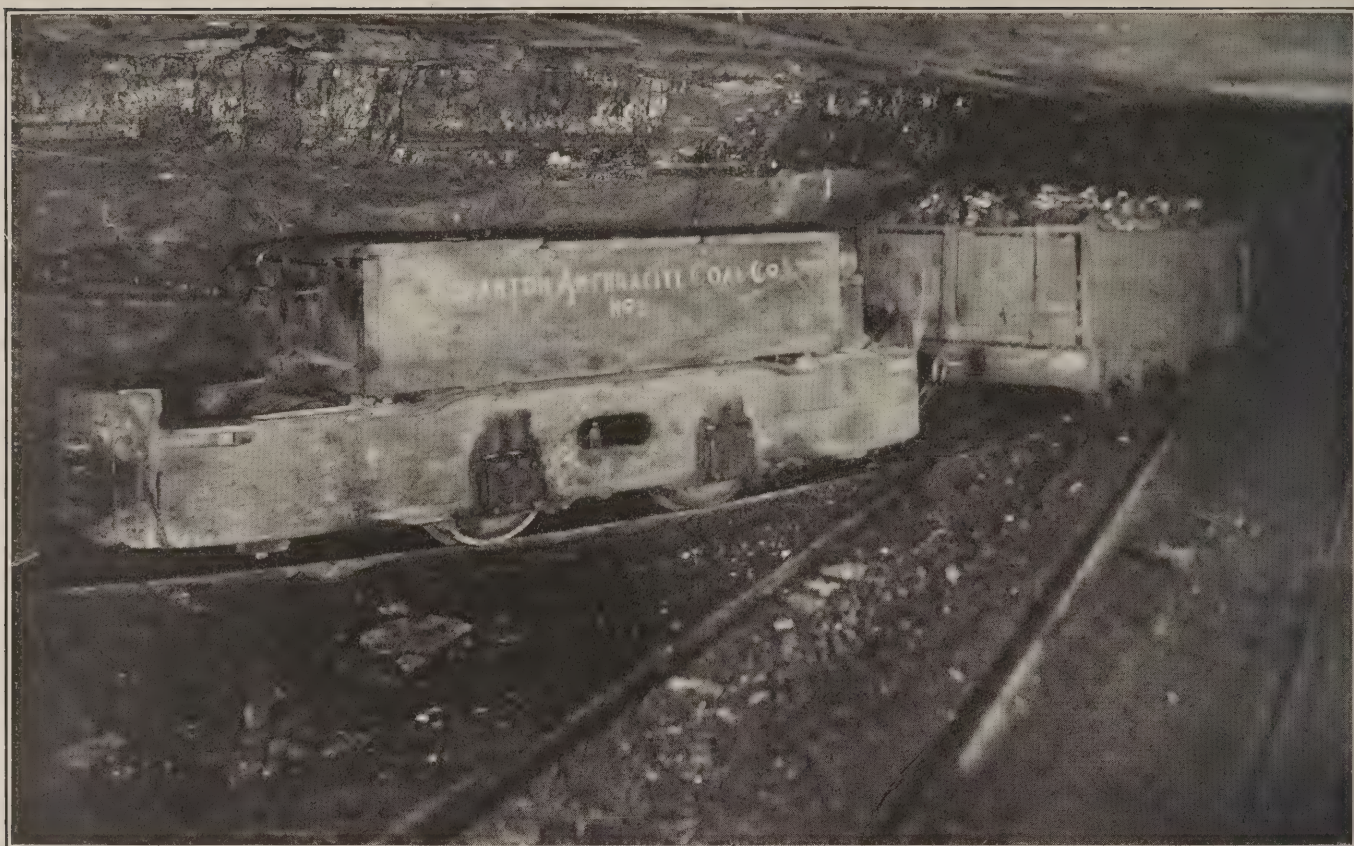
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The seven battery motors at the Blue Goose Colliery, Scranton Anthracite Coal Co., Moosic, Pa., are all equipped with Exide-Ironclad Batteries

At Scranton Anthracite Coal Co., Moosic, Pa.

The Blue Goose Colliery of the Scranton Anthracite Coal Company at Moosic, Pa., operates seven storage battery locomotives, all equipped with Exide-Ironclad Batteries, 42 cells MV 29.

Five of the seven Exide-Ironclads, when originally installed, replaced another make of battery.

The average working life of the Exide-Ironclad Batteries at the Blue Goose Colliery has been 36 months.

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Runs on Picking-Table Refuse

A power plant that is charged for refuse from the picking table at clean-coal rates uses that refuse and screenings for generating the steam by which its power is obtained. Yet it gets its power for 1.6c. per kilowatt-hour and is running only at about one-half load. This story which every one will want to read will appear next week in *Coal Age*. Perhaps you will desire after reading it to put your picking-table refuse in your boiler room, to get such a tidy figure for this waste material and to obtain your power at low figures like these. Maybe you might improve your coal if you could afford to pick it with a lavish hand as it is done at this plant.

Hope for Low Accident Rate

An article deals with speed in coal extraction and says it may prove as economical of life and limb as it is profitable from the viewpoint of lower costs and conservation of coal.

How Uncle Sam Manages His Leases

The Bureau of Mines makes regulations for Government leases. An article next week will give some interesting details regarding this regulation and supervision from the man who has charge of the latter.



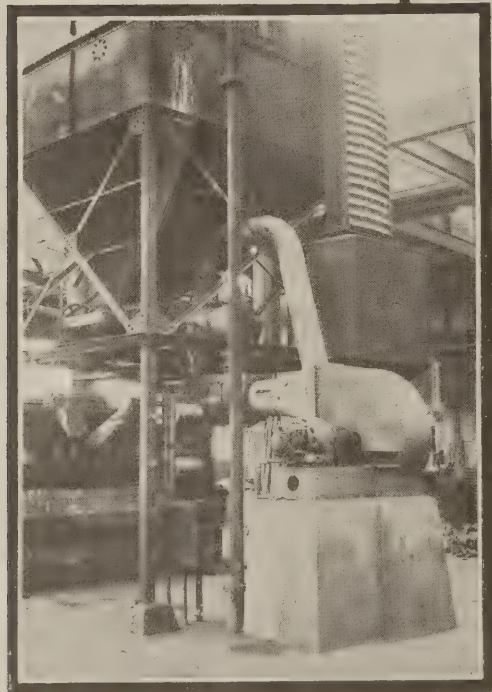
POWDERED COAL

Rigid Technical Control of metallurgical operations and uniform production are vital to the manufacture of the products that have established the O-B name. That is why the most modern and efficient methods in utilizing fuel are employed in the O-B Plant. Powdered or pulverized coal plays an important part in supplying high quality and uniform grade O-B Products to you.

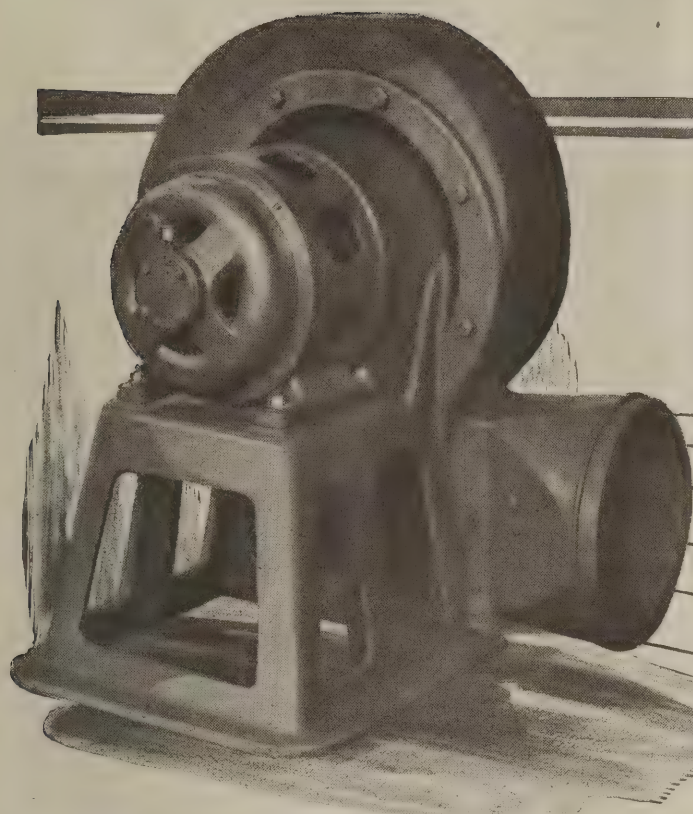
(Top) Exterior view of the O-B pulverizing plant at Mansfield. Note the pipes for transporting the powdered coal from pulverizing plant to points where utilized.

(Center) One end of the pulverizing plant showing dried coal storage, pulverizing mill, pulverized coal storage and distributing system.

(At left) Pulverized coal burning unit on the 20-ton melting furnace in the malleable iron foundry at Mansfield.



THE OHIO O-B BRASS CO.
Mansfield, Ohio, U.S.A.
 TROLLEY MATERIAL—ELECTRIC RAILWAY CAR
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Before You Speed up Your Main Fan to Get More Air-

REMEMBER—To get twice the volume your fan is now doing, you must run it twice as fast, and this takes **EIGHT TIMES THE HORSEPOWER.**

A Jeffrey Universal Blower, installed to boost the current, will immediately improve your conditions at the working faces, while the work of improving the air courses is going on. Ventilation cost will be kept at a minimum, at the same time assuring efficiency from the miners.

Example:—Assume the main fan has a normal capacity of 80,000 C.F.M. at a certain speed, and the mine is divided into four splits, each requiring 20,000 C.F.M. The resistance in one split will only pass 10,000 C.F.M. Speeding

up main fan to get the additional 10,000 C.F.M. would be uneconomical because it would require double the fan speed, and the placing of regulators on the other three splits, requiring more than four times the horsepower.

The correct and economical thing to do is to place a Booster fan on the split requiring the additional volume and not touch the main fan.

Blowers and Boosters are built in sizes from 8 in. to 5 ft. 0 in. diameter. The smaller direct connected units are principally adapted for use with flexible canvas tubing for ventilating dead ends, entry driving, sinking shafts, driving tunnels, conveying rock dust, ventilation of underground hospitals, etc. All sizes carried in stock.

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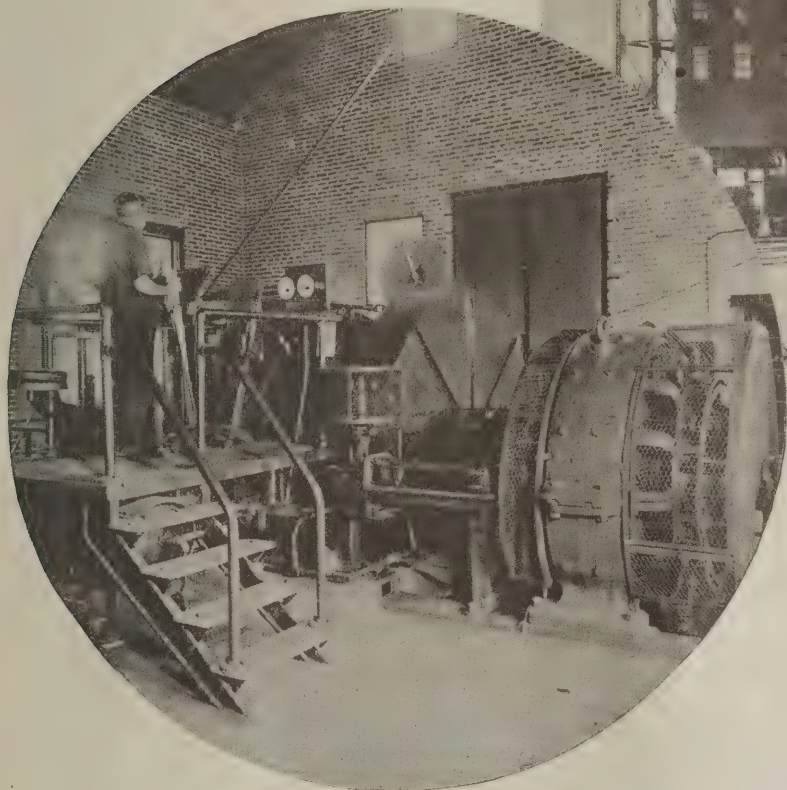
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500 tons per hour
from a depth
of 405 feet!



HERE'S an 850 horsepower Vulcan, hoisting "in balance" 500 tons per hour from a depth of 405 feet. The installation is at the Coverdale Colliery of the Pittsburgh Terminal R. R. and Coal Company.

The cage weighs 20,000 lbs.; cars, 5,600 lbs.; coal 10,000 lbs.; rope 2,000 lbs.

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The Vulcan used here is single reduction geared with a cylindro-conical drum 9 to 11 feet in diameter. An air released, weighted engine operates two post type drum brakes. An auxiliary motor shaft brake, a Vulcan Travel and Speed Limit Device as well as other special Vulcan safety devices, complete the equipment.

The maximum rope speed is 1,560 feet per minute.

There's a Vulcan Hoist
for every purpose

Vulcan Iron Works

Established 1849

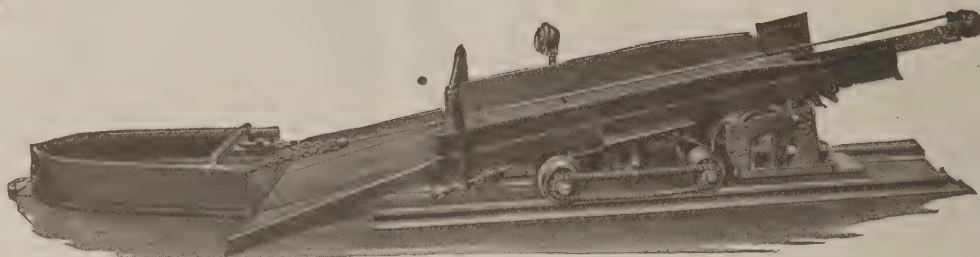
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VULCAN OF WILKES-BARRE

HOISTS

a New Loader

Built by Goodman



One Operator Has Nine of Them

The "Type B" Loads on the Entry!

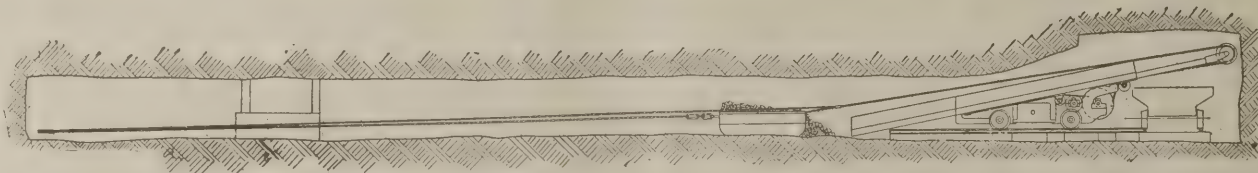
That's worth repeating: *The "Type B" loads on the entry!* No cars at the face. No tracks in the rooms.

This means: Saving in track. No yardage costs. Less haulage. An easier job keeping the loader supplied with cars.

More could be told here, but you would want to see our salesman anyway. So write us and he'll call.

Goodman Manufacturing Co.

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Chicago, Ill.



Sullivan Air-Electric Drilling Rigs

**Save Time
and Labor in
removing
Rock under-
ground**

Rock Fault Pierced Quickly

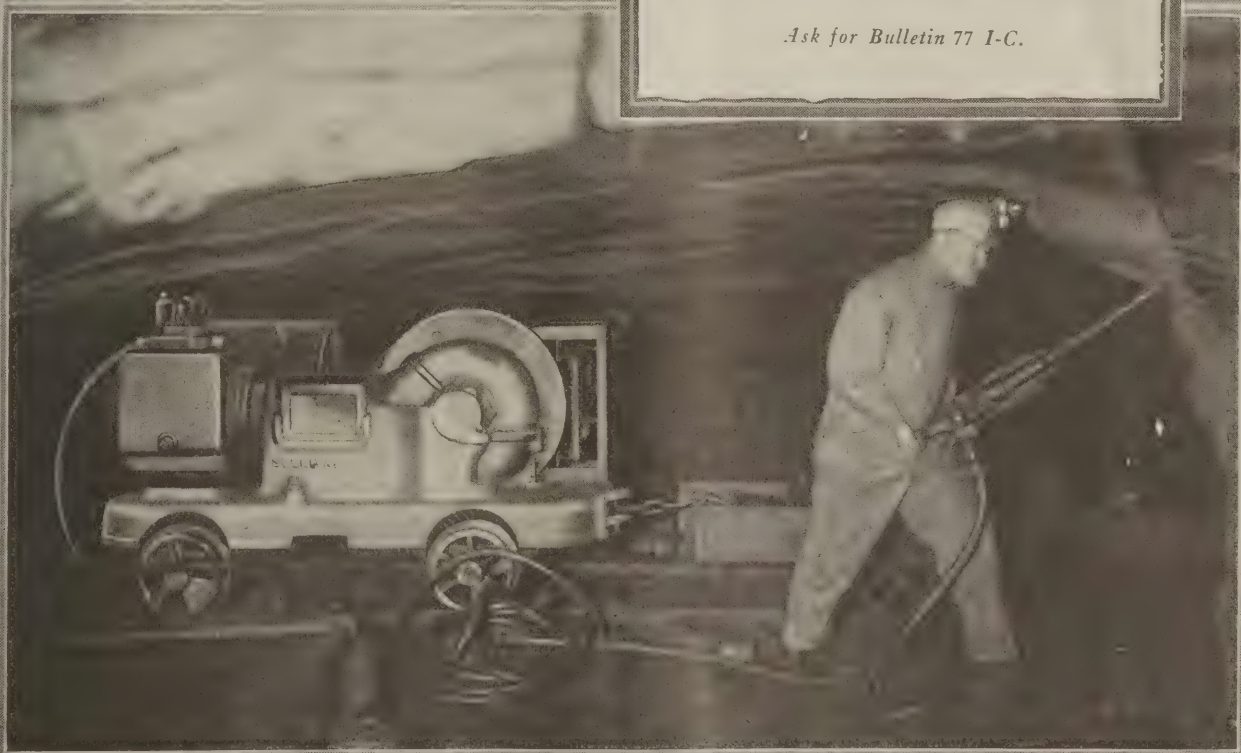
At an Ohio mine, a *Sullivan W'K-26 Motor Driven Compressor*, size 8x8, and a *Sullivan Rotator Hammer Drill* drove an entry through a rock fault in hard conglomerate.

The Compressor provided air at 80 pounds to the square inch. Holes were drilled to a depth of six feet in the center of the heading, and 2 spotters, one on each side, to a depth of four feet.

With this outfit 81 feet of holes were drilled in three hours' time.

This rig did as much work in two hours as was formerly done in eight hours with the old style breast auger. Just an instance of one of many kinds of useful work you can do with a Sullivan "WK-26" Compressor.

Ask for Bulletin 77 I-C.



SULLIVAN MACHINERY COMPANY
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Correct

National Pyramid Brushes—

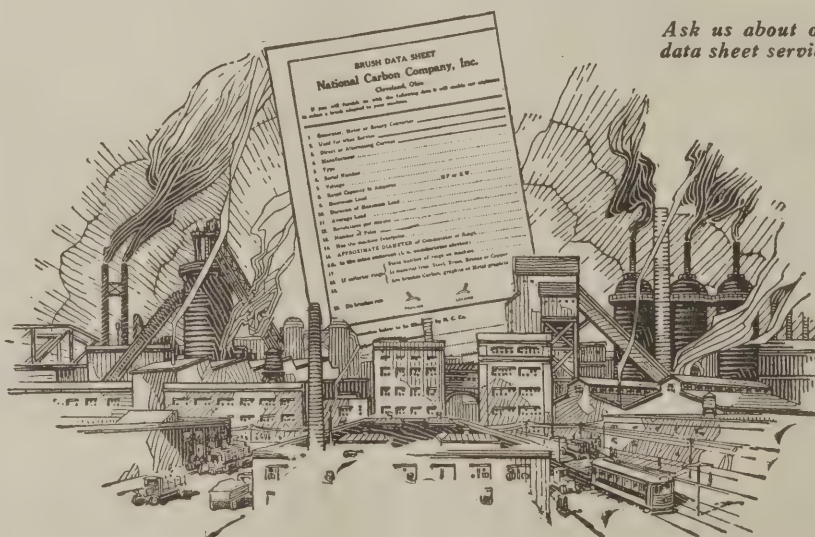
for all operating conditions

BY MEETING correctly the conditions in numerous individual installations, National Pyramid Brushes have saved thousands of dollars for industrial plants, central and sub-stations, trolley and rail lines.

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Our sales engineers are always at your service.

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*Ask us about our
data sheet service.*

Changing Conditions Necessitate Redesign of Mine Cars



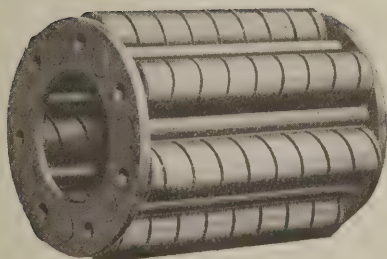
In the days of easy competition, coal costs could stand the extra tax due to wastefulness, but in these days of sagging markets only low cost coal mines employing economical methods can hope to survive.

Increased production usually results in lower costs, and one way to boost production is to install cars of greater capacity. Numbers of companies are taking this way out of their difficulty, even though it often requires an entirely new design of car, usually of the low, wide and long barge type for use in rotary dumps.

An operator recently told us that "these newer designs of mine cars with greater capacity make Hyatt bearings even more imperative. We used them under our old cars with complete success and couldn't get along without them now."

Many companies are throwing out entire lots of old cars, making the replacement with Hyatt bearing equipment especially designed by one of the many manufacturers who build Hyatt bearings into their mine cars.

If your production is dwarfed by small cars you can make it grow by having new cars designed which will carry more coal. And if equipped with Hyatt bearings they will have a lower power consumption than the old, small, plain bearing cars.



HYATT ROLLER BEARING COMPANY

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WORCESTER	PHILADELPHIA	DETROIT	SAN FRANCISCO
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Keep Them Rolling

Trouble with your mine car wheels goes hand in hand with poor lubrication. Correct the cause and the trouble will vanish.

The cause is chiefly a type of lubricant that will not stay in the wheel bearings; the remedy is a semi-fluid grease of unchanging density. It should be of high lubricating value, impervious to water, and free from ingredients that clog and cake.

Such a lubricant is found in Keystone Grease No. 119 density medium, intended for equipment in good condition, and Keystone Grease No. 119 density heavy and Keystone Grease No. 119 density extra heavy for worn equipment.

Hyatt Roller-Bearing mine car wheels will operate for six months or more on one application of Keystone Grease No. 119 heavy. For solid roller-bearing mine car wheels Keystone Grease No. 2 density is recommended.

Write and ask us what our guarantee and our service department will do for you.

THE KEYSTONE LUBRICATING CO.

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Philadelphia, Pa.

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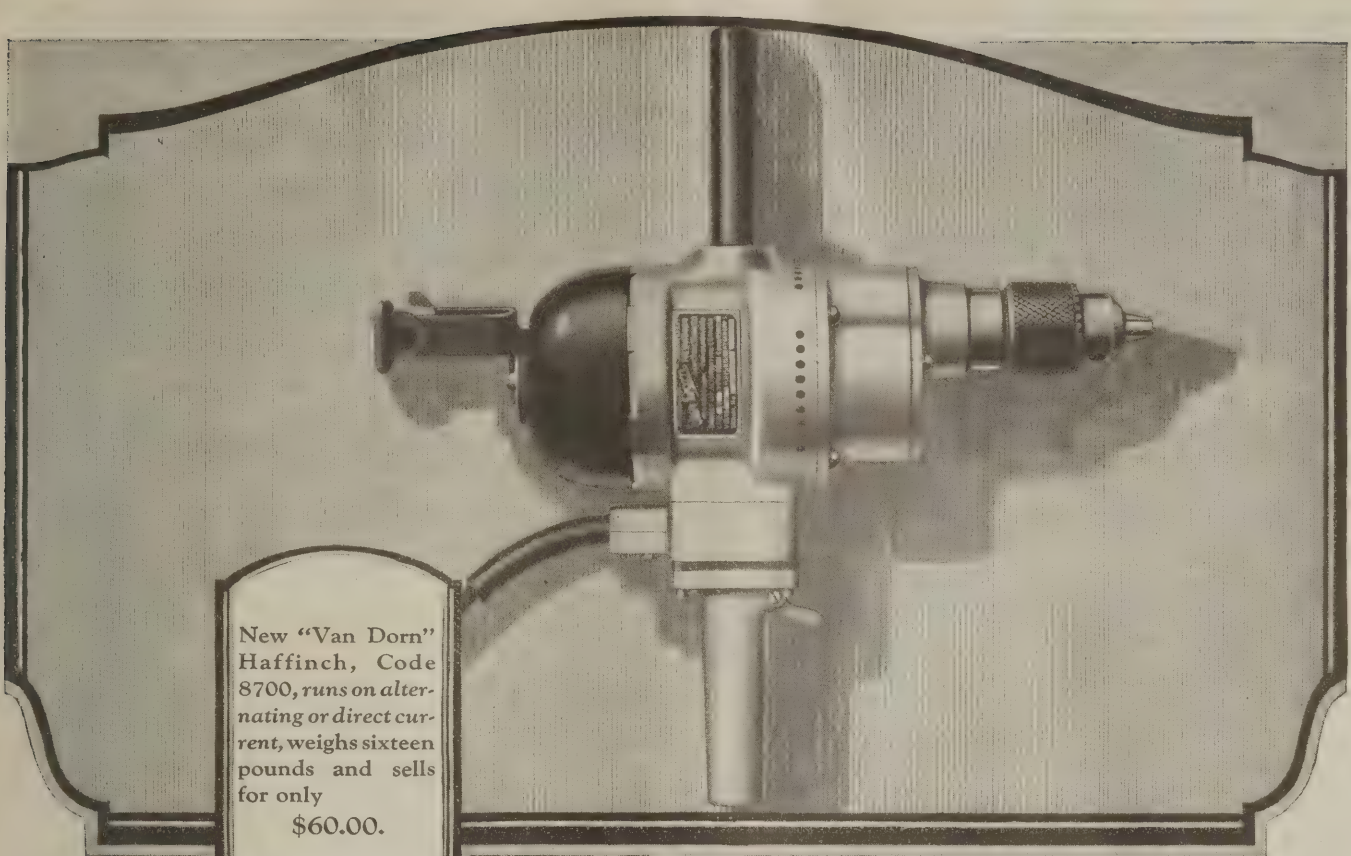
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Keystone Grease makes the most efficient mechanical unit more efficient.

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New "Van Dorn"
Haffinch, Code
8700, runs on alter-
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rent, weighs sixteen
pounds and sells
for only
\$60.00.

Holes in a Hurry With This New "Van Dorn" Haffinch

An Electric Drill that has more "pep per pound" than any other drill on the market.

Mines everywhere will welcome this light weight, reasonable priced, half inch, "Van Dorn" Electric Drill that has more power and delivers more holes per man — per tool — per day than any universal electric drill ever offered to this field.

Haffinch is a wizard for speed on maintenance and repair jobs to mine cars, pumps, hoisting equipment, tipples, conveyors, crushers and other odd jobs without number.

You will find this light weight tool a time saver and a money maker for all "hurry up" jobs around the mines and a fine addition to the larger "Van Dorn's" that you have possibly used for 20 years.

A "Van Dorn" representative will welcome an opportunity to demonstrate it to you.

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Makers of Portable Electric Drilling, Reaming
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"Van Dorn"
**ELECTRIC
DRILLS**



**HIGHER
HOLEAGE**
Lower Costs

"Van Dorn"

Your Copy of this valuable book is now ready. Everyone interested in more economical hole-making should send for this 60 page educational booklet. Sent free upon request.

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Steam and Electric Hoists

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"BETTER GRADE HOISTS"
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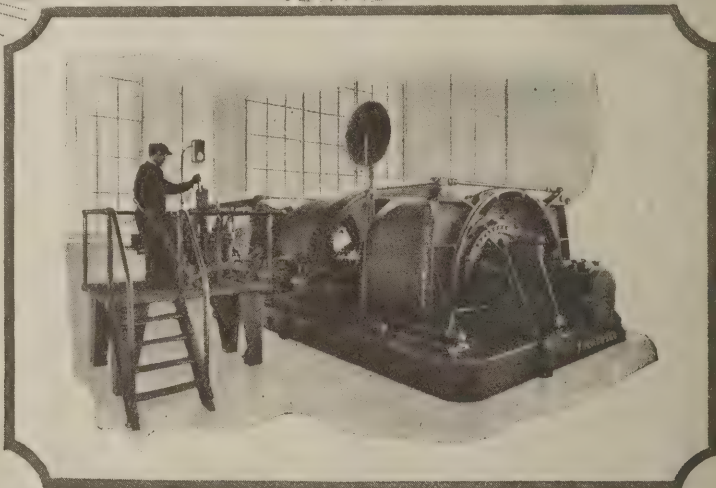
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finishes a "guniting" job it is ready to apply ROCK DUST at any spot in the mine a hose will reach. In this important matter it is not wise to experiment with make-shift equipment—get a "Cement-Gun," the dual purpose

The "dual purpose" machine, and keep it outfit



busy "rock-dusting" and "guniting" all through the mine

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Send this coupon and get details of the dual purpose outfit

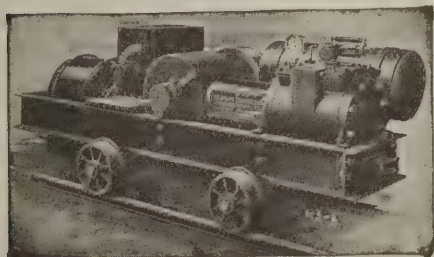
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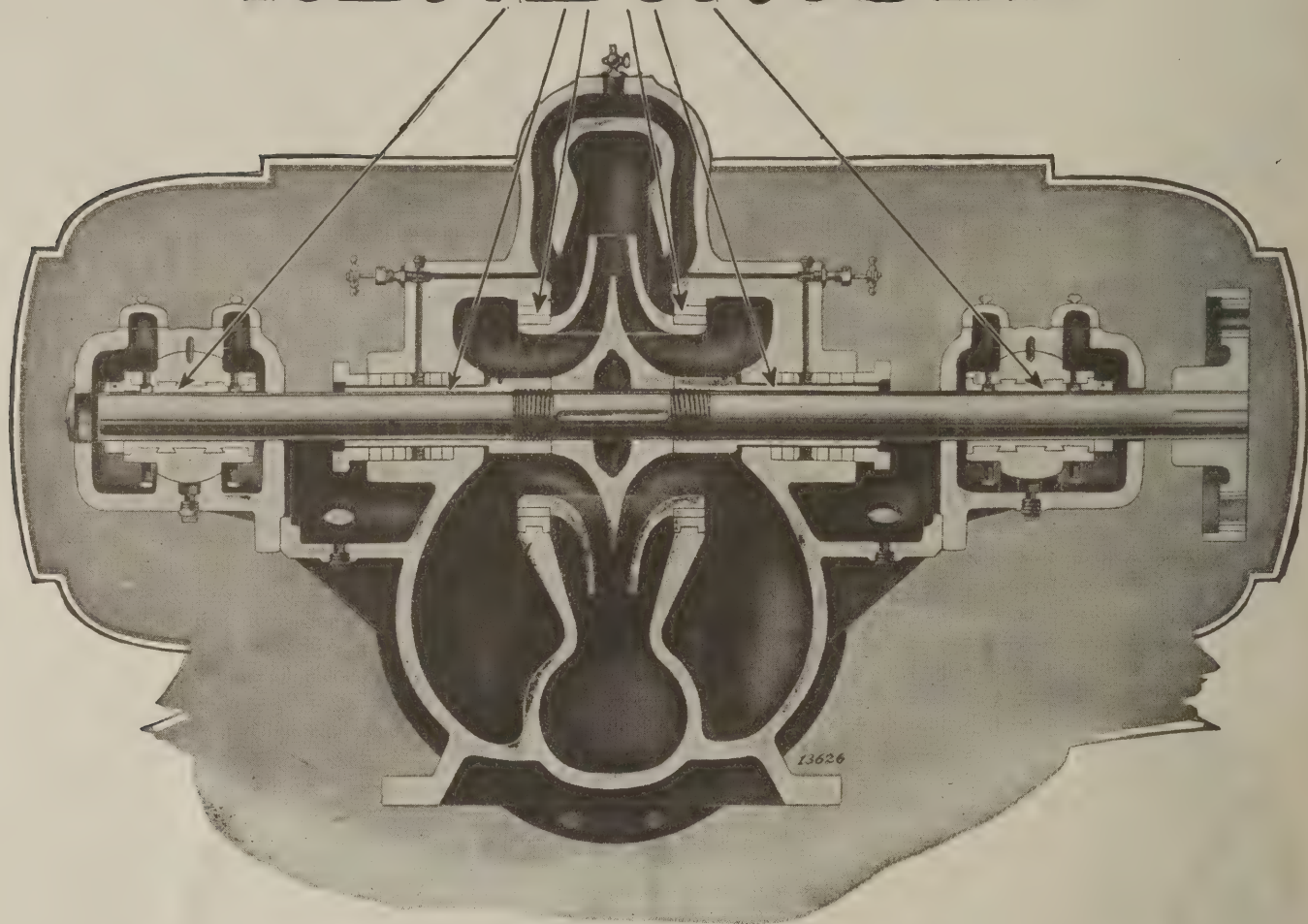
No "Cement-Gun" is Properly Complete Without a TRAYLOR Compressor

To Cement-Gun Co., Inc.
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We are interested in knowing all about the "Cement-Gun" and its many advantages as a dual-purpose outfit for rock-dusting and guniting.

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BEARD'S new work offers the ambitious mining man a real opportunity to win a bigger job for himself.

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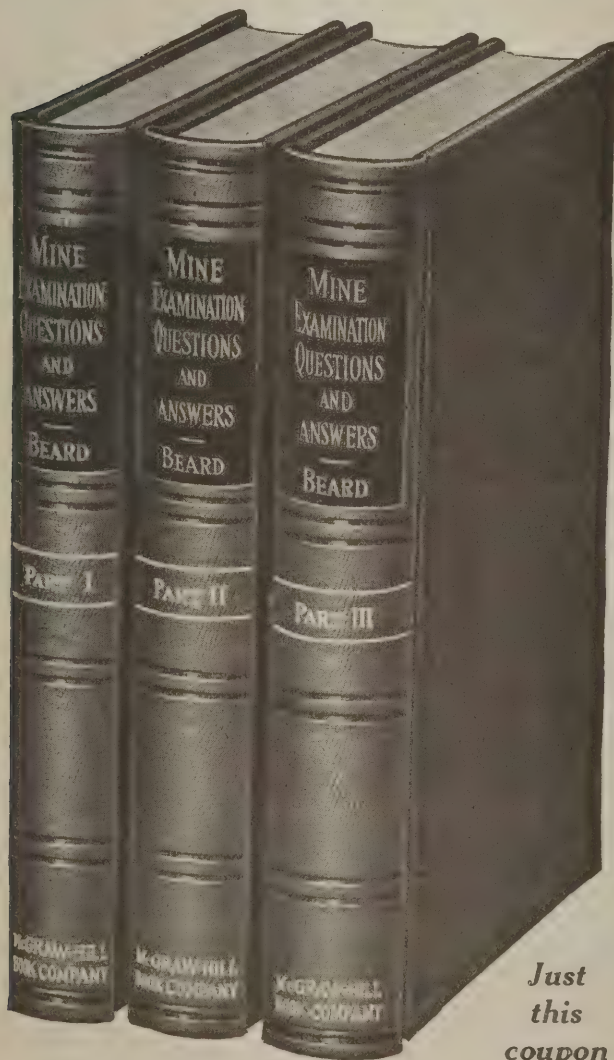
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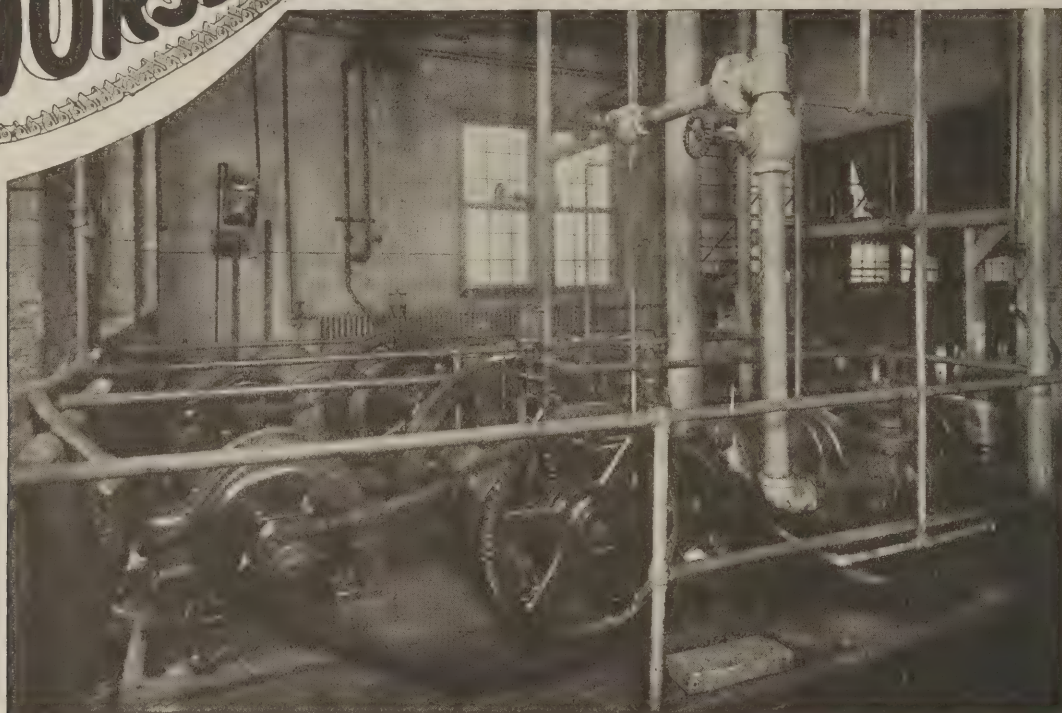
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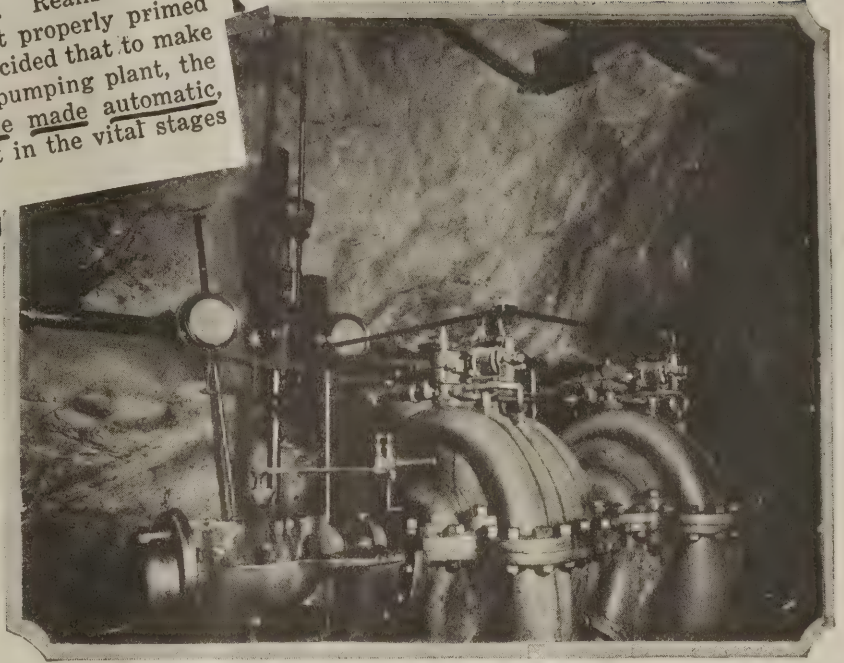
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The Reading engineers became anxious over these stoppages and after a thorough investigation decided that many of the breakdowns were due in part at least to the operator's starting the pumps before they were properly primed and continuing the operation of the pumps after the sump was lowered. Realizing that any attempt to operate the pump not properly primed was disastrous to the pump, it was decided that to make a really successful centrifugal mine pumping plant, the several manual operations should be made automatic, thus eliminating the human element in the vital stages of operation.

Extract from
Coal Age—9/13/13



“eliminating the human element in the vital stages of operation”

This is exactly what the Hazleton Automatic Pumping and Control Unit does. And it was built in answer to a vital need.

This Hazleton Pump is primed, started, protected and controlled automatically.

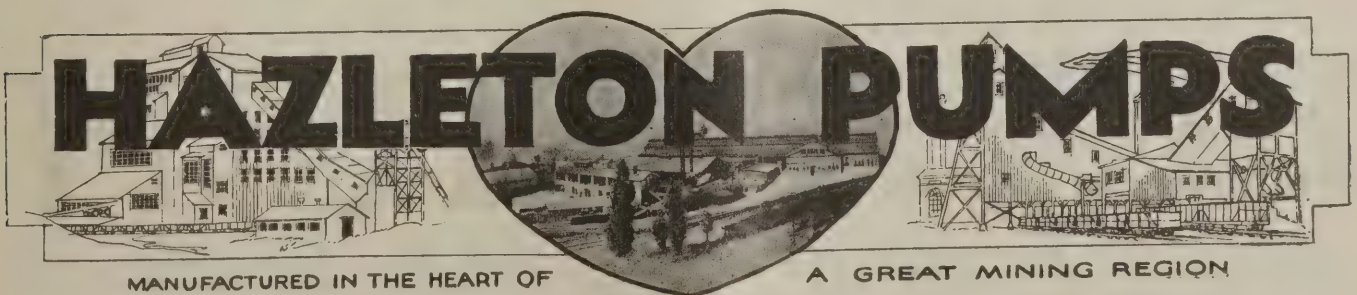
When the water rises to a predetermined height, a float, in connection with a vacuum breaker, rises, effecting the closing of an electric control circuit. When this circuit is closed, the priming pump starts, opening the priming valves. When the priming is completed, the centrifugal pump starts. After the water is pumped down to a predetermined level, the electrical control stops the pump.

Protective devices, too, take care of any possible emergency. By means of these devices, the operation cannot go on if there is any danger of leakage in the pipe lines or any danger of the pump losing its water.

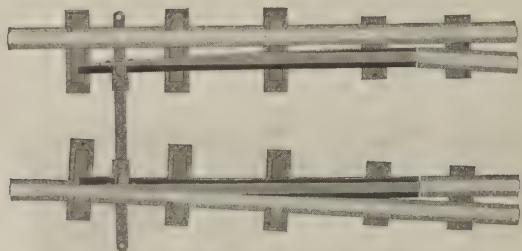
Thus with the Hazleton Automatic on the job, disasters due to human mistakes or forgetfulness are eliminated once and for all.

Complete particulars on the operation of this new revolutionary pumping unit will be sent you by return mail, along with Bulletins on our entire line of Centrifugal Mine Pumps, Priming Pumps and Valves, Vacuum Breakers, Check Valves, etc. Let us know where we can reach you.

BARRETT, HAENTJENS & CO., HAZLETON, PA.

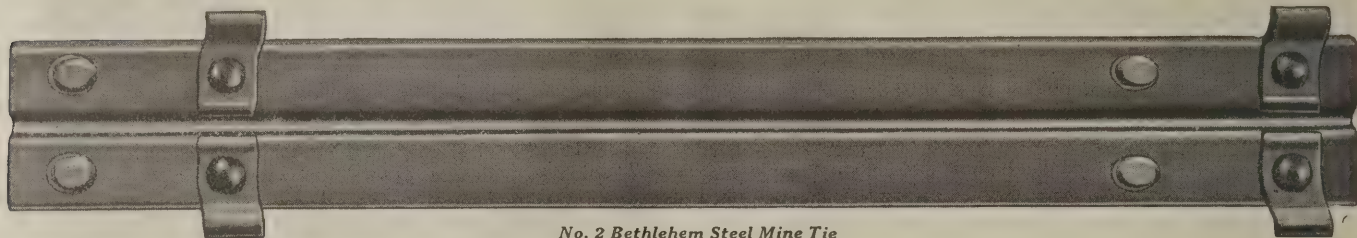


Bethlehem Mine Specialties



Heavy Duty Switch, Design 396

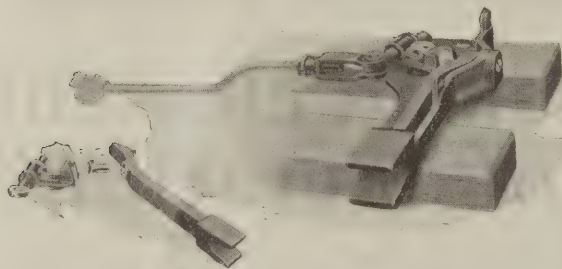
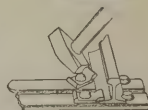
BETHLEHEM HEAVY DUTY SWITCH is fitted with extra heavy plates and braces—practically corrosion proof—will stand unlimited abuse—derailments eliminated—lengthens tie life—maintenance expense wiped out—plates and braces last indefinitely—switch points cost no more to renew than other kinds.



No. 2 Bethlehem Steel Mine Tie

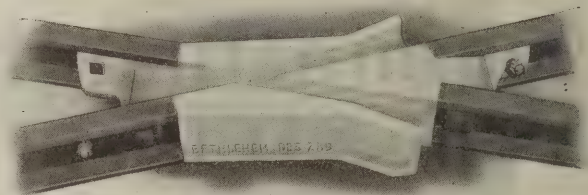
BETHLEHEM MINE TIES are in one piece—no loose parts to mislay—clamping clip quickly turned to position with hammer—track always to gage—extra ties can be added or taken out without disassembling track

—maximum head room—longer life than wooden ties—greater strength by increased weight over earlier Cambria designs—can be used many times—popular with miners.



Paralled Throw Switch Stand, Model 1217

BETHLEHEM PARALLEL THROW SWITCH STAND, MODEL 1217, is adjustable for any throw—lever throws parallel to the track—when in normal position, lever is on “dead center” and switch is positively held—only 3 in. high—only 3 moving parts—no bolts—can also be furnished with spring rod.



Solid Cast Frog, Design 289

BETHLEHEM SOLID CAST FROG, Design 289, is made either of carbon, or manganese steel—strictly one-piece construction with no rivets or plates to work loose—flange bearing feature makes for smoother riding and reduces wear on wing rails and point—unbreakable and easy to install.

Bethlehem also manufactures heavy track work for steam Railroads, such as Rails, Guard Rails, Switch Stands, Crossings, Tie Plates, Fish Plates, Splice Bars, Solid Cast Frogs, Special Track Work, etc.

BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.

Sales Offices
 New York Buffalo Boston Cleveland Philadelphia Detroit Baltimore Cincinnati Washington Chicago St. Louis Atlanta San Francisco Pittsburgh
 Bethlehem Steel Export Corporation, 25 Broadway, New York, Sole Exporter of Our Commercial Products

BETHLEHEM

Track Equipment for Mine Service



TIREX Cord Cuts Drilling Costs

Economical, efficient drilling depends largely on the flexible cord upon which the tool must depend for power. Cord failures mean idle tools, idle men and expense of repairs. Even a high grade tool will make a poor showing when it is frequently laid up for cord repairs or replacement.

TIREX costs less than ordinary cords because it lasts so much longer. The conductors are flexible and are adequately insulated with a high grade rubber compound. The outer covering is a 60% rubber sheath having the wearing qualities of a first class tire tread. It is almost wearproof.

TIREX costs less than ordinary cords because it lasts so much longer.

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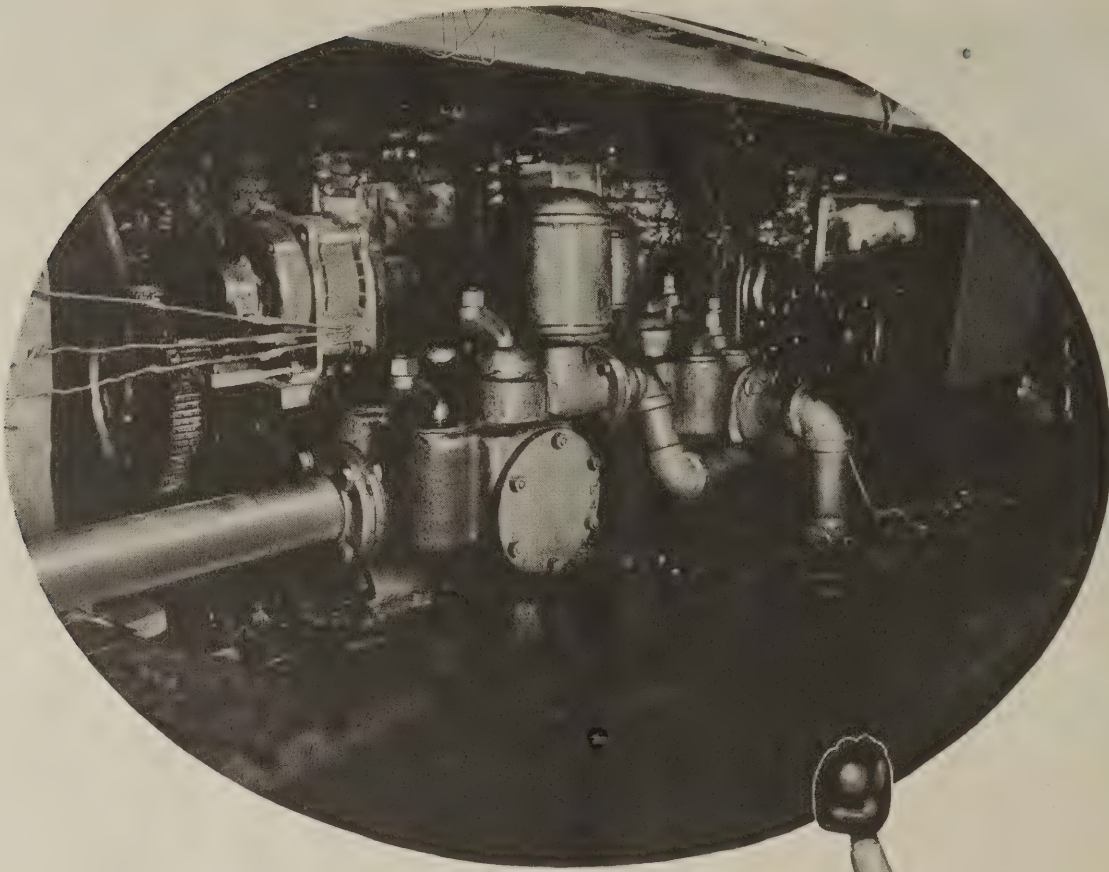
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TRADE

TIREX

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"The Simplex Cable that wears like a Cord Tire"



10 Innings—No Errors!

A ten-inning ball game with no errors is considered a remarkable performance in the world of sport.

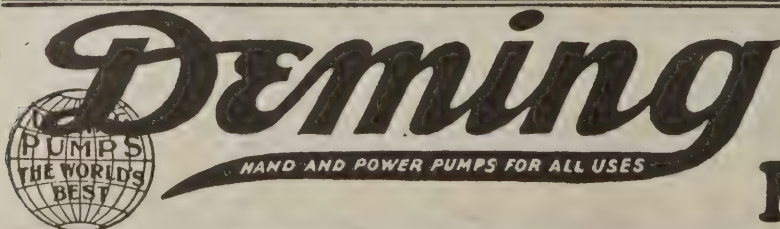
The *ten year* record of dependable mine pumping service established by the Deming pump shown in the view above is not unusual. This Deming "Neptune" Double-Acting Piston Pump was installed ten years ago in the mines of the Valley Smokeless Coal Company, Johnstown, Pa. It has been in 12-hour-a-day service ever since, working under the worst acid conditions, and its owners report *it has never given any trouble!*

*For Complete Catalog of
Deming Mine Pumps, Write*

THE DEMING CO. Est. 1880 Salem, Ohio

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Like giant hands, restraining~

Always on guard, never apparent, the restraining rings stand behind the normal governing devices in the Westinghouse Small Turbine for generator drive, prepared for instant action and providing an insurmountable factor of safety against overspeeding due to motorizing of generator or other accidental causes. This splendidly characterizes the high state of perfection to which the small Westinghouse unit has been developed.

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If you use Oxweld welding and cutting apparatus, Oxweld engineers and fieldmen will gladly show you how the oxy-acetylene process can help keep your plant equipment in working condition at all times. Send for free book, "Oxweld Can Do It." It illustrates many applications.

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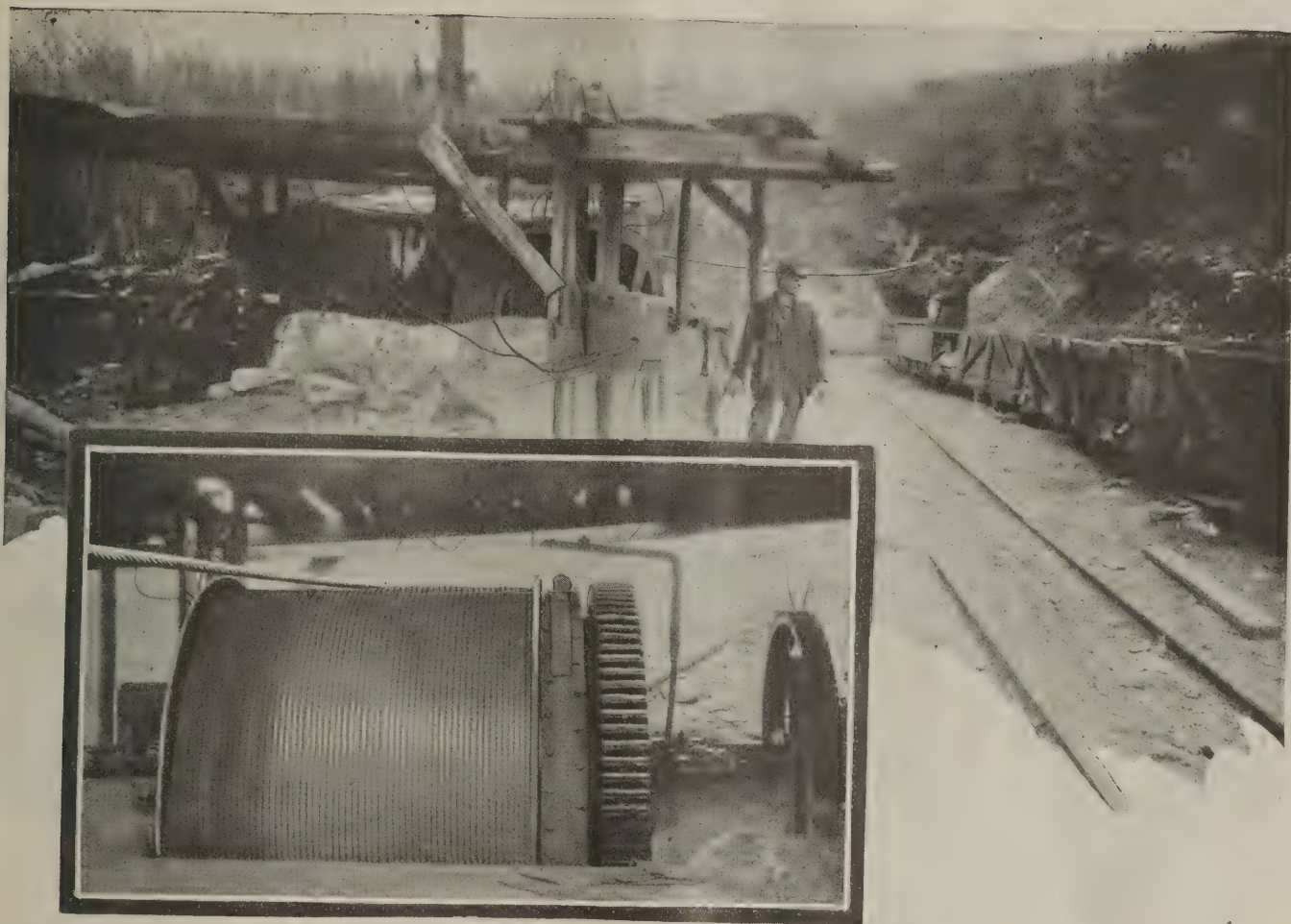
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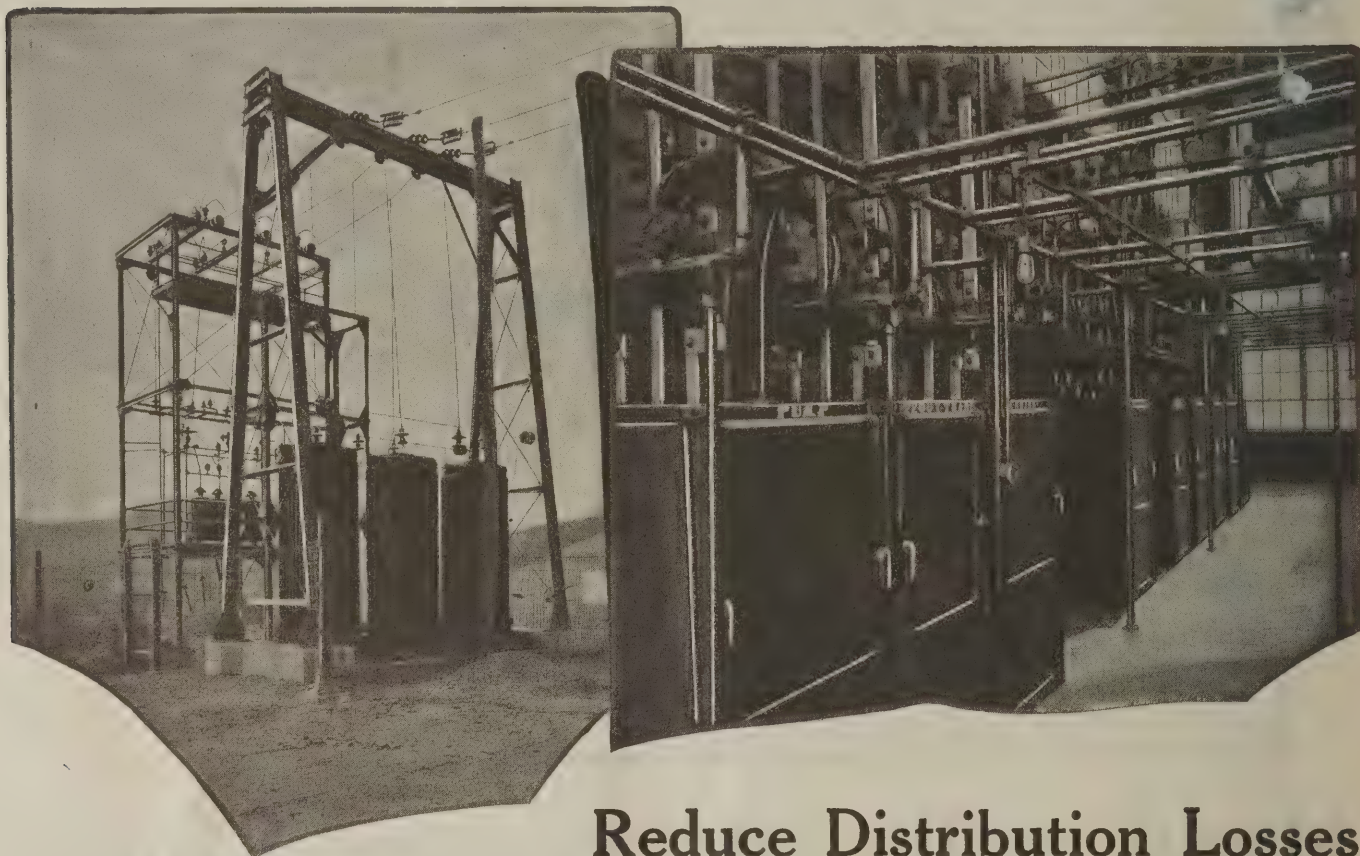
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HAZARD

Electrical Equipment



A Bank of 500 kv-a. G-E Transformers stepping down 6000 volts to 440 volts at a Pennsylvania coal operation. G-E Lightning Arresters protect the installation. Other view shows G-E Oil Circuit Breakers in the Mine Power House supplying this Receiving Station.

Reduce Distribution Losses with Modern Transmission Equipment

High-tension power distribution has rightly superseded direct-current power lines at modern coal operations, because of the well-known higher efficiency of alternating-current distribution.

The efficient transmission of energy from a central coal-mine power station to several mines requires modern, efficient, *dependable* equipment.

G-E Oil Circuit Breakers, Transformers, Lightning Arresters and other apparatus making up complete switching equipment insure continuity of service and the highest possible operating economy.

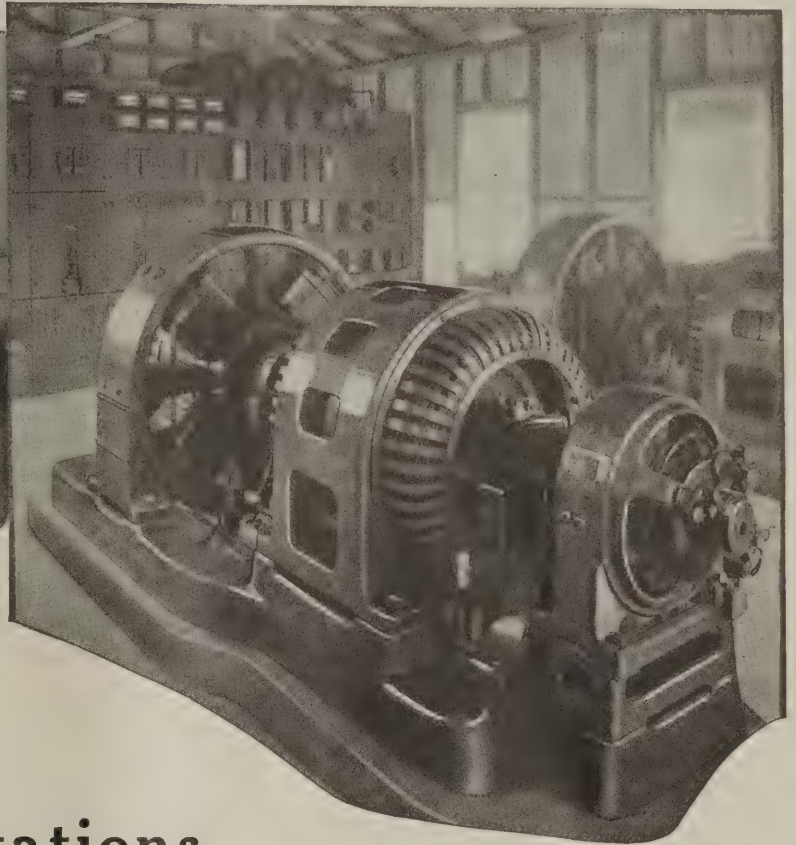
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The automatic sub-station is an established factor in reducing operating costs per ton.

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Send for the Waverly Industrial Lubrication Booklet. It gives precise recommendations for oil and grease lubrication of all standard machines. Only book of its kind in print.

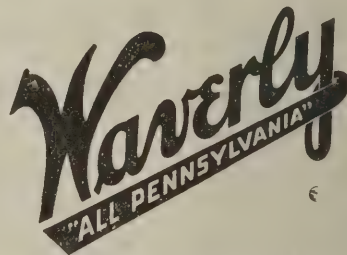
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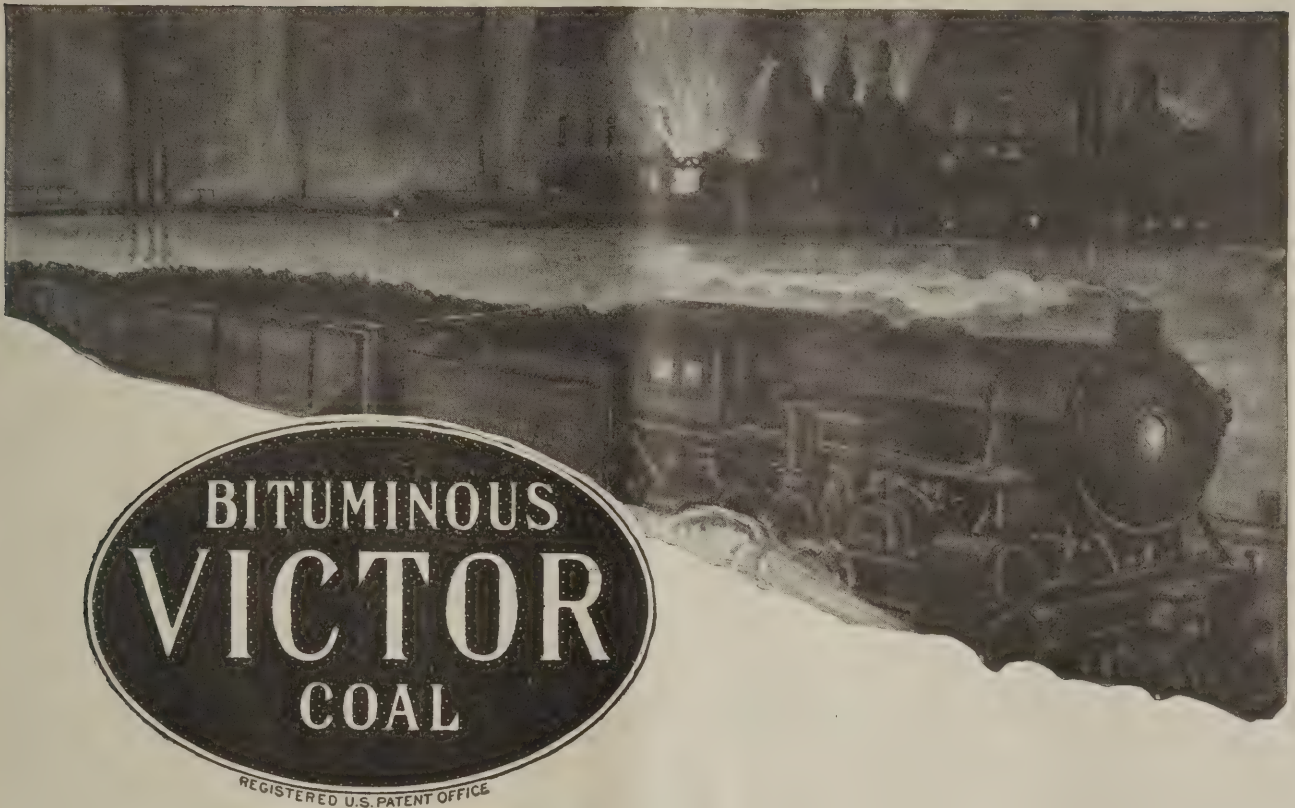


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This process successfully *cleans from finest Slack to Lump* and the resultant product can be loaded together as R/M, or separately as Lump—Nut and Slack.

It is entirely and continuously mechanical in its operation, thus avoiding the human element, which has, heretofore, prevented the continuous and uniform elimination of impurities so absolutely essential in the maintenance of a high standard of preparation.

As no water is used in this process, as contrasted with wet washing methods, no additional freight charges are incurred by reason of excess moisture, nor difficulty encountered in unloading frozen coal during

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Reconditioned Like New—Guaranteed
New and used generators, motors, meters, switchboards and transformers.
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- 3—Allis-Chalmers 14 in. Type S Centrifugal pumps.
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When you need new or relaying rails, come to headquarters and get just what you want, in any quantity, and get them quick.

We always have a big stock of rails, from 12 lbs. to 100 lbs. per yard, for immediate delivery. Every rail inspected and guaranteed. Complete with the necessary angle bars.

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2—200 kw. Westinghouse, 250-125 v.,
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New Relaying
1 TON or 1000

FROGS
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SPICE BARS
BOLTS
NUTS
TIE PLATES
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BRACES

All Rails and
Track Mate-
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subject to in-
spection and
approval at
destination.

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125—Motors 1/4 to 150 hp.
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NEW AND SECOND-HAND MINE CARS

Carried in stock of most all gauges. Also a quan-
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Immediately
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250 Volt D.C.

2—35-B Jeffrey, 6-ft. Cutter Bar, 36-in. Gauge
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drop axles.

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60 Tons—12 Lb. Relayers

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Complete Stock All Weights.

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LOCOMOTIVES

1—11x16 (21 ton).

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Excellent condition

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STORAGE BATTERY LOCOMOTIVES

14—G. E. Co. 4-ton, 30-in. G. Locos.
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90—1 cu. yd., 30-in. G. Koppel Trunnion.
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Underground Coal Loaders

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Particularly for those conditions
which are unusual or exacting

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"STANDARD" and "JUNIOR" Shaking Screens,
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Bradford Breakers and Coal Cleaners, Steel
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BIRMINGHAM,
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ROBERTS AND SCHAEFER CO.

ENGINEERS AND CONTRACTORS
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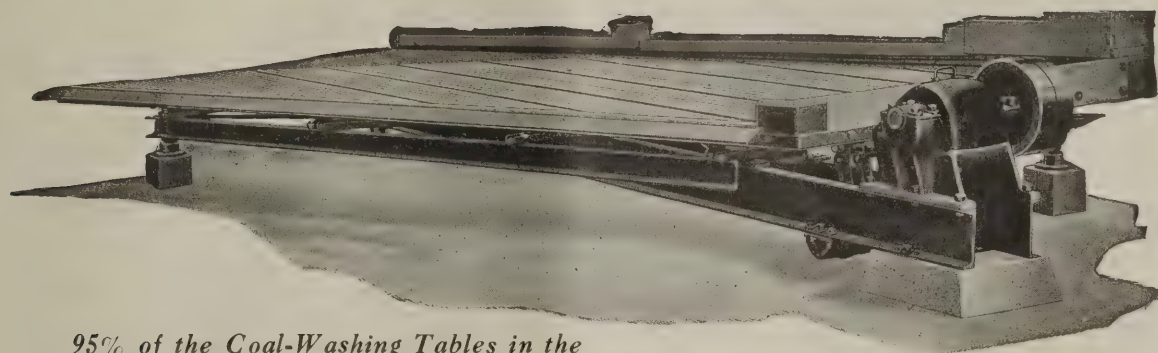
Complete Coal Mining Plants
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To secure first-class typographical set up and enable us to submit proof in sufficient time to make any necessary corrections before going to press, it is essential, that we get copy in our hands together with all necessary cuts at least three weeks prior to date of publication.

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Not one cent for repairs in one year's continuous operation—



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MANUFACTURERS OF DEISTER AND DEISTER-OVERSTROM TABLES
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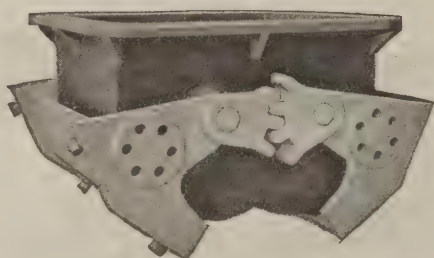
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Cut off Gates
Single and Duplex Types in
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Rugged in Construction,
Easy to Operate,
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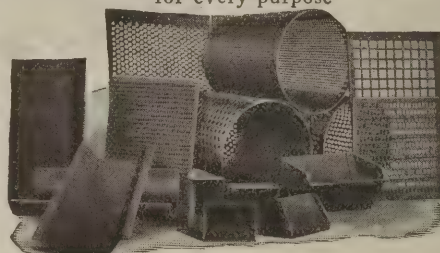
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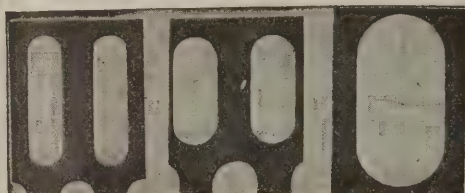
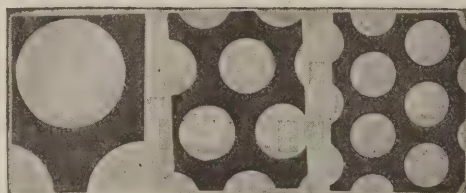


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*All sizes
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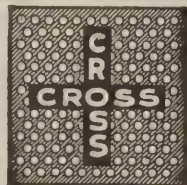
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For Ore Concentration and
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Screens for every purpose

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FAIRMONT

Tipples and Equipment

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Let us send you the Fairmont Tipple Equipment Bulletin

FAIRMONT MINING MACHINERY CO., Fairmont, West Va.

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DENVER, COLO.—O. H. Davidson Equipment Company
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of continuing reliability

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*A Revolution In Design
Find out why*



**NO LEAKAGE
BRILLIANT
FOOL-PROOF**

Concordia Electric Co.
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Over 11,000 Satisfied Users!

If we brought a Little Giant Power Hammer to your Shop or factory and told you to try it a month free of charge and then decide whether to keep it or let us take it back, would you try it?

You can order one any size and try it 30 days and if you do not like it we take it back and stand the freight both ways. That's how well thought of is The Little Giant Power Hammer. If you don't want to pay all cash, we will sell on easy terms.

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Little Giant



Belt driven

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Motor driven

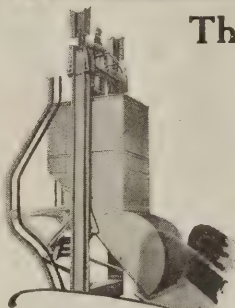
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The New Model Hoist Skip which discharges from the bottom of bucket. Never spills. Positive in action. Big capacity.

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"U.S." CONVEYOR BELTING

will reduce your
handling costs

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"Sirocco" Fans and "Ventura" Fans for
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Complete Engineering Service

American Blower

AMERICAN BLOWER COMPANY, DETROIT

(255)



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Best for Service*

SCREENS OF ALL KINDS

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Turbine Centrifugal and Disc Fans

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Factory at Harmony, Pa.





Adaptable to any
standard scale

The Correct weight— for every car

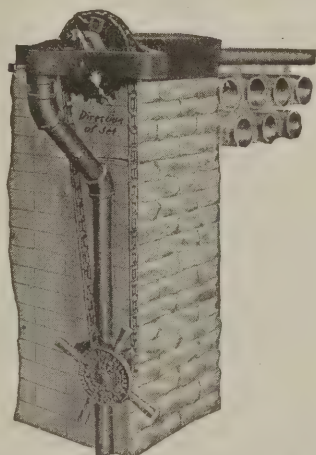
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The Streeter-Amet weighing and recording attachment eliminates these losses. It records the *correct* weight instantly. Miners are better satisfied because this machine cannot fail to record all tonnage mined. Operators know it eliminates all overpayments. Write for details.

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Clean Boiler Tubes Pay Dividends

Keep Tubes Clean with
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Send for booklet completely describing the advantages of Marion Soot Blowers and other power plant equipment.



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for better work in mining coal

YEARS of study devoted to the coal miner's problems combined with a great amount of chemical research, constant experimentation and exhaustive field tests, have resulted in the development of the Atlas line of Coalite Permissibles.

Atlas now makes two permissibles that are stronger on a weight basis than any other permissible on the market. The company also makes one that is the weakest on the market, and one that has a lower velocity of detonation than any other permissible. Thus, the Atlas line of permissibles covers a wider range of desired characteristics than any other line of permissible explosives—a range that will meet the conditions encountered in any kind of coal mining.

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a copy of
the new
Atlas
catalog.

Let the Atlas Service Man help you in determining what grade of Coalite is best adapted to the requirements of your work.

ATLAS COALITE

The permissible explosive packed in white paper cartridges

ATLAS POWDER COMPANY

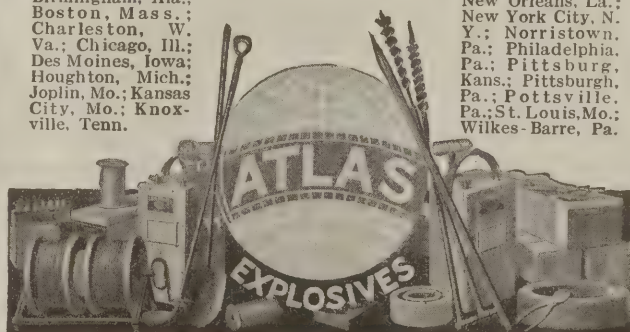
A proper explosive for every blasting requirement
WILMINGTON, DELAWARE

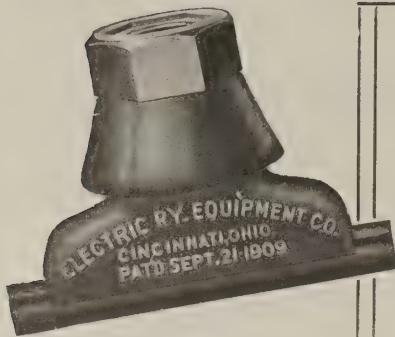
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Sure-Grips



AETNA COMMUTATOR SMOOTHING STONES



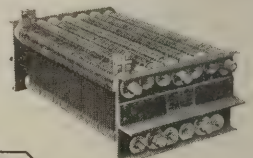
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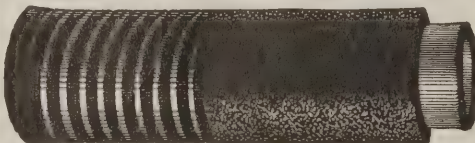


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Cincinnati,
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Made in the
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Been in use over 68 years. Used extensively now by the vast majority of mines. Unaffected by acids, fumes, or electrolysis. Investigate.

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36 Cents Per Year Per Starter For Maintenance



Type "SS" Automatic
Motor Starter

¶ For 200 type "SS" Automatic Motor Starters installed on mine pump motors over a period of two years, there was purchased only \$72.44 worth of repair parts during that time. The average length of time these Starters had been in service was one year. \$72.44 divided by 200 is 36 cents.

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Maintenance cost on type "SS" Automatic Motor Starters is low because they are built of good stuff and plenty of it to begin with.

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Obtainable in Bronze, Iron Body Bronze Mounted and Steel Model Mounted.

Catalog 58 J portrays this extensive line. Write for a copy.

THE LUNKENHEIMER CO.

CINCINNATI, U.S.A.

600-33-9



Where wood outlasts steel

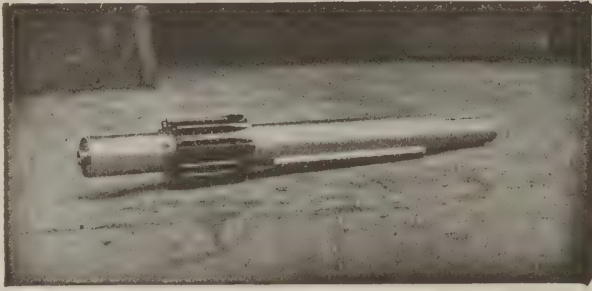
It is *corrosion* that shortens the life of steel tanks and makes necessary inside and outside painting every year. Hauser-Stander Wood Tanks never corrode. They require no inside painting and so are never out of service. They last 30, 40 and even 50 years, with only a minimum of repairs. Send for booklet.

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Does This Pinion Give You Trouble?

Do you have continual expense because of wear or breakage on this pinion?

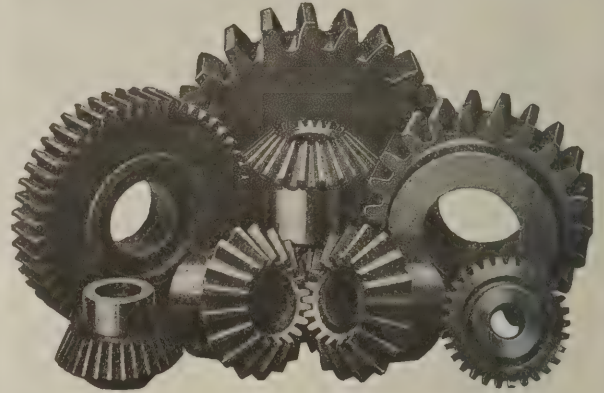
If you do, ask us about our new design with a modified tooth shape that wears very slowly and does not break.

We have absolutely solved the problem presented by this pinion.

*The standard of Quality
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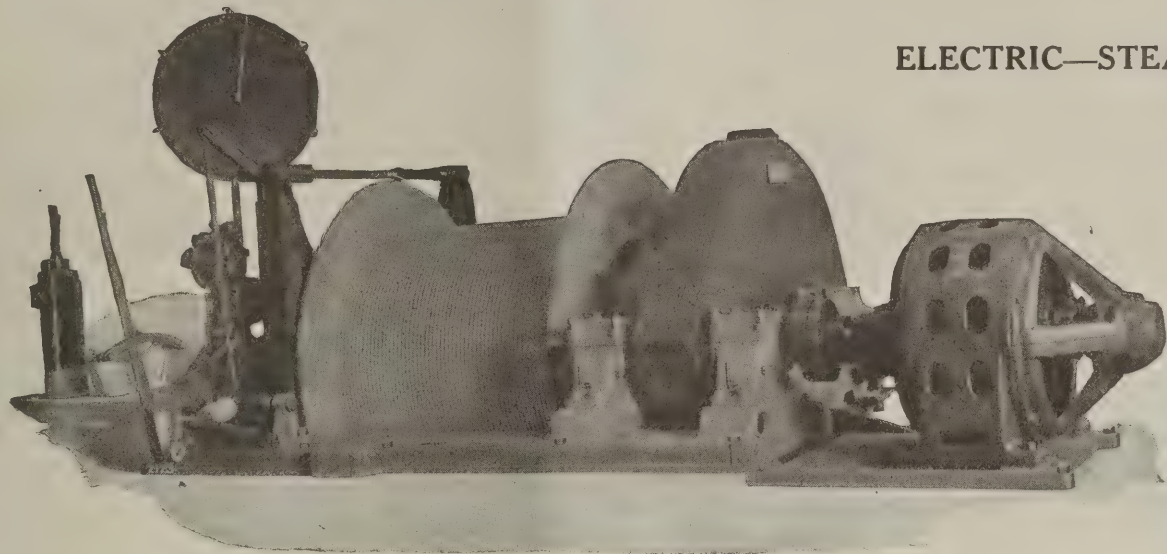
NORDBERG

Uniflow Engines · Corliss Engines · Diesel Engines
Steam and Electric Hoists
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NORDBERG MANUFACTURING CO.
MILWAUKEE WISCONSIN

LIDGERWOOD MINE HOISTS

ELECTRIC—STEAM



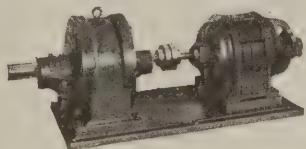
Single Fixed Drum Haulage Hoist, Maximum Rope pull 6,200 lbs.
Heavy lowering duty of 17,250 lbs. Drum holds 11,000 feet rope.

Lidgerwood Mfg. Co., 96 Liberty Street, New York

Philadelphia Pittsburgh Chicago Detroit Seattle Birmingham, Ala. Los Angeles Portland, Ore. Columbus, O.
London, England Sao Paulo, Brazil Rio de Janeiro, Brazil Apartado, 813, Mexico, D. F.
Woodward Wight & Co., New Orleans, La. John D. Westbrook, Inc., Norfolk, Va. Norman B. Livermore & Co., San Francisco

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All gear transmission problems solved on short notice

Coal operators will find it to their advantage to entrust all their gear and speed reducing problems to James. For 20 years James has been recognized in many industrial fields as reliable gear specialists. The reason for this compliment is James' facilities for prompt and satisfactory handling of miscellaneous gear work.

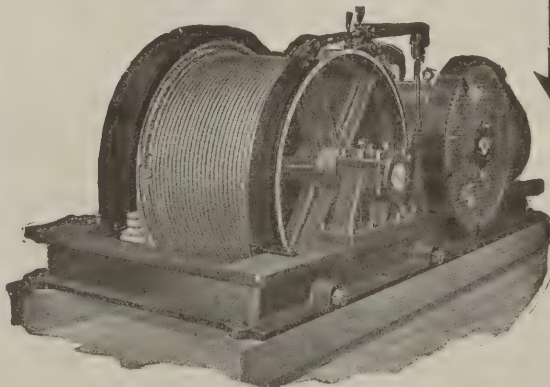
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For Counterbalanced Shaft or Slope Hoisting

WHERE counterbalanced hoisting is available, the Thomas Double Reduction, Single Drum Mine Hoist is strong, economical, and reliable. In construction it is extremely rigid and simple. All gears are machine cut; the drum is machine scored, and arranged to alternately wind and unwind cable of a given length and diameter.

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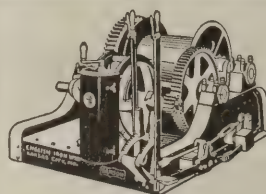
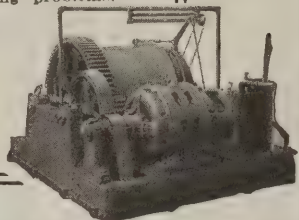


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Ottumwa Hoists comprise a line which completely covers the requirements of coal mines. Ottumwa Engineers are always available for consultation regarding hoisting problems.

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Ottumwa, Iowa

*Ottumwa Electric and Steam
Hoists, Mine Cars, Sheave
Wheels and Rollers, and
Roller Bearing Trucks.*



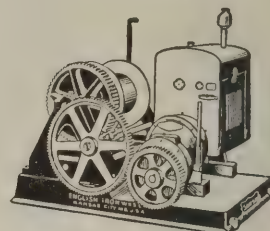
Electric Hoist

Hoists for every class
of mine service

Iron Works Dept.
**ENGLISH BROTHERS
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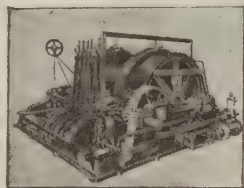


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Mine Locomotives

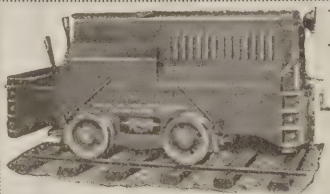
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Engineers

Manufacturers



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THE ALDRICH PUMP CO.
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For Mine and
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Ask for Bulletins

THE FATE-ROOT-HEATH CO.
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EFFICIENT, economical hauling. Find out about storage battery locomotives for your hauling. The Ironton is the best storage battery locomotive.



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Have You the Right Type of Locomotive?

TRANSPORTATION costs will always be high unless the locomotives employed are perfectly suited to mining conditions.

The Shay Geared Locomotive meets every haulage requirement of the mining and stripping operator.

The Shay works on lighter rail and rougher track than a rod-driven engine of the same power. The Shay hauls loads up grades that would stop a rod engine. The Shay stays on the track at curves that invariably derail the rod engine.

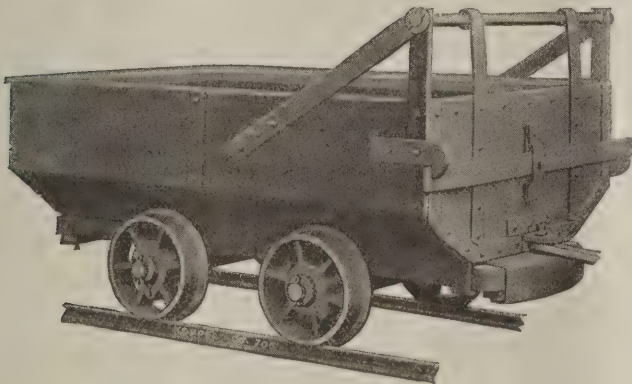
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Do you specify "KOPPEL"?



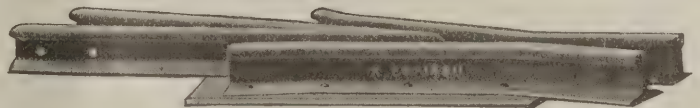
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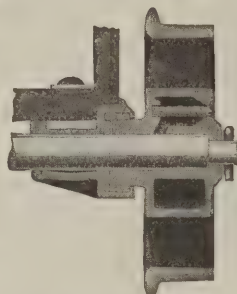
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Holds lubricant for long periods.

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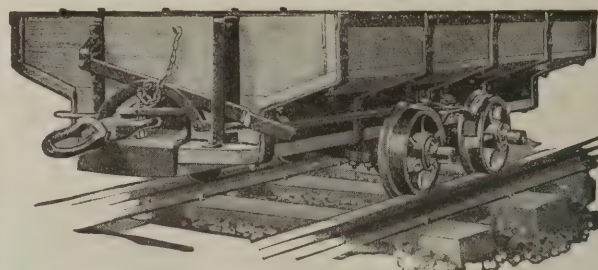
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Patent Open Cap Wheel Truck

This Truck is the ideal running-gear for large or small mines, light or heavy cars, animal or mechanical haulage. It will solve that problem of hard-running cars—on level track it runs 25 per cent easier than other improved trucks selling at the same price.

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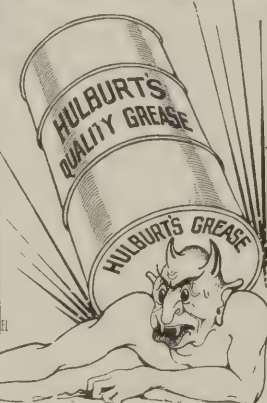
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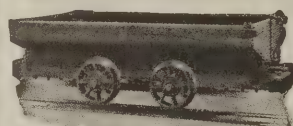
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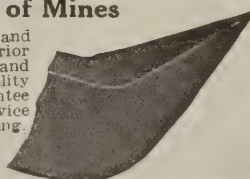
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"Superior" Bit Steel and
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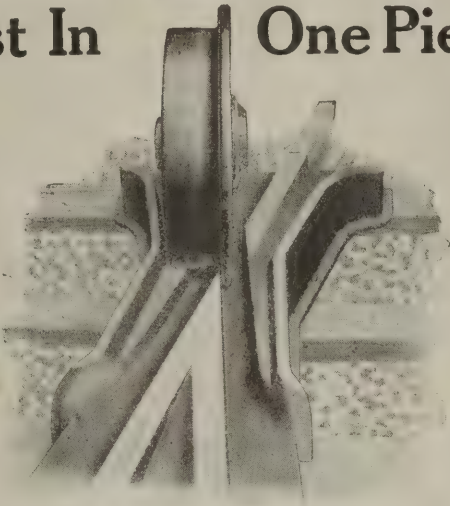
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Eliminates Shock
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We now make these frogs with rail extensions for bolting to the rails.

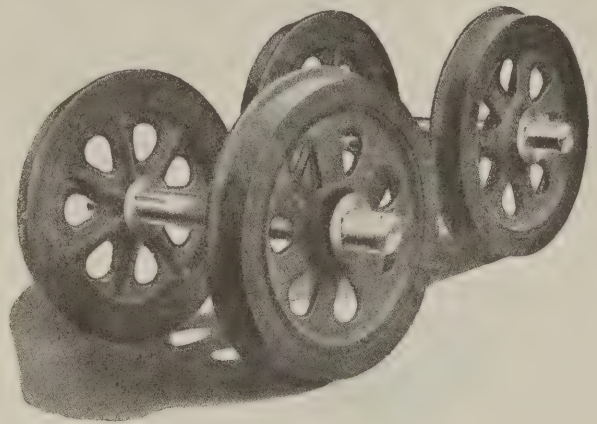
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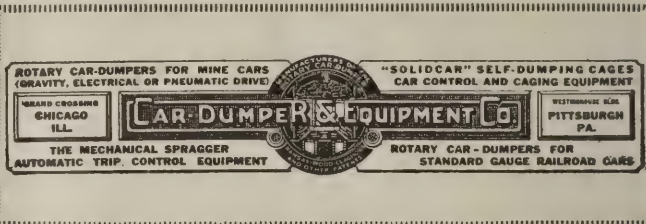
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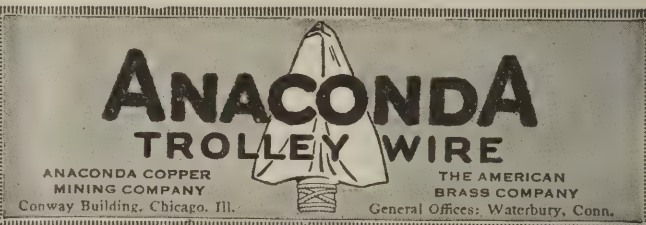
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The World's Standard for over 20 Years
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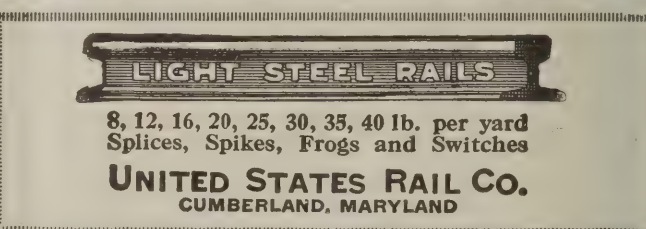
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One-piece
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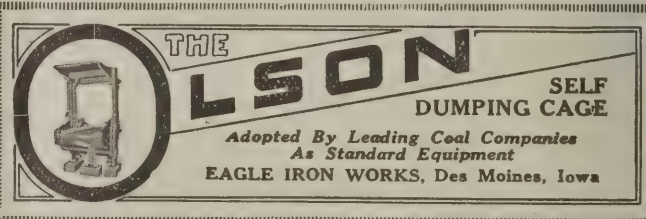
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Adopted By Leading Coal Companies
As Standard Equipment
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That Haul From Tipple to Siding—
A one man machine and a steady movement of coal when using the
AUTOMATIC AERIAL TRAMWAY—
Assures economical operation and takes you a long step towards profits.
Put your hauling problem up to us.

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You can depend upon "Cincinnati" equipment to provide safety and facility for your haulage year in and year out at low service cost.

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Representatives:

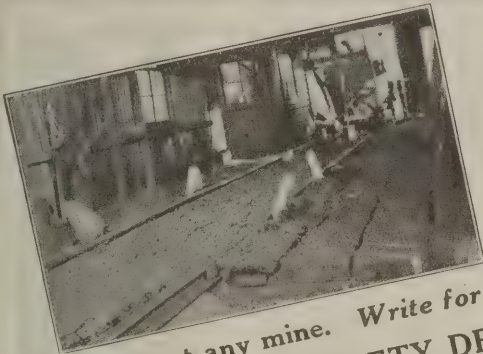
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A
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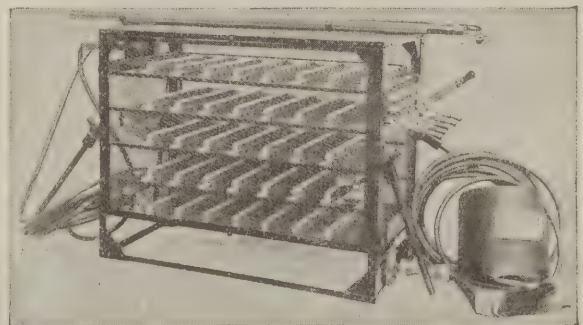
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Bowerston, Ohio

A track-shifting kink

When you shift the track, call the welder. Go over the bonds. Be sure of the welds. Good bonds are purely in the jewelry class unless they are properly welded to the rail. The secret of good welding is a good welder. Here's one that has made good—

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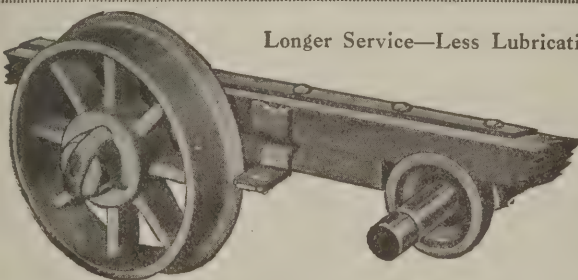
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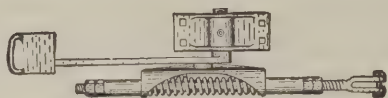


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THE SENSENICH TRUCK

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Switch Stand With Spring
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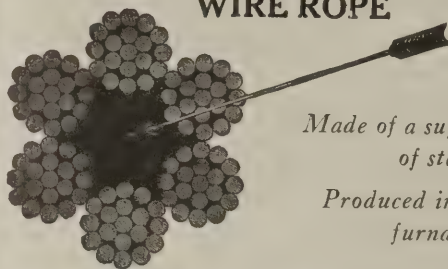
Write for full particulars

**THE CENTRAL
FROG & SWITCH CO.**
CINCINNATI, OHIO

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MINE TRACK EQUIPMENT

BLUE CENTER STEEL WIRE ROPE



Made of a superior grade
of steel.

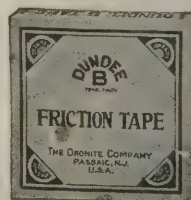
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Strength
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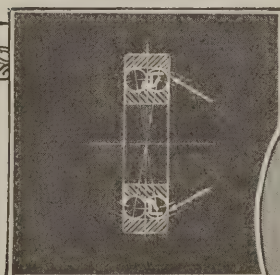
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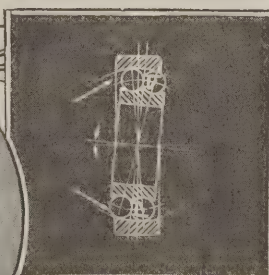
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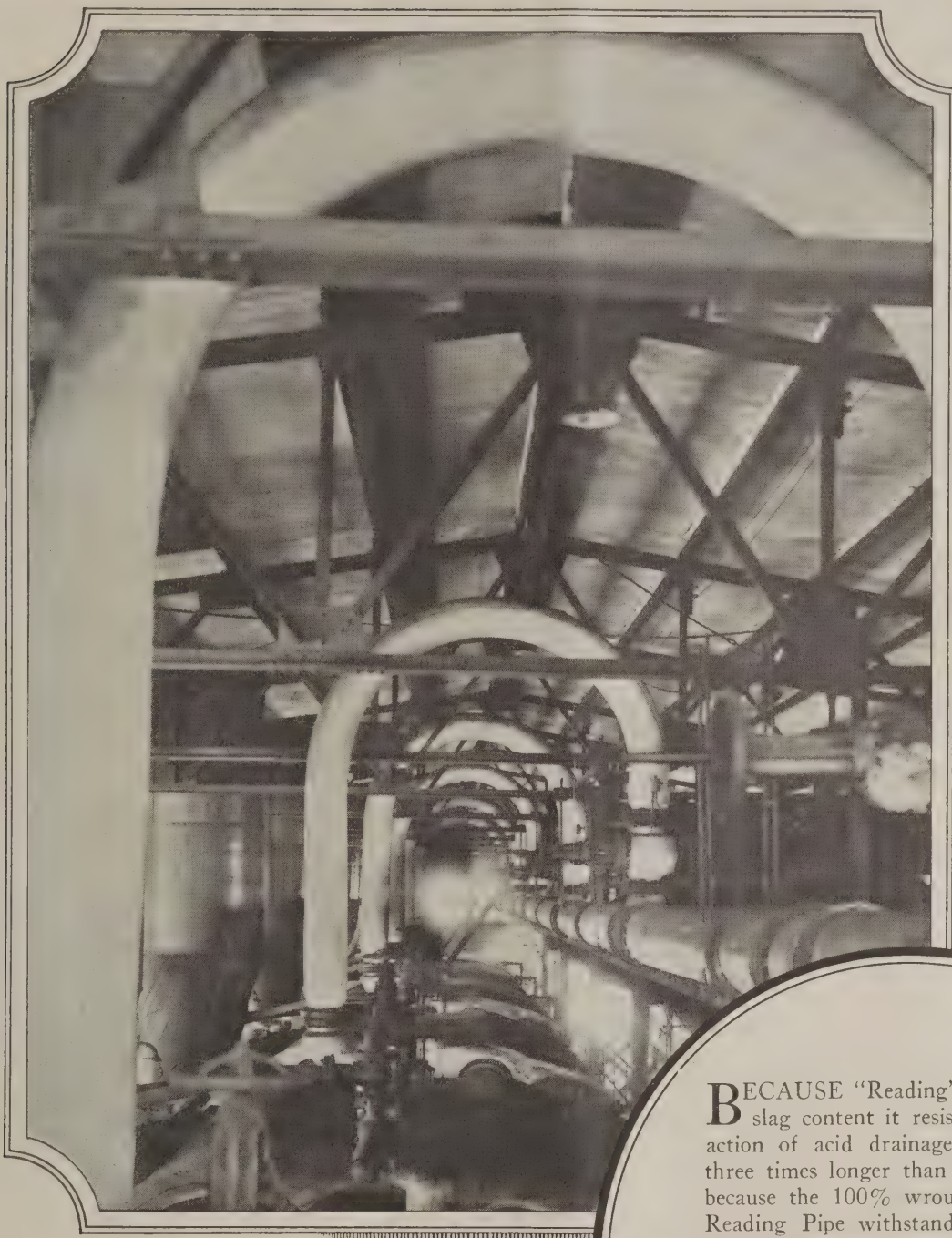


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we have only bought two mining machines cutting over 200
tons each day, 200 bits where difficult cutting is en-
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your chain.

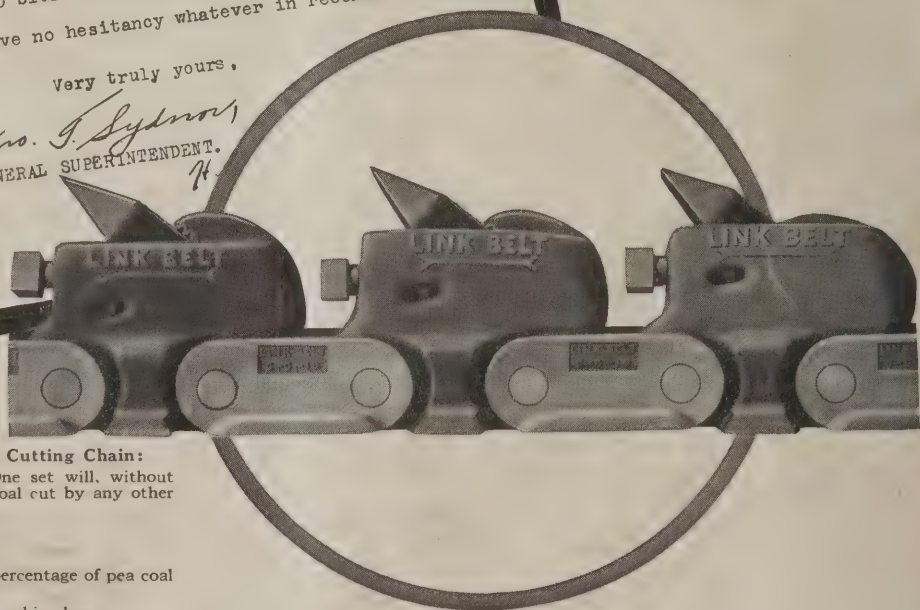
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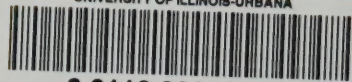
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